FLORA OF MADHYA PRADESH

Volume III

Editors : N.P. Singh • K.K. Khanna • V. Mudgal • R.D. Dixit

BOTANICAL SURVEY OF INDIA

ADHYA PRADESH
MORENA
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Khargone
Khandwa
25°
23°
75°
77°
79°
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100
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FLORA OF INDIA

Series - 2

FLORA OF MADHYA PRADESH

VOLUME III

ANGIOSPERMS
(Hydrocharitaceae to Poaceae)
and
GYMNOSPERMS

Editors
N.P. Singh
K.K. Khanna
V. Mudgal
R.D. Dixit

भारतीय वनस्पति सर्वेक्षण
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Front Jacket : **Saccharum spontaneum** L.
(Courtesy : K.K. Khanna)

Back Jacket : **Typha angustifolia** L.
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ABOUT THE PRESENT BOOK

The present book, the third and last volume of Flora of Madhya Pradesh, deals with an account of 706 species of angiosperms belonging to 241 genera and 37 families (Hydrocharitaceae to Poaceae) and 7 species of gymnosperms (mostly cultivated) under 5 genera and 4 families.

ABOUT THE FLORA OF MADHYA PRADESH VOLUME I

The first volume of Flora of Madhya Pradesh, published in 1993, deals with an account of 102 species of pteridophytes belonging to 51 genera and 36 families and 874 species of angiosperms belonging to 407 genera and 83 families (Ranunculaceae to Plumbaginaceae).

ABOUT THE FLORA OF MADHYA PRADESH VOLUME II

The second volume of Flora of Madhya Pradesh, published in 1997, deals with an account of 792 species of angiosperms belonging to 320 genera and 51 families (Primulaceae to Ceratophyllaceae).

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131. HYDROCHARITACEAE

(O.P. Misra and S.K. Srivastava)

About 16 genera and 100 species; cosmopolitan; 5 genera and 7 species in M.P.

1a. Stems present; leaves cauline:

2a. Leaves mostly whorled; stamens 3; styles undivided; stigma fimbriate ...2. *Hydrilla*

2b. Leaves scattered, fasciculate or subverticillate; stamens 2-3; styles notched; stigma not fimbriate ...3. *Lagarosiphon*

1b. Stems absent or plants with only stolons; leaves radical:

3a. Leaves linear, narrow, sessile; male peduncles many-flowered:

4a. Peduncles of female flowers spirally coiled; perianth 1-seriate ...5. *Vallisneria*

4b. Peduncles of female flowers not spirally coiled; perianth 2-seriate ...1. *Blyxa*

3b. Leaves linear-lanceolate to broadly ovate or suborbicular, distinctly petiolate; flowers solitary ...4. *Ottelia*

1. BLYXA Noronha *ex* Thouars

Herbs, submerged, tufted, acaulescent, stoloniferous. Leaves linear, acute, entire or minutely serrulate. Flowers unisexual or bisexual. Male flowers several in a tubular, 2-toothed spathe on long or short peduncles from the leaf axils. Sepals 3, linear. Petals 3, longer. Stamens 3-9, 1 or more rudimentary; anthers narrow, erect. Pistillodes 3, slender. Female flowers solitary in its spathe on peduncles as in male; hypanthium elongated above ovary. Perianth as in male. Staminodes absent or minute. Ovary very slender, beaked with the hypanthium; ovules many; style very short; stigmas 3, filiform. Fruit a capsule, fusiform, slender, included in the ventricose ribbed spine, many-seeded. Seeds with mucilaginous testa.

About 12 species; tropical regions of Old World; 3 in M.P.

1a. Flowers bisexual; stamens 3:

2a. Leaves 10-50 cm long; capsules 2.5-3.8 cm long; seeds with short tails ...1. *B. aubertii*

2b. Leaves 15-125 cm long; capsules 5-7.5 cm long; seeds with long tails ...2. *B. echinosperma*

1b. Flowers unisexual; stamens 9 ...3. *B. octandra*

1. Blyxa aubertii Rich. in Mem. Inst. Paris 12. 2: 19, 77. t. 4. 1812; Subram., Aquatic Angiosp. 59. 1962. *B. oryzetorum* (Decne.) Hook. *f.*, Fl. Brit. India 5: 661. 1888. *B. griffithii* Planch. *ex* Hook. *f.*, Fl. Brit. India 5: 661. 1888, *p.p. Diplosiphon oryzetorum* Decne. in Jacquem., Voy. Bot. 167. 1844.

Small herbs, slender. Leaves 10-50 x 0.5-1 cm, filamentous at apex, entire, finely serrulate or obscurely crenulate. Peduncles solitary or more, up to 40 cm long. Flowers bisexual. Petals linear, white with yellowish twisted ends. Stamens 3. Ovary long beaked. Capsules 2.5-3.8 cm long. Seeds ellipsoid, 1-2 mm long, with 8, longitudinal, tuberculate ribs, with a short tail.

In ponds. Bilaspur, Rajnandgaon. *Fl. & Fr.*: Oct. March.

2. Blyxa echinosperma (C.B. Clarke) Hook. *f.*, Fl. Brit. India 5: 661. 1888; Subram., Aquatic Angiosp. 59. 1962. *Hydrotrophus echinospermus* C.B. Clarke in J. Linn. Soc. London (Bot.) 14: 8. t. 1. 1875. *Blyxa echinospermoides* Blatt. in J. Proc. Asiat. Soc. Bengal (N. S.) 26: 354. 1931. *B. talboti* Hook. *f.*, Fl. Brit. India 5: 661. 1888.

Herbs, annual. Leaves variable in length, 15-125 x 1-1.4 cm, very finely acuminate; nerves 5, prominent. Flowers bisexual. Spathe long, linear, opening with a slit on one side, produced and tubular above the flower. Sepals greenish, obtuse. Petals white, often spirally twisted at the tip. Stamens 3. Capsules 5-7.5 x 0.4 cm, terete. Seeds *ca* 1.3 cm long, spinescent, with a long, filiform tail.

In shallow and deep water. Surguja. *Fl. & Fr.*: Feb.

3. **Blyxa octandra** (Roxb.) Planch. *ex* Thwaites, Enum. Pl. Zeyl. 332. 1864; Subram., Aquatic Angiosp. 60. 1962. *Vallisneria octandra* Roxb., Pl. Coromandel 2: 34. t. 165. 1802. *Blyxa roxburghii* Rich. in Mem. Inst. Paris 12, 2: 77. t. 5. 1812; Hook.*f.*, Fl. Brit. India 5: 660. 1888. *B. griffithii* Planch. *ex* Hook.*f.*, Fl. Brit. India 5: 661. 1888, *p.p.*

Herbs, dioecious. Leaves 10-50 x 0.5-1 cm, subentire or serrulate. Flowers unisexual. Male spathe tubular. Male flowers white. Petals linear. Stamens 9. Female spathe stouter. Petals filiform. Capsules 5-10 x 0.4 cm. Seeds tuberculate, acute or shortly tailed.

In shallow water of ponds and streams. Bilaspur, Raigarh, Raipur, Rajnandgaon. *Fl. & Fr.*: Sept. Feb.

2. HYDRILLA Rich.

Herbs, submerged, dioecious. Leaves 3-4-nately whorled or the lower opposite. Flowers unisexual. Male flowers solitary in subglobose, muricate spathe. Sepals 3, ovate or obovate, green. Petals 3, oblong or cuneiform. Stamens 3; anthers large, reniform, opening elastically. Pistillode minute. Female flowers 1-2 in a tubular, 2-toothed spathe. Sepals 3, linear, green. Petals 3, narrow. Ovary produced beyond the spathe into a filiform beak, 1-locular; styles 2-3, linear, undivided; stigmas fimbriate. Fruits subulate, smooth or muricate. Seeds 2-3, oblong, minute.

A monotypic genus; Old World.

Hydrilla verticillata (L.*f.*) Royle, Ill. Bot. Himal. Mts. t. 376. 1839; Hook.*f.*, Fl. Brit. India 5: 659. 1888; Subram., Aquatic Angiosp. 55. 1962. *Serpicula verticillata* L. *f.*, Suppl. Pl. 416. 1782. *Hydrilla polysperma* Blatt. in J. Proc. Asiat. Soc. Bengal (N. S.) 26: 356. 1931.

Herbs, perennial. Leaves 3-8 in a whorl, linear-oblong, 5-12 x 1.5-3 mm, entire or serrulate, with a strong midrib, sessile. Flowers minute, unisexual. Male flowers shortly pedicellate. Sepals ovate, green. Petals oblong. Female flowers sessile. Sepals and petals as in male, narrow. Fruits *ca* 5 mm long, shortly apiculate at both ends.

Common in fresh water ponds, ditches, rivers and tanks, often forming dense masses. Bilaspur, Damoh, Raigarh, Raipur, Sagar, Seoni, Shivpuri. *Fl. & Fr.*: Nov. - April.

3. LAGAROSIPHON Harv.

Herbs, submerged, dioecious. Leaves scattered, fasciculate or subverticillate, the lower ones sometimes opposite, serrulate. Flowers unisexual. Male flowers minute, many in an ovoid, 2-fid, axillary, sessile spathe. Perianth 2-seriate. Stamens 2-3, ovoid; 3 staminodes often present. Pistillode absent. Female flowers solitary, sessile in a narrow oblong spathe. Hypanthium produced into a long, filiform beak above the ovary. Perianth as in male. Staminodes absent. Ovary oblong; ovules many; styles 3, stout, notched. Fruits ovoid, oblong or linear; pericarp membranous. Seeds numerous.

About 9 species; tropical Africa and Madagascar; one in M.P.

Lagarosiphon alternifolia (Roxb.) Druce in Rep. Bot. Exch. Cl. Brit. Is. 1916: 630. 1917. *Vallisneria alternifolia* Roxb., Pl. Coromandel 2: t. 165. 1802 & Fl. Ind. 3: 750. 1832. *Nechamandra alternifolia* (Roxb.) Thwaites, Enum. Pl. Zeyl. 332. 1864; Subram., Aquatic Angiosp. 56. 1962. *N. roxburghii* Planch. in Ann. Sci. Nat. ser. 3, 11: 78. 1849. *Lagarosiphon roxburghii* (Planch.) Benth. in Benth. & Hook. *f.*, Gen. Pl. 3: 451. 1883; Hook. *f.*, Fl. Brit. India 5: 659. 1888. **Fig. 1.**

Herbs, annual, submerged, dioecious. Leaves linear, 1.5-3 cm long, acute, minutely serrulate, many-nerved, sessile. Male flowers minute, crowded in axillary, ovoid, 2-fid, sessile spathe. Outer tepals 3, enclosing 2, smaller inner tepals. Female flowers solitary, sessile, in tubular, 3-4 mm long, 2-fid spathe. Perianth pinkish, tubular, 3-lobed. Fruit an utricle, ovoid, indehiscent, enclosed in the spathe.

Usually in stagnant water. Bilaspur, Morena, Rajnandgaon. *Fl. & Fr.*: Nov. - April.

4. OTTELIA Pers.

Herbs, submerged or partially floating in fresh water. Roots fibrous. Leaves radical, crowded, of 2 forms; submerged leaves narrow, shortly petiolate; floating ones ovate, lanceolate or suborbicular, broad, long petiolate. Flowers solitary, bisexual, sessile, within a tubular, long pedunculate spathe. Sepals 3, linear or oblong. Petals 3, obovate or orbicular, longer than the sepals, with fleshy basal appendages. Stamens

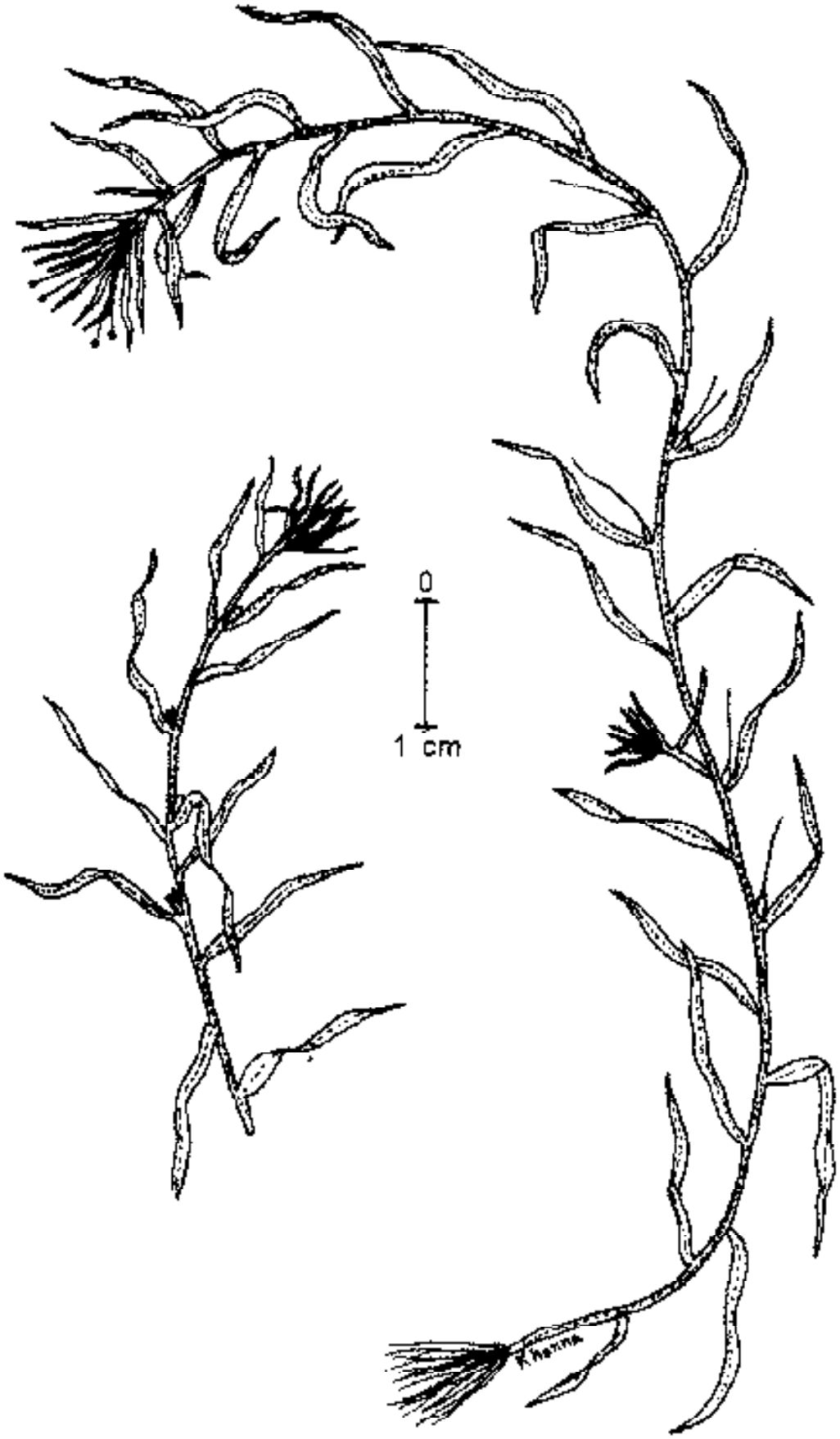

Fig. 1. Lagarosiphon alternifolia (Roxb.) Druce

6-15 in 2-5 series; anthers erect. Ovary oblong, beaked; ovules many; styles 6, linear, 2-fid. Fruits oblong or ellipsoid, enclosed in a spathe, 3-6-winged. Seeds many, oblong.

About 40 species; tropical and subtropical regions especially of Old World; one in M.P.

Ottelia alismoides (L.) Pers., Syn. Pl. 1: 400. 1805; Hook. *f.*, Fl. Brit. India 5: 662. 1888; Subram., Aquatic Angiosp. 61. 1962. *Stratiotes alismoides* L., Sp. Pl. 535. 1753.

Herbs, annual, submerged to partly floating and rooting in mud. Floating leaves broadly ovate or suborbicular, 5-20 x 3-15 cm, rounded, acute or acuminate at apex, cordate-truncate at base, undulate, 3-11-nerved; submerged leaves linear-lanceolate. Spathe 2.5-3.5 cm long, tubular, with 6 undulate margins. Sepals linear-oblong, 1-1.5 cm long. Petals white with yellow base, obovate-orbicular, 2-3 cm long. Fruits ellipsoid, 2.5-5 cm long, 6-valved, enclosed in the spathe. Seeds oblong, minute.

Common in ponds, lakes and roadside ditches. Balaghat, Bilaspur, Morena, Raigarh, Raisen, Rajnandgaon, Sagar, Satna, Shivpuri, Sidhi, Surguja. *Fl. & Fr.*: Oct. March.

5. VALLISNERIA L.

Herbs, submerged, tufted, dioecious, acaulescent, stoloniferous. Leaves very long. Flowers unisexual, the male many, minute in an ovoid, 3-lobed, shortly pedunculate spathe; the female solitary in a tubular, 3-toothed spathe, terminal on long, filiform, spiral peduncle. Sepals 3. Petals absent. Male flowers: Stamens 1-3; filaments thick; anthers didymous. Pistillode absent. Female flowers: Staminodes 3, each 2-fid. Ovary narrow, not produced upwards; ovules numerous; styles 3, splitted into broad stigmatic lobes. Fruits linear, included in the spathe. Seeds numerous, oblong.

About 8 species; tropical and subtropical regions; one in M.P.

Vallisneria natans (Lour.) Hara in J. Jap. Bot. 49: 136. 1974. *Physkium natans* Lour., Fl. Cochinch. 2: 662. 1790. *Vallisneria spiralis auct. non* L., 1753: Hook. *f.*, Fl. Brit. India 5: 660. 1888, *p.p.*; Subram., Aquatic Angiosp. 57. 1962.

Herbs, annual, rooting in mud. Leaves radical, linear, 5-40 x 0.3-0.8 cm, obtuse, 3-9-nerved, sheathing at base. Male flowers many in 5-6 mm long spathe. Sepals 3, ovate-oblong. Petals absent. Female flowers solitary in a tubular, 3-toothed spathe; peduncles *ca* 1 cm long, filiform. Fruits 5-7 cm long.

Common in muddy bottom of ponds and ditches. Balaghat, Bastar, Bilaspur, Gwalior, Indore, Raigarh, Raipur, Sagar, Seoni, Shivpuri, Sidhi, Tikamgarh. *Fl.* & *Fr.*: Dec. Feb.

132. BURMANNIACEAE

(Ram Lal)

About 21 genera and 165 species; tropical regions of both hemispheres; one species in M.P.

BURMANNIA L.

Herbs, annual, erect. Stems simple or branched. Leaves ensiform, acuminate at apex; radical leaves sometimes reduced to scales or absent. Flowers solitary or few, fascicled or unilateral on branches of forked cyme, bisexual, bracteate, pedicellate. Perianth persistent, 2-seriate, tubular at base; outer series 3-lobed, with narrow wings; inner series 3-lobed, smaller or sometimes obsolete; tube 3-winged. Stamens 3, sessile or subsessile; anther cells separated by a broad connective, dorsally crested and spurred at base, inserted on the mouth of perianth-tube, dehiscing laterally by transverse slits. Ovary inferior, 3-locular; ovules on axile placentae; style short or nearly equal to perianth-tube; stigma 3-lobed. Fruit a capsule, more or less 3-winged. Seeds minute, oblong or subglobose.

About 57 species; subtropical regions; one in M.P.

Burmannia coelestis D. Don, Prodr. Fl. Nepal. 44. 1825; Hook. *f.*, Fl. Brit. India 5: 665. 1888; Hajra in Fasc. Fl. India 19: 9. 1988.

Herbs, slender, usually unbranched, 5-20 cm high. Stems simple, slightly margined, glabrous. Leaves both radical and cauline, elliptic or linear-lanceolate, scale-like, 4-10 x 1-1.5 mm. Flowers 1-3 in a cluster, *ca* 7 mm across; pedicels 2-4 mm long; bracts lanceolate, 2-4 x 1-1.5 mm. Perianth

purplish blue with yellow blotches; outer lobes *ca* 6 x 3 mm, adnate to ovary; inner lobes ovate, *ca* 2 x 1.5 mm. Ovary oblong or ovoid, *ca* 2 mm long; ovules many. Capsules obovoid, dehiscing transversely.

Balaghat, Bilaspur, Raigarh, Raipur, Surguja. *Fl.* & *Fr.*: Sept. April.

133. ORCHIDACEAE

(K.K. Khanna)

About 795 genera and 17,500 species; cosmopolitan; 34 genera and 89 species in M.P.

1a. Plants epiphytic:

2a. Leaves equitant, ensiform ...20. *Oberonia*

2b. Leaves otherwise:

3a. Leaves 1-2:

4a. Lateral sepals adnate to foot of column forming a mentum; petals oblong-ovate; column with foot ...5. *Bulbophyllum*

4b. Lateral sepals not forming a mentum; petals linear; column without foot:

5a. Rhachis zigzag; sepals rounded, ovate or broadly ovate; labellum distinctly 3-lobed, saccate at base ...26. *Pholidota*

5b. Rhachis not zigzag; sepals oblong-lanceolate, linear-oblong, linear or lanceolate; labellum entire or obscurely lobed, not saccate at base ...16. *Liparis*

3b. Leaves more than 2:

6a. Labellum not spurred:

7a. Flowers with a mentum; column with a distinct foot:

8a. Pollinia 4; caudicle absent ...7. *Dendrobium*

8b. Pollinia 8; caudicle present ...10. *Eria*

7b. Flowers without a mentum; column with a very short, indistinct foot or without foot:

9a. Leaves terete, fleshy ...17. *Luisia*

9b. Leaves flat, membranous or coriaceous, not fleshy:

10a. Labellum entire or obscurely lobed; column winged; pollinia 4 ...16. *Liparis*

10b. Labellum distinctly 3-lobed; column unwinged; pollinia 2 ...6. *Cymbidium*

6b. Labellum spurred:

11a. Column with a distinct foot:

12a. Leaves terete; mid lobe of labellum 2-fid, lateral lobes forming a tube round the column ...22. *Papilionanthe*

12b. Leaves flat; mid lobe of labellum entire, lateral lobes not forming a tube round the column ...3. *Aerides*

11b. Column with an indistinct foot or without foot:

13a. Spur longitudinally septate ...23. *Pelatantheria*

13b. Spur not septate:

14a. Spur distant from the base of labellum ...29. *Rhynchostylis*

14b. Spur at the base of labellum:

15a. Flowers more than 2 cm across:

16a. Leaves membranous; flowers terminal; pollinia 8 ...31. *Thunia*

16b. Leaves coriaceous; flowers lateral; pollinia 2 or 4 ...33. *Vanda*

15b. Flowers up to 2 cm across:

17a. Plants up to 10 cm high:

18a. Mid lobe of labellum hairy or fimbriate ...12. *Gastrochilus*

18b. Mid lobe of labellum neither hairy nor fimbriate ...4. *Ascocentrum*

17b. Plants more than 10 cm high:

19a. Stems slender; mid lobeof labellum not lobulate; pollinia 4 ...28. *Pomatocalpa*

19b. Stems stout; mid lobe of labellum not lobulate; pollinia 2 or unequally 2-partite ...[1] *Acampe*

1b. Plants terrestrial:

20a. Leafless, either throughout or during flowering time or leafy only during flowering time:

21a. Leafless throughout:

22a. Labellum entire; spurred ...9. *Epipogium*

22b. Labellum 3-lobed, not spurred ...6. *Cymbidium* (*C. macrorhizon*)

21b. Leafless or leafy only during flowering time:

23a. Sepals and petals pubescent ...21. *Pachystoma*

23b. Sepals and petals glabrous:

24a. Leaves solitary, orbicular, broadly ovate, reniform-cordate or broadly infundibuliform ...19. *Nervilia*

24b. Leaves 2 or more, linear, oblong-lanceolate, broadly elliptic-lanceolate, broadly lanceolate or ovate-elliptic ...11. *Eulophia*

20b. Leafy throughout the plant life:

25a. Labellum spurred or saccate at base:

26a. Labellum spurred at base:

27a. Spur cylindrical:

28a. Lateral sepals connate at base, forming a mentum with the base of labellum; petals and dorsal sepal not forming a hood ...32. *Tropidia*

28b. Lateral sepals free, not forming a mentum; petals with the dorsal sepal forming a hood:

29a. Bracts not foliaceous; flowers 2-3 cm across ...15. *Habenaria*

29b. Bracts foliaceous; flowers *ca* 5 cm across ...27. *Platanthera*

27b. Spur globose, ellipsoid, scrotiform or conical:

30a. Pollinia 8:

31a. Leaves distichous, not plaited ...31. *Thunia*

31b. Leaves not distichous, plaited ...25. *Phaius*

30b. Pollinia 2:

32a. Inflorescence lateral, on a separate leafless shoot ...11. *Eulophia*

32b. Inflorescence terminal, on a central leafy shoot ...24. *Peristylus*

26b. Labellum saccate at base:

33a. Inflorescence terminal, glandular pubescent; pollinia granular ...34. *Zeuxine*

33b. Inflorescence lateral, glabrous; pollinia waxy:

34a. Inflorescence erect; labellum inferior ...11. *Eulophia*

34b. Inflorescence decurved; labellum superior ...13. *Geodorum*

25b. Labellum neither spurred nor saccate at base:

35a. Flowers solitary in the axil of leaves, progressively reduced in size upwards ...8. *Epipactis*

35b. Flowers in racemes or spikes:

36a. Inflorescence lateral or axillary; column long:

37a. Sepals connate forming a swollen tube; foot long; pollinia 8 ...2. *Acanthephippium*

37b. Sepals free; foot very short or absent; pollinia 2-4 ...6. *Cymbidium*

36b. Inflorescence terminal; column short:

38a. Dorsal sepal forming a hood with lateral petals; margin of sepals and petals not curved:

39a. Leaves radical, linear-lanceolate, up to 0.7 cm broad; labellum geniculate at the middle, glabrous inside (but with thickenings), with basal calli ...30. *Spiranthes*

39b. Leaves cauline, ovate or elliptic, 2.8-4.5 cm broad; labellum not geniculate, glandular or bristly hairy inside, with subterminal calli ...14. *Goodyera*

38b. Dorsal sepal and lateral petals distinct, not forming a hood; margin of sepals and petals revolute, reflexed, recurved or incurved:

40a. Labellum superior; column straight ...18. *Malaxis*

40b. Labellum inferior; column incurved ...16. *Liparis*

1. ACAMPE Lindl., *nom. cons.*

Herbs, epiphytic. Roots stout, vermiform. Stems stout, thick, covered with leaf sheaths. Leaves distichous, obliquely 2-lobed at apex, coriaceous,

lorate or ligulate. Flowers in few to many-flowered panicles, small, fragile; peduncles with cupular sheaths; bracts short, persistent. Sepals fleshy, brittle, flat; dorsal sepal slightly larger than the lateral ones; lateral sepals adnate to the small spur of the labellum. Petals resemble sepals, straight. Labellum thick, 3-lobed, saccate or spurred; mid lobe fleshy; lateral lobes small or absent. Column short, stout, without foot. Anthers 2-celled; pollinia 2, globose, waxy, entire or unequally 2-partite, on a long caudicle; gland oblong, small. Fruit a capsule.

About 12 species; Indo-Malesia to Africa; 3 in M.P.

1a. Stems *ca* 10 cm long; mid lobe of labellum rhomboid ...1. *A. congesta*

1b. Stems more than 20 cm long; mid lobe of labellum ovate-oblong or oblong:

2a. Stems 50-70 cm long; spur conical to cylindrical; mid lobe of labellum narrowly ovate ...2. *A. papillosa*

2b. Stems 20-30 cm long; spur rounded; mid lobe of labellum broadly ovate or rounded ...3. *A. praemorsa*

1. Acampe congesta Lindl., Fol. Orchid. Acampe 2. 1853. *Saccolabium congestum* (Lindl.) Hook. *f.*, Fl. Brit. India 6: 63. 1890.

Epiphytes. Stems short, *ca* 10 cm long, very stout. Leaves narrowly strap-shaped, 15-20 cm long, unequally 2-lobed at apex with a mucro in between. Flowers crowded, white, with yellow and purple tinge; peduncles 4-5 cm long, with short internodes. Sepals and petals oblong. Labellum white with red stripes, 3-lobed, with two tubercles at base; mid lobe rhomboid with acute angles, papillose above; lateral lobes small; spur shortly conical, hairy inside.

Surguja (Tiwari and Maheshwari, 1963). *Fl. & Fr.*: Aug. Dec.

2. Acampe papillosa (Lindl.) Lindl., Fol. Orchid. Acampe 2. 1853; Khanna *et al.* in *J. Econ. Tax. Bot.* 23(3): 711. 1999. *Saccolabium papillosum* Lindl. in Edward's Bot. Reg. 18: t. 1552. 1833; Hook. *f.*, Fl. Brit. India 6: 63. 1890.

Epiphytes. Stems erect, stout, clustered, 50-70 cm long. Leaves conduplicate, curved, 7.5-10 x 1.3-1.6 cm, truncate or obliquely notched at apex, coriaceous, fleshy. Flowers in 4-8-flowered, subcorymbose racemes, fragrant; peduncles simple, leaf-opposed. Sepals spreading, yellow, oblong, subequal. Petals yellow with brown blotches, subspathulate, narrower than sepals. Labellum adnate to the base of column, longer than sepals, 3-lobed; mid lobe white with purple streaks, ovate-oblong, decurved, crenate; lateral lobes very small or absent; disk transversely rugulose; spur pale yellow, cylindrical, hairy inside. Capsules fusiform, ridged.

Surguja. *Fl. & Fr.*: Oct. Dec.

3. Acampe praemorsa (Roxb.) Blatter & McCann in J. Bombay Nat. Hist. Soc. 35: 495. 1932. *Epidendrum praemorsum* Roxb., Pl. Coromandel 34. t. 43. 1795. *Saccolabium praemorsum* (Roxb.) Hook. *f.*, Fl. Brit. India 6: 62. 1890. *S. wightianum* (Lindl.) Hook. *f.*, Fl. Brit. India 6: 62. 1890. *Acampe wightiana* Lindl., Fol. Orchid. Acampe 2: 95. 1853. *Vanda wightiana* Lindl. *ex* Wight, Icon. Pl. Ind. Orient. 5(1): 9. t. 1670. 1851.

Epiphytes. Stems stout, sheathed with leaf bases, up to 30 cm long. Leaves alternate, distichous, oblong, 15-20 x 1.7-2.5 cm, emarginate with unequally deeply cleft at apex, entire, coriaceous. Flowers in corymbose panicles; peduncles stout, with minute, cupular bracts. Sepals and petals more or less similar, coriaceous; dorsal sepal obovate-oblong, mucronulate; lateral sepals oblong-ovate. Petals creamy yellow with pinkish stripes, oblanceolate-spathulate. Labellum 3-lobed, saccate, fleshy; mid lobe ligulate, more or less reflexed; lateral lobes small, erect. Column with 2, erect, terminal horns. Capsules subcylindrical, longitudinally ribbed.

On *Mangifera indica* and other trees in deciduous forests. Mandla, Raigarh. *Fl. & Fr.*: Aug. Dec.

2. ACANTHEPHIPPIUM Blume

Herbs, terrestrial. Stems pseudobulbous; pseudobulbs conical, sheathed, articulate, exposed. Leaves plaited, articulate, large, convolutive mostly towards apex, shortly petiolate. Flowers in lateral, erect racemes arising from the young pseudobulb, large, resupinate. Sepals connate to form a swollen tube, with short, free, recurved tips; lateral sepals adnate to the

long, curved foot of column forming a saccate mentum. Petals free, more or less spathulate, narrow, as long as sepals. Labellum saddle-shaped, small, mobile, 3-lobed; mid lobe recurved; lateral lobes erect. Column rather long; foot very long, spurred or not. Anthers 4-celled; pollinia 8, in 2 bundles of 4 each, waxy, unequal. Fruit a capsule.

About 15 species; tropical Asia to Fiji; 2 in M.P.

1a. Petals yellowish white with pink dots; lateral lobes of labellum hatchet-shaped ...1. *A. bicolor*

1b. Petals pale pink with red lines; lateral lobes of labellum not hatchet-shaped ...2. *A. striatum*

1. Acanthephippium bicolor Lindl. in Edward's Bot. Reg. 20: t. 1730. 1835; Hook. *f.*, Fl. Brit. India 5: 815. 1890.

Large herbs, terrestrial. Pseudobulbs ovoid or fusiform, *ca* 9 cm long, stout, fleshy, with persistent sheaths. Leaves 2 or 3, broadly elliptic or ovate-oblong, unequal in size, 20-35 x 7-9.5 cm, acute-acuminate at apex, narrowed to sheathing petiole. Flowers in short, 3-flowered racemes, fleshy; racemes arising from the axil of scale at about the base or from the top of new pseudobulb, enveloped in foliaceous scaly sheath; bracts foliaceous, cymbiform. Sepals fusiform, forming a pitcher-like calyx-tube; dorsal sepal oblong, cohering with the lateral sepals; lateral sepals obliquely oblong, fused with the foot forming the base of pitcher. Petals yellowish white with pink dots, spathulate, erect, fleshy. Labellum 3-lobed, jointed to a long, recurved foot. Column subcylindrical, stout. Capsules green, ellipsoid, 8-10 cm long, ridged, long stipitate.

Bastar. *Fl. & Fr.*: Dec. Feb.

2. Acanthephippium striatum Lindl. in Edward's Bot. Reg. Misc. 24: 45. 1838; Hook. *f.*, Fl. Brit. India 5: 816. 1890.

Large herbs, terrestrial. Pseudobulbs elongate-obpyriform, 7.5-10 x 4-5 cm, with violet-streaked sheaths. Leaves 2-3, elliptic, 18-25 x 6-10 cm, acuminate at apex, 5-nerved. Flowers in subcapitate racemes borne on stout peduncles; bracts large, cymbiform. Dorsal sepal oblong, obtuse; lateral sepals ovate-triangular, acute, forming a conical mentum. Petals pale pink with bold red lines, oblong-spathulate, concealed by the sepals.

Labellum pale pink with bold red lines, oblong, concealed, 3-lobed, shortly clawed; mid lobe triangular, small; lateral lobes triangular-falcate. Column foot with a short, obtuse spur.

Bastar (Mooney, 1942; Tiwari and Maheshwari, 1963). *Fl.*: July - Aug.

3. AERIDES Lour.

Perennials, epiphytic. Stems usually long, stout, sheathed with leaf bases. Leaves alternate, distichous, flat, spreading, sheathing at base, coriaceous, sessile. Flowers in few to many-flowered leaf-opposed racemes or panicles, fragrant. Sepals and petals similar, spreading; lateral sepals slightly oblique, decurrent on the column foot. Labellum adnate to column foot, 3-lobed, sessile, spurred; mid lobe spreading; lateral lobes small; spur usually bent forwards. Column short, thick, wingless, with a foot. Anthers 2-celled, terminal; pollinia 2, globose, waxy, with long, narrow caudicles; gland small. Fruit a capsule, ribbed.

About 40 species; tropical Asia, E. Asia and W. Malesia; 3 in M.P.

1a. Lateral lobes of labellum smaller than mid lobe:

2a. Sepals obovate-orbicular; spur hook like, curved ...1. *A. maculosum*

2b. Sepals oblong; spur conical, straight ...2. *A. multiflorum*

1b. Lateral lobes of labellum larger than mid lobe ...3. *A. odoratum*

1. **Aerides maculosum** Lindl. in Edward's Bot. Reg. 31: t. 58. 1845; Hook. *f.*, Fl. Brit. India 6: 45. 1890. *Saccolabium speciosum* Wight, Icon. Pl. Ind. Orient. 5(1): 9. t. 1674-1675. 1851.

Epiphytes. Leaves channelled, linear-oblong or oblong, 13-23 x 2-3 cm, green mottled with purple, with 2, unequal, rounded lobes at apex. Flowers in simple or branched, up to 24 cm long racemes, pedicellate; peduncles terete, stout, sheathed; bracts minute, ovate. Sepals obovate-orbicular, subequal; lateral sepals mucronulate. Petals faintly pinkish white, oblong-elliptic. Labellum straight, 3-lobed; mid lobe deep rosy pink, finely crisped on margin; lateral lobes pinkish white, smaller than mid lobe, spreading; spur hook like, curved downwards. Column pink, oblong. Capsules 3-5 cm long, strongly ribbed.

In open deciduous forests on *Terminalia* sp., *Acacia catechu* and *Mangifera indica*. Bastar (Tiwari and Maheshwari, 1963). *Fl. & Fr.*: May Sept.

2. Aerides multiflorum Roxb., Pl. Coromandel 3: 68. t. 271. 1820 & Fl. Ind. 3: 475. 1832; Hook. *f.*, Fl. Brit. India 6: 44. 1890.

Epiphytes, 10-20 cm high. Stems suberect. Leaves conduplicate, linear-oblong, 11-24 x 1.5-2 cm, recurved, obtuse, 2-fid at apex, sheathing at base. Flowers in axillary, simple, densely many-flowered, drooping racemes; peduncles stout, sheathed. Sepals and petals more or less similar, pink with dark pink spots, oblong, fleshy. Labellum adnate to the base of column, triangular, twice as long as the sepals; mid lobe with a fleshy, 2-lobed callus at base; lateral lobes small; spur conical, straight. Column with thickened margins; foot short. Anthers beaked. Capsules subclavate, *ca* 2 cm long, stipitate.

On a number of trees like *Shorea robusta, Mangifera indica, Diospyros* sp. and *Madhuca longifolia*. Balaghat, Bastar, Bilaspur, Hoshangabad, Raigarh, Sidhi, Surguja. *Fl. & Fr.*: July - March.

3. Aerides odoratum Lour., Fl. Cochinch. 2: 525. 1790; Hook. *f.*, Fl. Brit. India 6: 47. 1890.

Epiphytes, *ca* 20 cm high. Leaves flat, linear-oblong, 8-15 x 2-3 cm, unequally 2-fid at apex, not contracted at the sheathing base, thick. Flowers in lateral, supra-axillary, many-flowered, arched or pendulous racemes; racemes 1-3, with short, distant sheaths; bracts broad, sheathing. Sepals obovate, spreading; lateral sepals larger. Petals pinkish white, oblong, falcate, shorter than sepals, rounded at apex. Labellum adnate to the short foot of column, 3-lobed; lateral lobes larger than mid lobe, obtuse; spur stout, recurved. Anthers beaked. Capsules fusiform, *ca* 2 cm long, winged.

On *Shorea robusta*. Raigarh, Surguja. *Fl. & Fr.*: Nov. April.

4. ASCOCENTRUM Schlechter *ex* J.J. Sm.

Herbs, epiphytic. Leaves unequally 2-lobed at apex, fleshy. Flowers in many-flowered, erect or drooping racemes, small. Sepals and petals similar. Labellum immovably fixed to the base of column, 3-lobed, spurred; mid lobe tongue-shaped, larger than lateral lobes, pointing forwards or

downwards; lateral lobes triangular or rounded, small, erect; spur shorter than ovary and pedicel, with a small thickening at its mouth at the base of the mid lobe, without keels. Column short, without foot. Pollinia 2, cleft, on a short, narrow or widened caudicle. Fruit a capsule.

About 5 species; S.E. Asia to Borneo; one in M.P.

Ascocentrum micranthum (Lindl.) Holttum, Gard. Bull. Sing. 11: 275. 1947. *Saccolabium micranthum* Lindl., Gen. Sp. Orchid. Pl. 220. 1833; Hook. *f.*, Fl. Brit. India 6: 59. 1890. *Cleisostoma micranthum* King & Pantl. in Ann. Roy. Bot. Gard. Cal. 8: 234. t. 312. 1898. *Saccolabium fissum* Ridl. in J. Linn. Soc. London (Bot.) 32: 361. 1896.

Small herbs, epiphytic, erect, 8-10 cm high. Leaves up to 11 x 1.5 cm, rather deeply and unequally 2-lobed at tip; lobes rounded. Flowers in horizontal or drooping, up to 7 cm long racemes. Sepals very broad, blunt at tips. Petals white with purple spots, as long as sepals but only half as broad. Labellum purple, 3-lobed, spurred; mid lobe oblong, fleshy, with a thickening at base; lateral lobes small, rounded; spur parallel to ovary and close to it, about as long as mid lobe. Column with swollen area on either side of the rostellum.

Surguja (Tiwari and Maheshwari, 1963). *Fl.*: June July.

5. BULBOPHYLLUM Thouars, *nom. cons.*

Epiphytes, with sympodial branches. Rhizomes creeping. Pseudobulbs globose or subglobose-ovoid, naked or covered with the remains of old sheaths, 1-articulate. Leaves 1 or 2, terminating pseudobulb, oblong, ovate or lanceolate, articulate, petiolate, sometimes caducous. Flowers in racemes, umbels or heads borne on a separate scape from the base of pseudobulb or rhizome, small to large, resupinate or not. Sepals unequal; dorsal sepal about half as long as lateral sepals; lateral sepals adnate to the foot of the column forming a short mentum. Petals smaller than sepals. Labellum tongue-shaped, mobile, hinged to the end of column foot, entire or 3-lobed, polymorphous, coriaceous or fleshy, strongly recurved. Column short, winged or toothed at apex, produced into a long, upcurved foot at base. Anthers 2-celled; pollinia 4. Fruit a capsule.

About 1200 species; tropical regions; one in M.P.

Bulbophyllum triste Rchb. *f.* in Walp., Ann. Bot. Syst. 6: 253. 1861; Hook. *f.*, Fl. Brit. India 5: 768. 1890. *B. micranthum* Hook. *f.*, Fl. Brit. India 5: 768. 1890. *B. alopecurum* Rchb. *f.* in Gard. Chron. 2: 70. 1880; Hook. *f.*, Fl. Brit. India 5: 770. 1890.

Small epiphytes. Rhizomes naked and leafless during flowering. Pseudobulbs globose-ovoid, small. Leaves 2 from each pseudobulb, narrowly oblong, 7-12 cm long, acute at apex, flaccid, subcoriaceous. Flowers in small, densely flowered racemes; scape slender, 14-17 cm long; floral bracts lanceolate, acute. Dorsal sepal oblong-ovate, concave, obtuse, 3-nerved; lateral sepals falcately oblong, obtuse, incurved on margins. Petals pink, ovate-oblong, shorter than dorsal sepal, 1-nerved. Labellum purple, oblong-lanceolate, obtuse, stipitate, convex.on upper surface and with a divided protuberance; spur slender. Column with apical processes; foot much curved.

Surguja (Tiwari and Maheshwari, 1963). *Fl.*: Feb. May.

6. CYMBIDIUM Sw.

Herbs, terrestrial or epiphytic. Roots tufted. Pseudobulbs short or elongate, covered with overlapping sheaths of leaf bases. Leaves long, narrow, erect or curved, coriaceous, jointed on sheaths. Flowers in axillary, few to many-flowered, erect or pendulous racemes, fleshy, resupinate. Sepals and petals free, narrow, more or less equal, wide spreading. Labellum small, 3-lobed, sessile on the base of column; mid lobe recurved. Column long, slender; foot very short or absent. Anthers 1 or imperfectly 2-celled; pollinia 2 or 4, subglobose, waxy, joined by a common caudicle or sessile; gland broad. Fruit a capsule.

About 40 species; tropical Asia to Australia; 3 in M.P.

1a. Plants epiphytic; racemes pendulous; foot very short ...1. *C. aloifolium*

1b. Plants terrestrial; racemes erect or suberect; foot absent:

2a. Plants leafy; mid lobe of labellum orbicular ...2. *C. ensifolium* var. *haematodes*

2b. Plants leafless; mid lobe of labellum oblong ...3. *C. macrorhizon*

1. Cymbidium aloifolium (L.) Sw. in Nova Acta Regiae Soc. Sci. Upsal. 6: 73. 1799; Hook. *f.*, Fl. Brit. India 6: 10. 1890. *Epidendrum aloifolium* L., Sp. Pl. 953. 1753. *Cymbidium aloefolium* Blume, Bijdr. 378. t. 19. 1825. *C. bicolor* Lindl., Gen. Sp. Orchid. Pl. 164. 1833; Hook. *f.*, Fl. Brit. India 6: 11. 1890. *C. erectum* Wight, Icon. Pl. Ind. Orient. 5(1): 21. t. 1753. 1851. *C. mannii* Rchb. *f.* in Flora 55: 274. 1872. **Fig. 2.**

Epiphytes, tufted. Roots vermiform. Pseudobulbs covered with sheaths of leaf bases. Leaves oblong, 22-30 x 2-2.5 cm, unequally or obtusely 2-lobed at apex, coriaceous, stout, with a prominent midnerve. Flowers in 20-30 cm long, pendulous racemes, pedicellate; bracts minute, persistent. Sepals lanceolate, acute, entire, spreading; lateral sepals falcate. Petals yellow, vinaceous in the centre, oblong or lanceolate, erect, acute. Labellum 1.6-1.8 cm long, 3-lobed, saccate; mid lobe yellow with purple stripes, broadly ovate; lateral lobes mottled with brown-purple, oblong, entire; throat with 2 ridges and calli. Column clavate; foot very short. Pollinia 2, unequally 2-fid. Capsules ovoid to pyriform or ellipsoid.

On trees near water fall. Bastar. *Fl. & Fr.*: Feb. May.

2. Cymbidium ensifolium (L.) Sw. var. **haematodes** (Lindl.) Trimen, Syst. Cat. Fl. Pl. Ceylon 89. 1885; Jayaw. in Dassan. & Fosb., Rev. Handb. Fl. Ceylon 2: 186. 1981. *C. haematodes* Lindl., Gen. Sp. Orchid. Pl. 162. 1833. *C. cyperifolium* Wallich *ex* Lindl., Gen. Sp. Orchid. Pl. 163. 1833; Hook. *f.*, Fl. Brit. India 6: 13. 1890. *C. viridiflorum* Griff., Itin. Pl. Khasyah Mts. 126. 1848. *Limodorum longifolium* Roxb., Fl. Ind. 3: 468. 1832.

Terrestrials. Roots thick, vermiform. Stems covered with sheaths of leaf bases. Leaves radical, linear to lanceolate, 60-80 x 1.5-3 cm; lower leaves conduplicate, membranous; upper ones more or less erect, acute, scabrous on margins. Flowers in many-flowered, suberect racemes; bracts green, lanceolate, acute. Sepals oblong-lanceolate, subequal, 7-nerved. Petals dull yellow with pink nerves, lanceolate, acute, 9-nerved. Labellum *ca* 2 cm long, sessile at the base of column; mid lobe orbicular, revolute; lateral lobes rounded. Column incurved; foot absent. Pollinia 4, sessile in pairs on a gland, one of each pair smaller. Capsules *ca* 5 cm long.

On sandy soil of drainage bank. Bilaspur. *Fl. & Fr.*: Oct. Dec.

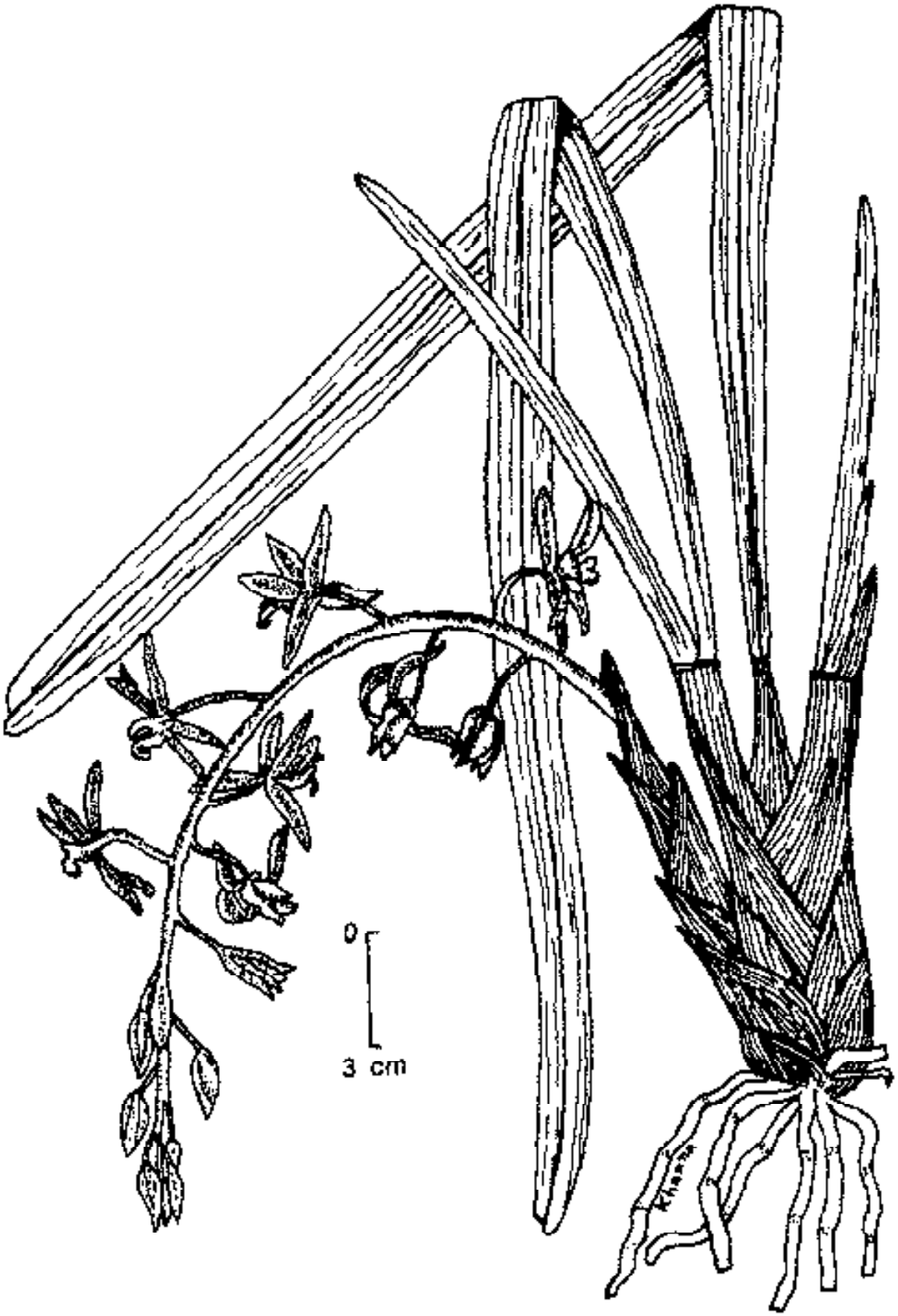

Fig. 2. Cymbidium aloifolium (L.) Sw.

3. Cymbidium macrorhizon Lindl., Gen. Sp. Orchid. Pl. 162. 1833; Hook. *f.*, Fl. Brit. India 6: 9. 1890.

Terrestrials, leafless. Rootstocks branched, creeping. Scape short, basal sheath conduplicate, *ca* 4 cm long. Flowers in 6-8-flowered, 10-15 cm long, erect racemes, pedicellate; bracts lanceolate, 1.5-2 cm long, foliaceous. Sepals yellow with pink tinge, linear-lanceolate, acuminate, spreading or reflexed. Petals whitish with pink streaks, shorter and broader than sepals. Labellum white with purple blotches along the margin, *ca* 2 cm long; mid lobe oblong, acute; lateral lobes narrow, erect, inflexed on margins. Column with crimson streaks on the inner surface, curved; foot absent. Pollinia 4, sessile.

In leaf litters of forest floor. Bilaspur, Surguja. *Fl. & Fr.*: July Nov.

7. DENDROBIUM Sw., *nom. cons.*

Epiphytes. Stems articulate, sympodial with elongate or pseudobulbous shoots. Leaves alternate on shoots or terminal on pseudobulbs, membranous or coriaceous, sessile. Flowers solitary, paired or in few to many-flowered racemes or clusters, leaf-opposed or terminal on pseudobulb. Sepals subequal; lateral sepals obliquely adnate by their bases to the column foot forming a mentum. Petals smaller or larger than sepals. Labellum mobile or immobile, entire or 3-lobed, contracted or clawed at base, usually with thickenings on the inner side; lateral lobes embracing the column; disk ridged or lamellate. Column short, angled or 2-toothed at apex, with a short or long foot. Anthers attached at the apex of column by a filament; pollinia 4, waxy, sessile, without caudicle, free or slightly adhering by a viscus. Fruit a capsule.

About 900 species; tropical and subtropical Asia to Australia and Pacific regions; 13 in M.P.

1a. Stems more than 1 m long:

2a. Petals orange-yellow; labellum without a pouch, deeply fringed ...4. *D. fimbriatum*

2b. Petals white with violet tips; labellum with a distinct pouch, not fringed ...9. *D. moschatum*

1b. Stems up to 1 m long:

3a. Inflorescence terminal raceme or both terminal and lateral racemes:

4a. Leaves ovate-oblong ...5. *D. formosum*

4b. Leaves linear-lanceolate:

5a. Petals yellow or greenish white; mentum not spurred ...6. *D. herbaceum*

5b. Petals white; mentum spurred ...13. *D. wightii*

3b. Inflorescence distinctly lateral, never terminal:

6a. Labellum trumpet-shaped:

7a. Plants pendulous; petals pale white or purple ...7. *D. lituiflorum*

7b. Plants erect or suberect; petals magenta or rosy purple ...11. *D. regium*

6b. Labellum otherwise:

8a. Petals yellow or greenish yellow:

9a. Petals broadly ovate; labellum reniform; capsules *ca* 4 cm long ...3. *D. denneanum*

9b. Petals lanceolate; labellum panduriform; capsules *ca* 2 cm long ...8. *D. macrostachyum*

8b. Petals pinkish white, light pink or pink-red:

10a. Stems stout; leaves coriaceous ...10. *D. nobile*

10b. Stems slender; leaves chartaceous or membranous:

11a. Bracts *ca* 2 mm long; sepals oblong or oblong-lanceolate:

12a. Petals oblong or elliptic; labellum as long as broad ...1. *D. aphyllum*

12b. Petals broadly ovate; labellum longer than broad ...2. *D. crepidatum*

11b. Bracts *ca* 6 mm long; sepals linear-lanceolate ...12. *D. transparens*

1. Dendrobium aphyllum (Roxb.) Fischer in Gamble, Fl. Madras 3: 1416. 1928; Hunt in Kew Bull. 24: 86. 1970. *Limodorum aphyllum* Roxb., Pl. Coromandel 1: 34. t. 41. 1795. *Cymbidium aphyllum* (Roxb.) Sw. in Nov. Acta Upsal. 6: 73. 1799. *Dendrobium cucullatum* R. Br. in Bot. Reg. 7: t. 548. 1821-1822. *D. pierardi* Roxb. in Hook., Exot. Fl. 1. t. 9. 1823; Hook. *f.*, Fl. Brit. India 5: 738. 1890.

Herbs, epiphytic, erect or pendulous. Stems slender, cylindrical, close together, 30-50 cm long. Leaves lanceolate or ovate-lanceolate, 2.5-5 x 1.5-2.5 cm, acuminate at apex, sheathing at base. Flowers solitary or 2-3, on short peduncles from the nodes; bracts minute, lanceolate, *ca* 2 mm long. Sepals oblong-lanceolate, subequal; mentum short, conical. Petals pinkish white, oblong or elliptic, as long as the sepals, obtuse. Labellum yellow, suborbicular or elliptic to oblong, entire, pubescent and ciliate, shortly clawed, convolute at base. Column more or less equal to foot in length; foot with a nectary at its extremity. Capsules greyish green, small.

In dense forests. Bastar. *Fl. & Fr.*: Dec. Feb.

2. Dendrobium crepidatum Lindl. in Paxt., Fl. Gard. 1: 63. f. 45. 1850; Hook. *f.*, Fl. Brit. India 5: 740. 1890.

Herbs, epiphytic, pendulous. Pseudobulbs greenish yellow, 8-20 cm long; internodes longitudinally striated. Leaves oblong-lanceolate, 4-11 x 0.5-1.5 cm, acuminate at apex, sheathing at base, membranous, glabrous. Flowers paired, from the nodes of apical parts of pseudobulbs, pedicellate; bracts minute, *ca* 2 mm long, scarious. Sepals oblong, entire, fleshy; mentum short. Petals pinkish white, broadly ovate, spreading, wavy. Labellum oblong-orbicular, rarely lobed, with a narrow claw at base, pubescent. Column oblong, 3-4 mm long; foot curved. Capsules clavate.

Bastar (Mooney, 1942; Tiwari and Maheshwari, 1963). *Fl. & Fr.*: March - April.

3. Dendrobium denneanum Kerr in J. Siam. Soc. Nat. Hist. Suppl. 9: 229. 1933; Hara *et al.* in Enum. Fl. Pl. Nepal 1: 39. 1978. *D. clavatum* Wallich *ex* Lindl. in Paxt., Fl. Gard. 2: 104. 1851, *non* Roxb., 1832; Hook. *f.*, Fl. Brit. India 5: 746. 1890.

Herbs, epiphytic. Stems stout, slightly clavate, leaf-bearing smooth while leafless sulcate. Leaves narrowly oblong or lanceolate, 8-12 x 1.8-2.5 cm,

acuminate or slightly notched at apex, coriaceous. Flowers in 4-5-flowered, horizontal or decurved racemes, rather distant on peduncle; racemes arising from leafless stem of previous year, two or three times as long as the peduncle; pedicels purple; bracts oblong, membranous, shorter than ovary. Sepals oblong, obtuse; mentum short. Petals yellow, broadly ovate, subacute. Labellum purple-pink with a yellow patch, reniform, undulate at apex, with small, convoluted base, tomentose on upper surface. Column and foot short. Capsules green, *ca* 4 cm long.

On *Shorea robusta*. Bastar, Bilaspur, Raigarh. *Fl. & Fr.*: Dec. May.

4. Dendrobium fimbriatum Hook., Exot. Fl. 1. t. 71. 1823; Hook. *f.*, Fl. Brit. India 5: 745. 1890.

Herbs, epiphytic, pendulous. Stems 1.2-1.5 m long. Leaves oblong-lanceolate, up to 15 cm long, acuminate at apex. Flowers in 7-12-flowered racemes. Sepals elliptic-oblong, subequal; mentum short. Petals orange-yellow, subequal. Labellum with 2 slightly confluent, orange-yellow or dark brown blotches, orbicular, deeply fringed, shortly clawed, truncate at base, hairy inside.

Surguja (Tiwari and Maheshwari, 1963). *Fl. & Fr.*: April - June.

5. Dendrobium formosum Roxb. in Wallich, Pl. Asiat. Rar. 1(2): 34. t. 39. 1830 & Fl. Ind. 3: 485. 1832; Hook. *f.*, Fl. Brit. India 5: 721. 1890.

Herbs, epiphytic, erect. Stems cylindrical, furrowed, 30-45 cm long, sheathed; sheaths pubescent. Leaves ovate-oblong, 6-9 x 2-3.2 cm, obliquely 2-lobed at apex, amplexicaul at base, glabrous. Flowers in terminal or subterminal, 3-6-flowered, 3-4 cm long racemes, pedicellate; bracts pale brown, lanceolate, pubescent. Sepals oblong-lanceolate, narrowed at apex, keeled at back. Petals white, suborbicular, broader than lateral sepals, apiculate, undulate on margins. Labellum white with yellow patch inside, obovate, entire or obscurely 3-lobed, with a column-clasping base, more or less crenate, with 2 tuberculate ribs; mid lobe dilate, retuse; lateral lobes small, rounded; disk pubescent. Column short. Capsules shining green, oblong or obovoid, *ca* 5 cm long, with two apical ridges.

On *Shorea robusta* and *Diospyros melanoxylon*. Surguja. *Fl. & Fr.*: Nov. March.

6. Dendrobium herbaceum Lindl. in Edward's Bot. Reg. Misc. 26: 69. 1840; Hook. *f.*, Fl. Brit. India 5: 719. 1890. *D. ramosissimum* Wight, Icon. Pl. Ind. Orient. 5(1): 6. t. 1648. 1851.

Herbs, epiphytic, erect or pendulous, much branched, usually leafless during flowering. Stems yellow, shining, ridged, up to 50 cm long. Leaves alternate, distichous, linear-lanceolate, 3-11 x 0.5-1.3 cm, acute or subobtuse at apex, sheathing at base. Flowers in terminal and lateral condensed, 2-4-flowered racemes, long pedicellate; bracts very small, hyaline. Sepals greenish white, with a minute mucro just below the apex; dorsal sepal oblong, obtuse; lateral sepals narrowly lanceolate-oblong, subfalcate, connate along the foot; mentum very short. Petals yellow or greenish white, spathulate, linear or linear-oblong. Labellum greenish white, oblong or curved, obscurely 3-lobed, reflexed at base, shallowly constricted about the middle, sparsely gland-dotted; mid lobe ovate; lateral lobes narrower or obsolete. Column greenish white. Capsules brownish green, narrowly fusiform, *ca* 2.5 cm long, stipitate.

As large clumps on *Shorea robusta, Terminalia alata, Madhuca longifolia* and *Diospyros melanoxylon*. Bastar, Bilaspur, Hoshangabad, Raigarh, Surguja. *Fl. & Fr.*: Sept. April.

7. Dendrobium lituiflorum Lindl. in Gard. Chron. 372. 1856; Hook. *f.*, Fl. Brit. India 5: 740. 1890.

Herbs, epiphytic, pendulous. Stems slender, terete, never clavate, 30-50 cm long; internodes with transparent sheaths. Leaves linear-lanceolate, 7.5-10 cm long, acute or acuminate at apex, chartaceous. Flowers in 1-5-flowered racemes borne on leafless stem; peduncle with a large bract. Sepals linear-oblong, subacute; mentum short, less than half as long as dorsal sepal, saccate. Petals purple or pale white, broadly elliptic. Labellum deep purple inside, with a broad white ring inside the purple margin, trumpet shaped, puberulous; mouth large, orbicular, from a wide base. Capsules ellipsoid, *ca* 3 cm long.

On *Shorea robusta* in sal forests. Bilaspur, Surguja. *Fl. & Fr.*: Nov. - April.

8. Dendrobium macrostachyum Lindl., Gen. Sp. Orchid. Pl. 78. 1830; Hook. *f.*, Fl. Brit. India 5: 735. 1890.

Herbs, epiphytic. Stems pseudobulbous, drooping, terete, zigzag, leafless during flowering. Leaves distichous, oblong or oblong-lanceolate, 4-6 x 0.8-1.5 cm, spreading, sessile. Flowers in 2-3-flowered clusters; bracts oblong-lanceolate, acute. Dorsal sepal elliptic-lanceolate, acute; lateral sepals obliquely lanceolate. Petals greenish yellow, lanceolate, acute. Labellum panduriform, obscurely 3-lobed; mid lobe ciliate, crenulate, apiculate; lateral lobes embracing the column. Capsules *ca* 2 cm long.

On *Shorea robusta* and *Diospyros melanoxylon*. Surguja. *Fl. & Fr.*: Dec. Feb.

9. Dendrobium moschatum (Buch.-Ham.) Sw. in Schrad., Neu. J. Bot. 1: 94. 1805. *Epidendrum moschatum* Buch.-Ham. in Syme's, Embassy Ava. ed. 2. 3: 315. 1800. *Dendrobium calceolaria* Carey *ex* Hook., Exot. Fl. 3: t. 184. 1825-1826; Hook.*f.*, Fl. Brit. India 5: 744. 1890.

Herbs, epiphytic, tufted. Stems erect, stout, striate, terete, 1.5-2 m long. Leaves distichous, oblong or oblong-lanceolate, *ca* 12.5 x 4 cm, acute or minutely notched at apex, coriaceous. Flowers in lax, 8-16-flowered racemes; racemes 1 or 2 from the apex of leafless or leafy stem; bracts lanceolate. Sepals oblong-elliptic, subequal. Petals white with violet tips, broadly ovate, obtuse, larger than sepals. Labellum reddish, pyriform or hemispherical, shorter than petals, forming a subglobular or pyriform, open-mouthed pouch, incurved on margins, hairy. Column short, broad.

Surguja (Tiwari and Maheshwari, 1963). *Fl.*: May - July.

10. Dendrobium nobile Lindl., Gen. Sp. Orchid. Pl. 79. 1830; Hook. *f.*, Fl. Brit. India 5: 740. 1890.

Herbs, epiphytic, erect. Stems subcompressed, with white stripes, up to 30 cm long; internodes not much thickened. Leaves few, mostly towards the apex, oblong or lanceolate, up to 10 x 2.5 cm, obliquely 2-lobed at apex, firmly coriaceous. Flowers in 2-4-flowered racemes borne on leafless stems, bracteate. Sepals oblong, obtuse or acute; lateral sepals obtuse. Petals light pink or pink-red, elliptic, undulate on margins. Labellum ovate, acute at apex, shortly clawed, reflexed, pubescent inside. Column short. Capsules pale green, *ca* 2 cm long.

In dense forests. Bastar. *Fl. & Fr.*: Dec. Feb.

11. Dendrobium regium Prain in J. Asiat. Soc. Bengal 71: 80. 1902.

Herbs, epiphytic, sometimes lithophytic, erect or suberect. Stems stout, subfusiform, slightly compressed, 25-45 cm long. Leaves linear-oblong or oblong-lanceolate, 10-35 x 1-2.2 cm, obliquely notched at apex, thinly coriaceous. Flowers in 2-3-flowered racemes arising from leafless stems. Sepals with red-purple nerves, linear-oblong, obtuse; mentum less than half as long as the dorsal sepal. Petals magenta or rosy purple with red-purple nerves and transverse markings, obovate or elliptic, not undulated. Labellum magenta, with a pale yellow tube, trumpet-shaped, entire. Capsules with rounded ridges.

On rocks and *Madhuca longifolia*. Bastar (Mooney, 1942), Surguja (Tiwari and Maheshwari, 1963). *Fl. & Fr.*: April - June.

12. Dendrobium transparens Wallich *ex* Lindl., Gen. Sp. Orchid. Pl. 79. 1830; Hook. *f.*, Fl. Brit. India 5: 738. 1890. *D. henshallii* Rchb. *f.* in Bonplandia 3: 226. 1855.

Herbs, epiphytic. Stems slender. Pseudobulbs erect, sometimes pendulous, smooth, *ca* 50 cm long. Leaves linear-lanceolate, 7.5-10 x 1.5-2 cm long, acute at apex, entire, chartaceous. Flowers paired on leafless stem, fragrant; bracts *ca* 6 mm long. Sepals linear-lanceolate; mentum conical. Petals pinkish white, ovate. Labellum with a purple blotch in the middle, elliptic-oblong, obtusely lobed, clawed, cuneate at base, recurved, pubescent, fringed on margins.

Surguja (Tiwari and Maheshwari, 1963). *Fl.*: April - May.

13. Dendrobium wightii A.D. Hawkes & A.H. Heller in Orquidea 24: 16. 1962; Balakr. in J. Bombay Nat. Hist. Soc. 67: 66. 1970. *D. graminifolium* Wight, Icon. Pl. Ind. Orient. 5(1): 6. t. 1649. 1851, *non* Willd., 1805; Hook. *f.*, Fl. Brit. India 5: 718. 1890.

Herbs, epiphytic. Stems erect, slender, arising at distant intervals from creeping rhizome. Leaves bifarious, linear-lanceolate, 2.5-7.5 x 1-1.5 cm long, acute at apex, sheathing at base. Flowers in terminal racemes; axis slender, filiform; bracts ovate, acute. Sepals and lateral petals sparsely gland-dotted; dorsal sepal oblong-lanceolate, 3-nerved; lateral sepals

obliquely lanceolate, 5-nerved; mentum spur-like. Petals white, linear-lanceolate. Labellum adnate to the foot at base, 3-lobed; mid lobe obscurely crenulate; lateral lobes triangular, very small. Column *ca* 2 mm long. Capsules ovoid.

Bastar (Mooney, 1942; Tiwari and Maheshwari, 1963). *Fl. & Fr.*: May Jan.

8. EPIPACTIS Zinn, *nom. cons.*

Herbs, terrestrial, leafy. Roots fibrous. Leaves opposite or alternate, plaited, elliptic or lanceolate, sessile. Flowers solitary, in the axil of leaves progressively reduced in size upwards. Sepals and petals prominently nerved. Labellum adnate to the base of column, contracted in the middle, distinctly divided into hypochile and epichile; hypochile strongly deflexed, concave or saccate, jointed to epichile at right angle, both entire. Column short. Rostellum broad, prominent. Anthers erect; pollinia 2, 2-partite, very narrow. Fruit a capsule.

About 24 species; N. temperate regions to tropical Africa, Thailand and Mexico; one in M.P.

Epipactis veratrifolia Boiss., Diagn. Pl. Orient. ser. 1, 13: 11. 1854; Hunt in Kew Bull. 24: 76. 1970. *E. consimilis* Wallich *ex* Hook. *f.*, Fl. Brit. India 6: 126. 1890, *non* D. Don, 1825. *E. wallichii* Schlechter in Anz. Akad. Wiss. Wien 57: 275. 1920.

Herbs, terrestrial. Stems slender, 30-60 cm long. Leaves opposite or alternate, elliptic-lanceolate, 7-17 x 2.5-5 cm, acute or shortly acuminate at apex. Flowers solitary in the axil of reduced leaves or foliaceous bracts usually in the upper part of plants; rhachis pubescent. Dorsal sepal elliptic-lanceolate, acute, pubescent outside; lateral sepals obliquely ovate, broader than dorsal one, acute, spreading, pubescent outside. Petals ovate, obtuse. Labellum almost as long as sepals but narrower and constricted about the middle, trough-shaped at base, 3-lobed, bearing granular calli inside; mid lobe lanceolate; lateral lobes obtuse with erect margins. Column stout, curved.

Chhindwara (Saxena, 1972). *Fl.*: Feb.

9. EPIPOGIUM Gmelin *ex* Borkh.

Herbs, terrestrial, saprophytic, leafless. Rhizomes fleshy, thickened into tubers after anthesis. Flowers in lax, few to many-flowered, erect racemes, resupinate, pendulous, bracteate. Sepals and petals free, narrow, slightly differing. Labellum concave, much broader, entire, spurred, with a longitudinal ridge on the inner side. Column short. Anthers thick; pollinia 2, granular, each with a long, curved caudicle. Fruit a capsule.

Two species; temperate Eurasia and tropical regions of Old World; one in M.P.

Epipogium roseum (D. Don) Lindl. in J. Linn. Soc. London (Bot.) 1: 177. 1857. *Limodorum roseum* D. Don, Prodr. Fl. Nepal. 30. 1825. *Galera rosea* Blume, Mus. Bot. 2: 188. 1856. *Epipogium nutans* (Blume) Rchb.*f.* in Bonplandia 5: 36. 1857; Hook.*f.*, Fl. Brit. India 6: 124. 1890. *Podanthera pallida* Wight, Icon. Pl. Ind. Orient. 5(1): 22. t. 1759. 1851.

Herbs, saprophytic, leafless, 35-60 cm high. Rhizomes tuberous; tubers oblong-ovoid, wrinkled. Scape whitish to pale brown, hollow, fleshy. Flowers in erect, stout, sheathed racemes, pedicellate; bracts hyaline, lanceolate, shorter than ovary. Sepals and petals white, linear, entire, not much spreading, 3-nerved; dorsal sepal acute; lateral sepals obtuse. Labellum white with pink blotches, broadly lanceolate-ovate, concave, entire, irregularly crenulate; spur short, adhering to the ovary. Column very short.

Shahdol (Tiwari and Maheshwari, 1963). *Fl.*: Aug.

10. ERIA Lindl., *nom. cons.*

Epiphytes. Stems erect, branched, short or long; pseudobulbs swollen, tufted, from a creeping rootstock. Leaves articulate, flat, membranous or coriaceous, thin or fleshy, glabrous or hairy, sessile or petiolate. Flowers in lateral or seemingly terminal, 1 to many-flowered, short or long, hairy or glabrous racemes, resupinate. Sepals subequal; lateral sepals broader, adnate to the foot of the column forming a saccate mentum. Petals linear-oblong, slightly smaller. Labellum immobile or sometimes mobile, entire or 3-lobed, sessile on the foot of column. Column short or long, slender. Anthers imperfectly 4 or 8-celled; pollinia 8, pyriform, in two groups; each group with a single caudicle. Fruit a capsule.

About 350 species; Indopacific regions; one in M.P.

Eria pubescens (Hook.) Lindl. *ex* Steud., Nomencl. Bot. ed. 2. 1: 566. 1840. *Dendrobium pubescens* Hook., Exot. Fl. 2: t. 124. 1824. *Eria flava* Lindl., Gen. Sp. Orchid. Pl. 65. 1830; Hook. *f.*, Fl. Brit. India 5: 801. 1890.

Epiphytes. Pseudobulbs large, furrowed, laterally compressed, stem-like. Leaves usually 3-5, lanceolate-oblong, 15-25 x 2-4 cm, acute-acuminate at apex, shortly petiolate. Flowers in 7-12-flowered racemes; scape erect, stout, densely covered with soft, white tomentum. Sepals tomentose outside; dorsal sepal lanceolate, small; lateral sepals triangular, larger than dorsal one, spreading. Petals green-yellow, oblong, parallel to column. Labellum 3-lobed; mid lobe oblong, acute; lateral lobes short, truncate, with 2 calli in between. Capsules cylindrical.

Bastar (Mooney, 1942; Tiwari and Maheshwari, 1963). *Fl.*: April.

11. EULOPHIA R. Br. *ex* Lindl., *nom. cons.*

Herbs, terrestrial. Pseudobulbs tuberous. Leaves appearing with the flowers or before them, distichous, thin, grass like, plaited, erect-drooping, articulate. Flowers in lateral, erect, pedunculate racemes arising from the side of the pseudobulb. Sepals free, subequal, spreading. Petals subequal, slightly broader, decurrent along the column foot, spreading. Labellum erect from the base or foot of the column, entire or 3-lobed, saccate or spurred; mid lobe spreading or recurved, often broad; lateral lobes erect, embracing the column; disk crested or lamellate. Column long, thick, often with 2, lateral wings, with or without a foot. Anthers terminal, operculate, 2-celled; pollinia 2, globose, waxy, often deeply cleft, attached by a short, broad caudicle to a diskiform gland. Fruit a capsule.

About 200 species; tropical regions; 7 in M.P.

1a. Column with a distinct foot:

2a. Petals golden yellow; foot not forked ...1. *E. cullenii*

2b. Petals greenish purple; foot forked ...6. *E. nuda*

1b. Column without foot or with an indistinct foot:

3a. Labellum saccate at base:

4a. Racemes lax; peduncles up to 25 cm long; labellum distinctly 3-lobed ...2. *E. explanata*

4b. Racemes dense; peduncles more than 25 cm long; labellum entire or obscurely 3-lobed ...7. *E. ochreata*

3b. Labellum spurred at base:

5a. Sepals spreading; labellum with 5 lamellae:

6a. Petals brownish green; disk with hooked processes ...3. *E. graminea*

6b. Petals white with a yellow blotch at base; disk without hooked processes ...4. *E. herbacea*

5b. Sepals erect; labellum with 3 lamellae ...5. *E. mackinnonii*

1. Eulophia cullenii (Wight) Blume, Coll. Orchid 182. 1858, in obs. *Cyrtopera cullenii* Wight, Icon. Pl. Ind. Orient. 5(1): 21. t. 1754. 1851. *C. flava* Lindl., Gen. Sp. Orchid. Pl. 189. 1833. *Eulophia flava* (Lindl.) Hook. *f.*, Fl. Brit. India 6: 7. 1890, *p.p.*

Herbs, terrestrial, robust, up to 1 m high. Roots tuberous; rhizomes creeping. Leaves not appearing with the flowers, oblong-lanceolate, 30-40 x 5-6 cm, subacuminate at apex. Flowers in many-flowered, 40-60 cm long racemes; scape slender, angular, sheathed, unbranched; bracts ovate-ensiform. Sepals acute; dorsal sepal oblanceolate; lateral sepals falcate-lanceolate, inserted on the column foot, free from the spur of labellum. Petals golden yellow, oblong, obtuse. Labellum with brown spots, erect from the foot of column, as broad as long, 3-lobed, saccate; mid lobe tongue-shaped, concave, entire, rounded, with 3 tubercled crest on disk; sac with purple spots inside. Column stout, with a distinct foot.

On humus at the edge of forests and as undergrowth in sal forests. Balaghat, Bilaspur, Raipur. *Fl. & Fr.*: May - Oct.

2. Eulophia explanata Lindl., Gen. Sp. Orchid. Pl. 180. 1833; Hook. *f.*, Fl. Brit. India 6: 3. 1890. - *Mayurjharka*. **Fig. 3.**

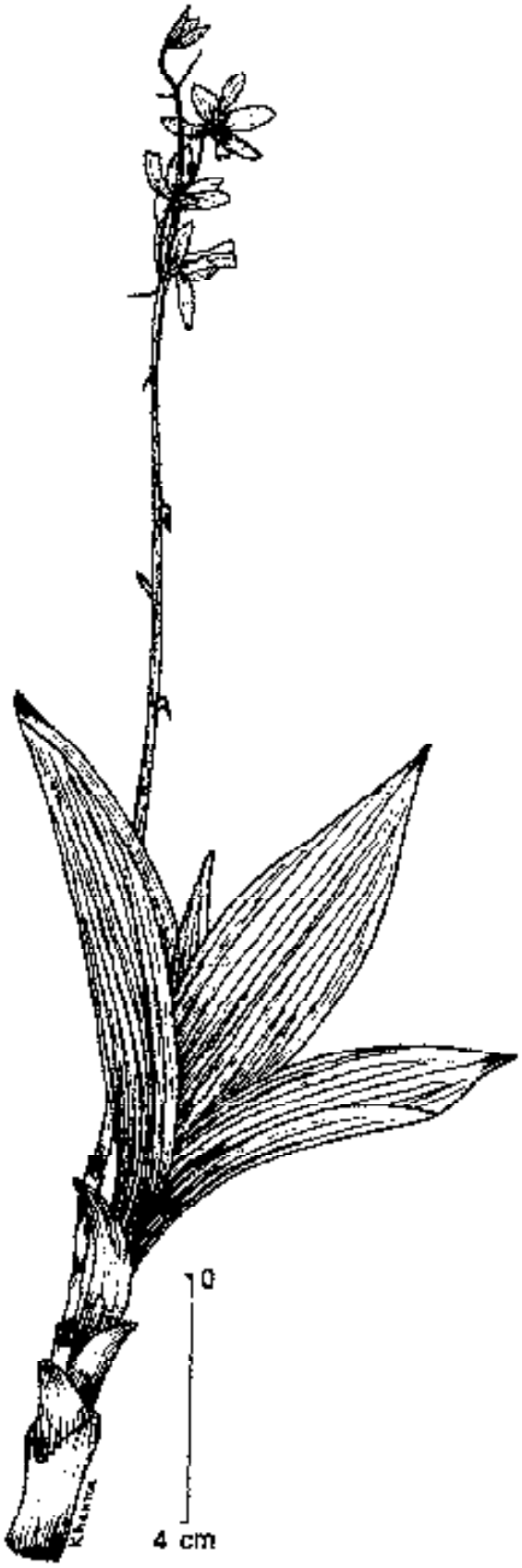

Fig. 3. Eulophia explanata Lindl.

Herbs, terrestrial. Pseudobulbs ovate, annulated, *ca* 5 cm long. Leaves appearing with the flowers, broadly elliptic-lanceolate, acuminate at apex, tapering to a short petiole. Flowers in lax, many-flowered racemes arising from the lower part of the pseudobulb; peduncles sheathed at base; bracts lanceolate, acuminate. Sepals spathulate-lanceolate, acute. Petals white with yellowish streaks, broadly oblong, rounded at apex. Labellum adnate by its base to the lateral sepals, little shorter than sepals and petals, 3-lobed; mid lobe oblong, rounded or emarginate, reflexed on margins; lateral lobes rounded, erect, forming a conical sac at base. Column short; foot absent.

As forest undergrowth. Bastar, Raipur (Tiwari and Maheshwari, 1963). *Fl.*: April - July.

The roots may be used for treating nets employed for catching peacocks.

3. Eulophia graminea Lindl., Gen. Sp. Orchid. Pl. 182. 1833; Hook. *f.*, Fl. Brit. India 6: 2. 1890. *E. inconspicua* Griff., Not. Pl. Asiat. 3: 349. 1851. *E. sinensis* Miq., J. Bot. Neerl. 1: 91. 1861. *E. ramosa* Hayata, Mat. Fl. Formosa 332. 1911.

Herbs, terrestrial. Roots vermiform. Pseudobulbs conical, covered with membranous sheaths. Leaves linear, 10-25 x 0.6-0.8 cm, finely acuminate at apex, sheathing at base. Flowers in lax, erect, racemose panicle; peduncles *ca* 40 cm long; bracts small, lanceolate, persistent. Sepals brownish green, oblong. Petals brownish green, elliptic-lanceolate, broader than sepals, tessellate. Labellum obovate-oblong, 3-lobed; mid lobe white with purple hairs in the middle, obovate; lateral lobes green with brown nerves, small; disk with five lamellae crested with hooked processes; spur conical, incurved. Column long; foot absent. Capsules clavate.

Raipur. *Fl. & Fr.*: Oct. Dec.

4. Eulophia herbacea Lindl., Gen. Sp. Orchid. Pl. 182. 1833; Hook. *f.*, Fl. Brit. India 6: 2. 1890. *Limodorum bicolor* Roxb., Fl. Ind. 3: 469. 1832. *Eulophia carinata* J. Graham, Cat. Pl. Bombay 202. 1839, *non* Lindl., 1833. *E. bicolor* (Roxb.) Lindl. in J. Linn. Soc. London (Bot.) 3: 24. 1859, *non* Dalzell, 1851. *E. brachypetala* Lindl. in J. Linn. Soc. London (Bot.) 3: 24. 1859.

Herbs, perennial, terrestrial. Tubers ovate to conical, with transverse circular markings. Leaves elliptic-lanceolate, 15-25 cm long, acute at apex, entire. Flowers solitary or in erect racemes arising in the axil of basal sheath from the pseudostem, fragrant; bracts linear-lanceolate, acuminate. Sepals green, linear-lanceolate, spreading; lateral sepals adnate to the base of the column. Petals white with a yellow blotch at base, oblong-elliptic, shorter than sepals. Labellum oblong-elliptic, 3-lobed; mid lobe oblong, crenate; lateral lobes oblong, small; disk with five median fimbriate lamellae; spur short. Column curved; foot absent. Capsules ellipsoid.

In mixed forests. Bastar (Tiwari and Maheshwari, 1963). Raipur. *Fl.* & *Fr.*: May - July.

5. Eulophia mackinnonii Duthie in J. Asiat. Soc. Bengal 71: 40. 1902.

Herbs, terrestrial, rhizomatous. Tubers triangular, flattened. Leaves usually 2, appearing with the flowers, broadly lanceolate, up to 75 x 8 cm, acuminate at apex, tapering into long sheaths, prominently nerved. Flowers in lax, 8-10-flowered racemes, deflexed at length; peduncles much shorter than leaves, arising from the side of the tuber; bracts linear-lanceolate, acuminate, persistent. Sepals yellow with reddish brown tinge, erect, fleshy; dorsal sepal ovate, obtuse, subcordate; lateral sepals rather longer, unequal at base. Petals oblong-obovate, shorter than sepals. Labellum yellow with purple streaks and three, white lamellae, 3-lobed; mid lobe yellow, broad; spur short, geniculate. Column short. Anthers with 2 short, purple horns at apex.

Raipur. *Fl.*: July - Aug.

6. Eulophia nuda Lindl., Gen. Sp. Orchid. Pl. 180. 1833; Hook. *f.*, Fl. Brit. India 6: 5. 1890. *Cyrtopera plicata* Lindl., Gen. Sp. Orchid. Pl. 190. 1833. *C. fusca* Wight, Icon. Pl. Ind. Orient. 5(1): 11. t. 1690. 1851. *Eulophia bicolor* Dalzell in Hook., J. Bot. Kew Gard. Misc. 3: 343. 1851.

Herbs, terrestrial, up to 1 m high. Roots vermiform; tubers large, white, ovoid, jointed in a row. Leaves oblong-lanceolate, 15-40 x 3-6 cm, acute-acuminate at apex, entire, forming a pseudostem. Flowers in lax, erect racemes arising from the side of the pseudostem; peduncles stout, covered with sheathing bracts; bracts lanceolate, acuminate. Sepals subequal,

spreading; dorsal sepal oblanceolate, acute; lateral sepals falcate, acute, adnate to the foot of the column. Petals greenish purple, ovate-oblong, narrow, entire. Labellum ovate-oblong, 3-lobed, recurved; mid lobe oblong, undulate, 2-fid; lateral lobes rounded; spur conical in continuation with the labellum and foot. Column with a distinct, forked foot. Capsules fusiform, *ca* 5 cm long, ridged.

In sal forests, alongwith *Elephantopus scaber*. Balaghat, Bilaspur, Raipur, Surguja. *Fl.* & *Fr.*: April - Sept.

7. Eulophia ochreata Lindl. in J. Linn. Soc. London (Bot.) 3: 24. 1859; Hook. *f.*, Fl. Brit. India 6: 2. 1890; Khanna *et al.* in J. Econ. Tax. Bot. 23(3): 712. 1999. *Graphorchis ochreata* (Lindl.) Kuntze, Revis. Gen. Pl. 2: 662. 1891.

Herbs, terrestrial. Pseudobulbs subterranean, ovoid-conical, with transverse and longitudinal markings. Leaves oblong-lanceolate or ovate-elliptic, 14-27 x 4-10 cm, sheathing at base, forming a pseudostem, entire, glabrous. Flowers in dense racemes clustered at the top of peduncle; peduncles *ca* 30 cm long, with ochreate sheaths below; bracts linear, entire, acute. Sepals yellowish green with purple or brown spots, linear-lanceolate, acute, entire. Petals similar to sepals in colour, broadly ovate-oblong, acute, glabrous. Labellum broadly ovate, entire or obscurely 3-lobed, with a minute sac; mid lobe yellow; lateral lobes pale cream. Column white with a purplish rim, subclavate, slightly produced into a short foot. Capsules broadly ovoid.

Raipur. *Fl.* & *Fr.*: June - Oct.

12. GASTROCHILUS D. Don

Epiphytes. Stems usually short, rooting. Leaves articulate; unequally notched at apex. Flowers in lateral, short racemes, small, fleshy, resupinate; racemes often 2 at node, sometimes clustered and opening together, perforating the leaf sheath. Sepals and petals free, slightly differing. Labellum shortly connate with column at base, immobile, 3-lobed, spurred; mid lobe broad, hairy or fimbriate, recurved; lateral lobes erect, short, broad with incurved connate anterior margins; spur short, saccate-cupular, with thickening on the inside. Column short, broad, without foot. Anthers 2-celled, short; pollinia 2, globose, each with a depression, porate or slightly notched, attached on a common, narrow, linear caudicle; gland rather large. Fruit a capsule.

About 20 species; India, Ceylon, Malesia and Indonesia to Japan; one in M.P.

Gastrochilus inconspicuus (Hook. *f.*) Kuntze, Revis. Gen. Pl. 2: 661. 1891; Seidenf. in Dansk. Bot. Ark. Denmark 27(4): 94. 1971. *Saccolabium inconspicuum* Hook. *f.*, Fl. Brit. India 6: 56. 1890. *Luisia inconspicua* (Hook. *f.*) King & Pantl. in Ann. Roy. Bot. Calc. 8: 203. t. 272. 1898.

Herbs, epiphytic, *ca* 10 cm high. Stems slender, covered with sheaths. Leaves stout, terete, up to 5 cm long, obtuse at apex. Flowers in many-flowered racemes, looking like spikes, often clustered, shortly pedicellate, bracteate. Sepals broadly oblong or ovate-lanceolate, subacute, not keeled, spreading. Petals yellowish green, broadly oblong, acute or subacute. Labellum green, flat, 3-lobed, sessile, spurred; mid lobe fimbriate;.lateral lobes short, broad. Column purple, short, stout. Capsules ribbed.

On *Shorea robusta*. Bilaspur. *Fl. & Fr.*: Aug. Dec.

13. GEODORUM G. Jacks

Herbs, terrestrial. Pseudobulbs subterranean, persistent. Leaves plaited, articulate, convolutive, petiolate. Flowers in lateral, few to many-flowered racemes; racemes decurved terminally, arising from the base of pseudobulb. Sepals and petals slightly differing. Petals slightly broader than sepals. Labellum superior, immobile, subentire with longitudinal thickening, forming a saccate base with column foot, sessile. Column short, with a distinct foot. Anthers 2-celled, with basal appendages; pollinia 2, globose, waxy, subsessile on a broad gland, ecaudiculate. Fruit a capsule.

About 16 species; Indo-Malesia and W. Pacific regions; one in M.P.

Geodorum densiflorum (Lam.) Schlechter in Fedde, Repert. Beih. 4: 259. 1919. *Limodorum densiflorum* Lam., Encycl. 3: 516. 1792. *L. recurvum* Roxb., Pl. Coromandel 1: 33. t. 39. 1795. *Malaxis cernua* Willd., Sp. Pl. 4: 93. 1805. *Geodorum purpureum* R. Br. in W.T. Aiton, Hortus Kew. ed. 2. 5: 207. 1813; Hook. *f.*, Fl. Brit. India 6: 16. 1890. *G. dilatatum auct. non* R. Br., 1813: Hook. *f.*, Fl. Brit. India 6: 17. 1890.

Herbs, perennial, terrestrial, rhizomatous. Roots vermiform. Stems short, sheathed; pseudobulbs tuberous, swollen, ovoid-conical. Leaves 2-

3, elliptic-lanceolate, 12-24 x 4-8 cm, acuminate at apex, sheathing at base, entire. Flowers in *ca* 30 cm long racemes, shortly pedicellate, bracteate; racemes sharply decurved terminally; scape thick, arising from the pseudobulb away from the leaves; bracts foliaceous, lanceolate. Dorsal sepal lanceolate, erect, obtuse; lateral sepals obliquely lanceolate, acute, adnate to dorsal sepal forming a hood. Petals yellowish white or cream-coloured, elliptic-oblong, slightly broader than sepals. Labellum flagellate, sessile, narrowed to a claw at base, wavy on margins. Capsules fusiform, pendulous.

In mixed forests. Bastar, Bilaspur, Hoshangabad, Raipur, Seoni. *Fl. & Fr.*: July - Oct.

14. GOODYERA R. Br.

Herbs, terrestrial, ascending-erect, rarely entirely erect, arising from a creeping base. Leaves exarticulate, petiolate, sometimes beautifully coloured. Flowers in terminal, few to many-flowered, erect spikes, small or large, resupinate. Sepals free; dorsal sepal forming a hood with petals; lateral sepals covering the base of the labellum by their bases. Petals unequal-sided. Labellum erect, entire, sessile on the base of the column, cymbiform, hollow, glandular or bristly hairy inside. Column short, without appendages at base. Anthers dorsal, operculate; pollinia 2, pyriform or clavate, divided into numerous contiguous lobules, with or without a strap and gland; rostellum erect, 2-dentate. Fruit a capsule.

About 40 species; cosmopolitan; one in M.P.

Goodyera procera (Ker-Gawl.) Hook., Exot. Fl. 1: t. 39. 1823; Hook. *f.*, Fl. Brit. India 6: 111. 1890. *Neottia procera* Ker-Gawl. in Bot. Reg. 8: t. 639. 1822-1823. *Goodyera carnea* A. Rich. in Ann. Sci. Nat. Bot. ser. 2, 15: 80. 1841. *Cordylestylis foliosa* Falc. in Hook., J. Bot. 4: 75. 1842.

Herbs, terrestrial, *ca* 40 cm high. Stems erect, stout, arising from a prostrate rooting base. Leaves several, ovate or elliptic, 9-14 x 2.8-4.5 cm, acute-acuminate at apex, narrowed and sheathing at base; petioles 3-5 cm long. Flowers in dense, *ca* 30 cm long spikes, fragrant; peduncles with large foliaceous bracts; bracts lanceolate. Dorsal sepal oblong or ovate, obtuse, concave; lateral sepals ovate, obtuse. Petals spathulate-

oblanceolate, obtuse, suberose on margins. Labellum *ca* 2.5 mm long, entire, strongly reflexed, with 2 subterminal calli.

In moist shady places and amidst rock boulders. Hoshangabad. *Fl.* & *Fr.*: Feb. May.

15. HABENARIA Willd.

Herbs, terrestrial, erect, usually growing from tubers. Leaves exarticulate, broad, flat on the ground or erect, sheathing at base. Flowers in terminal racemes or spikes, small or large, bracteate, resupinate. Sepals free, unequal or subequal; dorsal sepal forming a hood with petals. Petals entire, deeply 2-lobed or 2-partite. Labellum continuous with the column, entire, 3-lobed or 3-partite, spurred; lateral lobes sometimes pectinate or fimbriate; spur long, thin, infundibuliform at base. Column short, without foot. Anthers not operculate but lateral, confluent with the column, 2-celled; cells diverging; pollinia 2, glandular, each with a caudicle enclosed in tube; rostellum small, rarely large, 3-lobed, mid lobe situated between the anther chambers; staminodes lateral. Stigmas 2, distant, convex or on elongated processes. Fruit a capsule.

About 500 species; pantropical and subtropical regions; 12 in M.P.

1a. Petals 2-fid or 2-partite:

2a. Leaves always more than 2, alternate, cauline, spread over stem:

3a. Spur ligulate at mouth:

4a. Plants up to 30 cm high; petals greenish yellow; labellum 3-lobed ...1. *H. barbata*

4b. Plants 30-60 cm high; petals green; labellum 3-partite ...5. *H. digitata*

3b. Spur eligulate ...7. *H. foliosa* var. *foetida*

2b. Leaves 1-2, opposite, radical, almost flat on the ground ...9. *H. grandifloriformis*

1b. Petals entire:

5a. Leaves alternate, scattered throughout the stem:

6a. Labellum 3-partite; segments filiform ...2. *H. commelinifolia*

6b. Labellum 3-lobed at apex; lobes not filiform:

7a. Bracts longer than ovary; labellum oblong, mid lobe longer than lateral lobes ...3. *H. decipiens*

7b. Bracts as long as ovary; labellum suborbicular, mid lobe shorter than lateral lobes ...4. *H. dentata*

5b. Leaves clustered at the base or around the middle of the stem:

8a. Leaves 1-2 ...6. *H. diphylla*

8b. Leaves always more than 2:

9a. Spur up to 10 mm long ...10. *H. marginata*

9b. Spur more than 10 mm long:

10a. Labellum 3-partite; lateral segments filiform; spur up to 17 mm long ...8. *H. furcifera*

10b. Labellum 3-lobed; lateral lobes broader, never filiform; spur more than 20 mm long:

11a. Leaves oblong-lanceolate or elliptic, up to 2 cm broad ...11. *H. plantaginea*

11b. Leaves suborbicular, 5-7 cm broad ...12. *H. roxburghii*

1. **Habenaria barbata** Wight *ex* Hook. *f.*, Fl. Brit. India 6: 133. 1890; Jayaw. in Dassan. & Fosb., Rev. Handb. Fl. Ceylon 2: 345. 1981. *H. virens* (Lindl.) Abeywickr. in Ceylon J. Sci., Biol. Sci. 2(2): 151. 1959. *Ate virens* Lindl., Gen. Sp. Orchid. Pl. 327. 1835.

Herbs, terrestrial, up to 30 cm high. Tubers oblong or pyriform. Leaves cauline, mostly above the middle, erect, lanceolate, 5-11 x 1.5-2.5 cm, acuminate at apex, sheathing at base. Flowers in terminal, lax racemes; bracts large, as long as the flowers, lanceolate, sheathing the ovary. Sepals ovate, acuminate, unequal; dorsal sepal concave, horizontal; lateral sepals reflexed, oblong, narrowly falcate. Petals greenish yellow, 2-partite, broader

than sepals; upper segment longer; lower segment broader. Labellum linear, longer than sepals, 3-lobed; spur more or less equal to ovary, with a long, recurved ligule at the mouth. Column continuous with the labellum. Capsules linear-oblong.

In moist shady places. Raigarh. *Fl. & Fr.*: Sept. Dec.

2. Habenaria commelinifolia (Roxb.) Wallich *ex* Lindl., Gen. Sp. Orchid. Pl. 325. 1835; Hook. *f.*, Fl. Brit. India 6: 143. 1890. *Orchis commelinifolia* Roxb., Fl. Ind. 3: 451. 1832.

Herbs, terrestrial, *ca* 50 cm high. Tubers ellipsoid. Leaves cauline, alternate, distichous, oblong or oblong-lanceolate, 7-17 x 1.5-2.5 cm, acute or rarely subspinescent at apex, subcordate at base, entire. Flowers in dense, 15-30 cm long spikes, sessile; peduncles terete, rigid; bracts lanceolate, acuminate. Sepals white, unequal; dorsal sepal saccate, obovate-oblong, small, mucronulate; lateral sepals obliquely obovate-oblong, spreading, reflexed, rounded at apex. Petals white, more or less quadrately oblong, entire. Labellum white, divided into three, long, filiform segments; mid lobe narrowly linear, strap-shaped, 1.5-2 cm long; lateral lobes 2-3 cm long, spreading; spur clavate, curved. Column greenish white, oblong. Capsules ribbed.

In sal and mixed forests, also in muddy grasslands. Balaghat, Bastar, Mandla, Raigarh, Raipur, Rajnandgaon, Seoni, Surguja. *Fl. & Fr.*: Aug. Dec.

3. Habenaria decipiens Wight, Icon. Pl. Ind. Orient. 3(2): t. 927. 1844-1845; Hook. *f.*, Fl. Brit. India 6: 165. 1890.

Herbs, terrestrial, 10-40 cm high. Tubers small, oblong. Leaves cauline or subradical, linear or elliptic-lanceolate, 5-12 x 1.5-2.5 cm, acute or obtuse at apex, membranous. Flowers in dense, secund spikes, decurved; bracts ovate-lanceolate, membranous, longer than ovary. Sepals unequal, spreading; dorsal sepal ovate-lanceolate; lateral sepals linear-oblong. Petals white, lanceolate, acute, spreading. Labellum oblong, 3-lobed; mid lobe linear, longer and broader; lateral lobes rhomboid-cuneate, fimbriate; spur slender, very variable. Capsules ovoid.

Betul (Tiwari and Maheshwari, 1963). *Fl. & Fr.*: March May.

4. Habenaria dentata (Sw.) Schlechter in Fedde, Repert. Beih. 4: 125. 1919; Seidenf. in Dansk. Bot. Ark. 31(3): 99. 1977. *Orchis dentata* Sw. in Vet. Acad. Handl. Stockh. 21: 207. 1800. *Habenaria geniculata* D. Don, Prodr. Fl. Nepal. 25. 1825; Hook. *f.*, Fl. Brit. India 6: 138. 1890.

Herbs, terrestrial, stout, 30-50 cm high. Stems covered with leafy sheaths. Leaves cauline, oblong-lanceolate, 4-10 x 1.5-3 cm, thick, coriaceous, sessile. Flowers in dense, many-flowered spikes; bracts ovate or lanceolate, as long as the ovary. Sepals greenish white, unequal; lateral sepals acute, spreading, deflexed. Petals white or dull green, linear-oblong. Labellum suborbicular, 3-lobed; mid lobe oblong, small, much shorter; lateral lobes cuneate or rounded, fimbriate or crenate; spur subclavate, longer than the ovary. Capsules thickly ribbed, shortly stipitate.

In moist places. Bilaspur. *Fl. & Fr.*: Oct. Dec.

5. Habenaria digitata Lindl., Gen. Sp. Orchid. Pl. 307. 1835; Hook. *f.*, Fl. Brit. India 6: 134. 1890. *H. trinervia* Wight, Icon. Pl. Ind. Orient. 5(1): 12. t. 1701. 1851. *H. graveolens* Duthie in Ann. Roy. Bot. Gard. Calc. 9: 178. t. 128. 1906. **Fig. 4.**

Herbs, terrestrial, 30-60 cm high. Tubers 1-2, ovate. Leaves alternate, elliptic-lanceolate or ovate-oblong, 3-6 x 1.8-2.5 cm, acute at apex, sheathing at base, entire. Flowers in few to many-flowered, *ca* 10 cm long spikes, shortly pedicellate; bracts ovate-lanceolate, foliaceous, sheathing. Sepals green, unequal; dorsal sepal ovate-lanceolate; lateral sepals lanceolate, oblique at base. Petals green, 2-partite; upper segment filiform, linear, subfalcate; lower segment filiform, lying on the labellum. Labellum green, 3-partite up to base, fleshy; mid lobe slightly longer than the lateral ones; lateral lobes spreading; spur green, subclavate, ligulate at mouth. Column green, oblong. Capsules ribbed.

In humus soil and moist rocky slopes. Bilaspur, Hoshangabad, Rajnandgaon, Seoni. *Fl. & Fr.*: July - Oct.

6. Habenaria diphylla Dalzell in Hook., J. Bot. 2: 262. 1850; Hook. *f.*, Fl. Brit. India 6: 151. 1890. *H. jerdoniana* Wight, Icon. Pl. Ind. Orient. 5(1): t. 1715. 1851.

Herbs, terrestrial. Tubers ellipsoid. Leaves usually 2, radical, flat on the ground, ovate-oblong or orbicular, acute at apex, cordate at base,

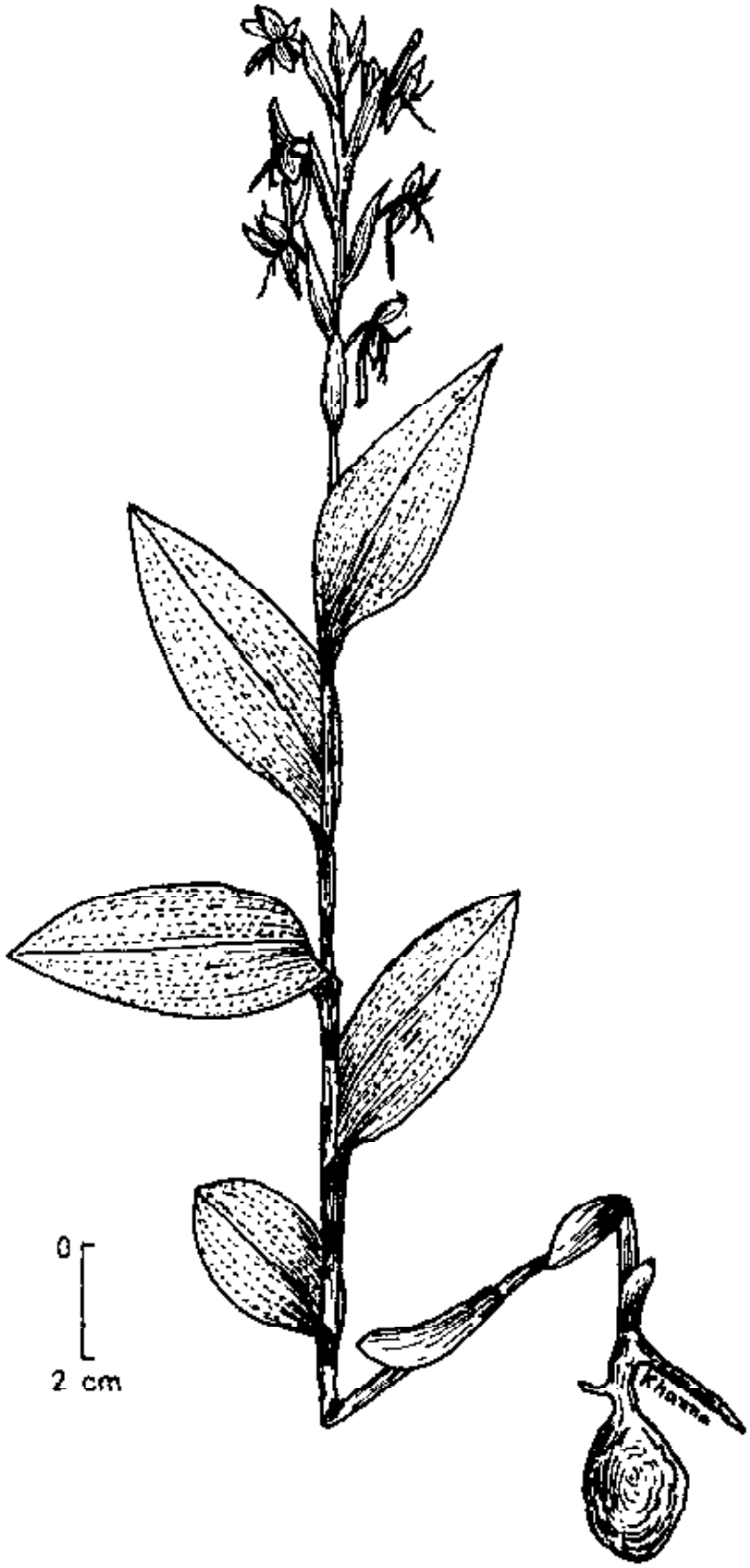

Fig. 4. Habenaria digitata Lindl.

coriaceous. Flowers in lax, many-flowered, *ca* 10 cm long racemes, shortly pedicellate; bracts ovate-lanceolate, shorter than ovary. Sepals subequal, entire; dorsal sepal pale green, broadly ovate; lateral sepals white, obliquely ovate or ovate-lanceolate, spreading. Petals greenish white, linear-oblong, acute. Labellum white, 3-lobed; mid lobe acute, straight or slightly incurved; lateral lobes somewhat filiform, acute, spreading; spur curved, clavate at apex. Column broadly oblong. Capsules fusiform, shortly stipitate.

Bastar (Mooney, 1942; Tiwari and Maheshwari, 1963). *Fl. & Fr.*: July Oct.

7. Habenaria foliosa A. Rich. var. **foetida** (Blatt. & McCann) Bennet in J. Econ. Tax. Bot. 5: 452. 1984. *H. gibsoni* Hook. *f.* var. *foetida* Blatt. & McCann in J. Bombay Nat. Hist. Soc. 36: 16. 1932.

Herbs, terrestrial, 20-40 cm high. Tubers cylindrical. Leaves alternate, ovate or oblong-lanceolate, 4-7 x 2-3 cm, acute at apex. Flowers in lax spikes, with foul odour during day-time, very shortly pedicellate; bracts ovate-lanceolate, longer than the flowers. Sepals white, unequal; dorsal sepal ovate-elliptic, broader than long, concave; lateral sepals ovate-lanceolate. Petals white, 2-partite nearly up to base; upper segment sickle-shaped, slightly longer than lower one; lower segment narrower. Labellum white, 3-lobed nearly up to base; mid lobe linear, acuminate; lateral lobes linear, acute; spur white, clavate at apex, eligulate at mouth. Capsules ribbed.

As forest undergrowth. Hoshangabad. *Fl. & Fr.*: July Sept.

8. Habenaria furcifera Lindl., Gen. Sp. Orchid. Pl. 319. 1835; Hook. *f.*, Fl. Brit. India 6: 149. 1890.

Herbs, terrestrial, 30-50 cm high. Tubers ovate-ellipsoid. Leaves usually clustered near the base of stem, oblong-elliptic, obovate or oblanceolate, 8-16 x 2.5-5 cm, acute or acuminate at apex, sheathing at base. Flowers in lax, many-flowered, 10-15 cm long racemes, shortly pedicellate; peduncle bracteate; bracts ovate-lanceolate, acuminate. Sepals unequal; dorsal sepal ovate-oblong, obtuse, concave; lateral sepals falcately lanceolate, shorter, spreading. Petals greenish yellow, broadly oblong. Labellum 3-partite up to base; mid lobe oblong, broad, straight; lateral lobes filiform, diverging, longer than mid lobe; spur slender, longer than ovary. Capsules fusiform, turgid, decurved, ribbed.

In sal forests. Mandla, Rajnandgaon, Seoni. *Fl. & Fr.*: Aug. Dec.

9. Habenaria grandifloriformis Blatt. & McCann in J. Bombay Nat. Hist. Soc. 36: 17. 1932 *emend.* Santapau & Kapadia in J. Bombay Nat. Hist. Soc. 56: 195. 1959 & Orch. Bombay 17. 1966. *H. grandiflora* Lindl. *ex* Hook. *f.*, Fl. Brit. India 6: 136. 1890. *H. rotundifolia* Lindl., Gen. Sp. Orchid. Pl. 306. 1835, *non* Richardson, 1823.

Herbs, terrestrial, *ca* 20 cm high. Tubers 1-2, globose or ellipsoid. Leaves 1-2, radical, almost flat on the ground, opposite, broadly ovate to suborbicular, 2-3.5 x 2-2.5 cm, acute or obtuse at apex, entire, coriaceous. Flowers in 1 to many-flowered, 10-15 cm long racemes, pedicellate; peduncles erect, rigid, longitudinally ribbed; bracts ovate or oblong-lanceolate, amplexicaul. Sepals white, unequal; dorsal sepal broadly ovate, concave; lateral sepals obliquely ovate. Petals white, 2-partite; upper segment obliquely ovate-triangular; lower segment filiform. Labellum white, 3-lobed; mid lobe linear; lateral lobes linear or filiform, spreading; spur white with green tinge, curved. Column greenish white. Capsules strongly ribbed.

In moist places. Chhindwara. *Fl. & Fr.*: July - Nov.

10. Habenaria marginata Colebr. in Hook., Exot. Fl. t. 136. 1824; Hook. *f.*, Fl. Brit. India 6: 150. 1890. *Vanpyaz.*

Herbs, terrestrial, 15-30 cm high. Tubers small, 1 or 2, ovate or ellipsoid. Leaves subradical, clustered in the lower part of the stem, oblong or oblong-elliptic, 5-8 x 1.3-2.5 cm, acute or obtuse at apex, whitish yellow on margins, somewhat fleshy. Flowers in lax or dense, many-flowered, 5-10 cm long spikes, sessile; peduncles green, terete, bracteate; bracts ovate-lanceolate. Sepals pale green, unequal; dorsal sepal green, broadly ovate, cymbiform, erect; lateral sepals falcately oblong, deflexed. Petals yellow or greenish yellow. Labellum yellow, 3-lobed, fleshy; mid lobe clavate, inflexed on margins; lateral lobes narrowly linear-lanceolate; spur fusiform. Capsules fusiform, turgid.

In moist places. Balaghat, Indore, Rajnandgaon, Rewa, Sidhi, Surguja. *Fl. & Fr.*: Aug. Jan.

11. Habenaria plantaginea Lindl., Gen. Sp. Orchid. Pl. 323. 1835; Hook. *f.*, Fl. Brit. India 6: 141. 1890.

Herbs, terrestrial, 20-50 cm high. Tubers 2, unequal. Leaves radical, prostrate on the ground, uppermost small and bract-like, oblong-lanceolate or elliptic, 4-8 x 1.5-2 cm, entire, membranous. Flowers in lax, few to many-flowered racemes on long, slender scape, shortly pedicellate; bracts ovate-lanceolate, much shorter than ovary. Sepals white, unequal; dorsal sepal broadly ovate, erect; lateral sepals falcately oblong. Petals white, linear-lanceolate. Labellum rhomboid, 3-lobed, long spurred; mid lobe narrowly linear; lateral lobes much broader than mid lobe, wing-like; spur white, slender, curved, pendulous, longer than ovary. Capsules fusiform, turgid, curved.

In moist shady places. Balaghat, Chhindwara, Jabalpur, Raipur, Seoni, Surguja. *Fl. & Fr.*: Sept. Nov.

12. Habenaria roxburghii Nicolson in Saldanha & Nicolson, Fl. Hassan Dist. 834. 1976. *H. platyphylla* (Willd.) Spreng., Syst. Veg. 3: 690. 1826, *nom. superfl.*; Hook. *f.*, Fl. Brit. India 6: 140. 1890. *Orchis platyphyllos* Willd., Sp. Pl. 4: 10. 1805, *nom. superfl. O. roxburghii* Pers., Syn. Pl. 2: 503. 1807, *nom. superfl.*

Herbs, terrestrial, up to 50 cm high. Tubers 1-2, ovate or oblong. Leaves radical, flat on the ground, suborbicular, 5-11 x 5-7 cm, acute, obtuse or rounded at apex, coriaceous, more or less fleshy. Flowers in dense or lax spikes, shortly pedicellate; peduncles bracteate; bracts lanceolate. Sepals white, unequal; dorsal sepal oblong-ovate; lateral sepals oblong or obliquely ovate, spreading. Petals white, linear-spathulate, entire. Labellum white, 3-lobed; mid lobe linear-lanceolate, tapering at apex; lateral lobes oblong, rounded; spur white, geniculate, clavate at apex, infundibuliform at mouth. Capsules ribbed.

In mixed deciduous forests. Rajnandgaon, Seoni. *Fl. & Fr.*: Aug. Oct.

16. LIPARIS Rich., *nom. cons.*

Herbs, perennial, terrestrial or epiphytic, with or without pseudobulbs. Leaves one or more, from the top of pseudobulb, membranous or coriaceous, exarticulate (in terrestrials) or articulate (in epiphytes), sheathed. Flowers in terminal, lax or dense, erect, many-flowered racemes, small, mostly resupinate. Sepals free, oblong-lanceolate, linear-oblong, linear

or lanceolate, spreading, reflexed, recurved on margins. Petals linear, erect, reflexed, recurved on margins; lateral sepals and petals sometimes placed under labellum. Labellum inferior, narrow, entire or obscurely lobed, sessile or clawed, without or with 1-2 tubercles. Column slender, incurved, winged on either side of stigma, without foot. Anthers erect or horizontal, ovate, 2-celled; pollinia 4, in two pairs, ovoid, waxy, free or cohering by a viscid appendage. Fruit a capsule.

About 250 species; almost cosmopolitan; 4 in M.P.

1a. Plants terrestrial; leaves membranous, continuous with sheath:

2a. Leaves ovate or orbicular; bracts linear-lanceolate, longer than pedicel; petals dark purple ...1. *L. atropurpurea*

2b. Leaves broadly elliptic, elliptic-ovate or elliptic-lanceolate; bracts ovate or ovate-lanceolate, shorter than pedicel; petals pink or green with pink tinge:

3a. Leaves up to 13 cm long; labellum oblong or obovate, entire; column curved ...2. *L. bituberculata*

3b. Leaves 17-22 cm long; labellum quadrate, obscurely lobed; column not curved ...3. *L. nervosa*

1b. Plants epiphytic; leaves coriaceous, jointed on the sheath ...4. *L. viridiflora*

1. Liparis atropurpurea Lindl., Gen. Sp. Orchid. Pl. 28. 1830; Hook. *f.*, Fl. Brit. India 5: 698. 1890.

Herbs, terrestrial, pseudobulbous. Stems stout, swollen, covered with sheathing scales. Leaves 3-4, ovate or orbicular, 7-15 x 4-8 cm, acute or acuminate at apex, uneven at base, membranous, narrowed into a petiole. Flowers in terminal, many-flowered racemes; bracts linear-lanceolate, longer than ovary and pedicel. Sepals linear, very long; dorsal sepal longest, 3-nerved; lateral ones 5-nerved, spreading. Petals dark purple, linear, spreading. Labellum orbicular-ovate, with 2, large, confluent tubercles at

base, fleshy, recurved, crenulate. Column very slender, curved. Capsules oblong.

Hoshangabad (Mukherjee, 1984). *Fl. & Fr.*: July Oct.

2. Liparis bituberculata (Hook.) Lindl. in Bot. Reg. 11: t. 882. 1825; Hook. *f.*, Fl. Brit. India 5: 696. 1890. *Cymbidium bituberculatum* Hook., Exot. Fl. 2: t. 116. 1824.

Herbs, terrestrial, erect, stout. Stems tufted, sheathed, 5-10 cm long. Leaves 2-4, variable, broadly elliptic or elliptic-ovate, 7.5-13 cm long, acuminate at apex. Flowers in many-flowered racemes, pedicellate; racemes much longer than leaves; scape stout; bracts ovate, minute, acute. Sepals linear-oblong, obtuse; lateral sepals often reflexed. Petals pink, linear, filiform, spreading. Labellum purple, oblong or obovate, shorter than sepals, deflexed, entire, retuse at apex, cuneate at base, undulate, with 2 tubercles. Column curved.

Surguja (Tiwari and Maheshwari, 1963). *Fl. & Fr.*: Aug. - Nov.

3. Liparis nervosa (Thunb.) Lindl., Gen. Sp. Orchid. Pl. 26. 1830. *Ophrys nervosa* Thunb., Fl. Jap. 27. 1784. *Empusa paradoxa* Lindl., Gen. Sp. Orchid. Pl. 17. 1830. *Liparis paradoxa* (Lindl.) Rchb. *f.* in Walp., Ann. Bot. Syst. 6: 218. 1861; Hook. *f.*, Fl. Brit. India 5: 697. 1890.

Herbs, terrestrial, slender, with pseudobulbs. Stems erect, sometimes swollen at base, *ca* 15 cm long. Leaves 2-5, alternate, elliptic-lanceolate, 17-22 x 2.5-3 cm, acute at apex. Flowers in 10-20 cm long racemes, long pedicellate; bracts ovate-lanceolate. Dorsal sepal linear-oblong, reflexed; lateral sepals falcately oblong, spreading, recurved on margins. Petals green with pink tinge, linear. Labellum adnate to the base of the column, quadrate, obscurely lobed, recurved from mid lobe. Column short.

Surguja (Tiwari and Maheshwari, 1963). *Fl. & Fr.*: Aug. - Oct.

4. Liparis viridiflora (Blume) Lindl., Gen. Sp. Orchid. Pl. 31. 1830; Seidenf. in Dansk. Bot. Ark. 31(1): 82. 1976. *Malaxis viridiflora* Blume, Bijdr. 392. 1825. *Liparis longipes* Lindl. in Wallich, Pl. Asiat. Rar. 1: 31. t. 35. 1830; Hook. *f.*, Fl. Brit. India 5: 703. 1890.

Epiphytes, tufted, up to 40 cm high. Stems short, sheathed; pseudobulbs ovoid or cylindrical. Leaves 2, opposite, linear-lanceolate, *ca* 20 x 2.5 cm, acute at apex, sessile. Flowers in terminal, many-flowered racemes; bracts lanceolate, acuminate. Dorsal sepal lanceolate, revolute; lateral sepals linear. Petals pale yellowish green, linear, revolute. Labellum ovate, concave, folded lengthwise, entire, clawless, fleshy; callus absent. Column short.

Bastar (Tiwari and Maheshwari, 1963). *Fl.* & *Fr.*: Sept. Dec.

17. LUISIA Gaud.

Epiphytes. Roots vermiform. Stems long, terete, non-pseudobulbous. Leaves terete, slender, articulate, fleshy. Flowers in axillary or extra-axillary, many-flowered, drooping racemes or spikes, small to large, resupinate, curved towards the ovary. Sepals free, subequal; dorsal sepal smaller; lateral sepals apically keeled. Petals free, equal to or longer and narrower than sepals. Labellum immobile, entire or 3-lobed, concave at base, sessile on column, fleshy; mid lobe entire or emarginate, glabrous or tuberculate-rugose. Column short, truncate, straight; foot absent. Anthers 2-celled; pollinia 2, globose or pyriform, entire or cleft, placed on a common, short, broad caudicle; gland broad. Fruit a capsule.

About 30 species; tropical Asia to Japan and Polynesia; 3 in M.P.

1a. Leaves slender, less than 3 mm in thickness; labellum entire ...1. *L. brachystachys*

1b. Leaves stout, 4-5 mm in thickness; labellum lobed:

2a. Flowers *ca* 10 mm across ...2. *L. trichorhiza*

2b. Flowers up to 6 mm across ...3. *L. zeylanica*

1. Luisia brachystachys (Lindl.) Blume, Rumphia 4: 50. 1849; Hook. *f.*, Fl. Brit. India 6: 23. 1890. *Mesoclastes brachystachys* Lindl., Gen. Sp. Orchid. Pl. 45. 1830. *Luisia indivisa* King & Pantl. in Ann. Roy. Bot. Gard. Calc. 8: 201. t. 269. 1898.

Herbs, epiphytic. Stems branched. Leaves cylindrical, slender, 8-15 cm long, spreading. Flowers in drooping spikes; pedicels slender; bracts

minute, triangular. Sepals subequal, oblong; lateral sepals somewhat broader, not keeled. Petals brick red, subequal, narrowly oblong, falcate, spreading. Labellum dark purple with a yellow base, oblong-obovate, entire, grooved, nearly flat, slightly concave at base. Column very short.

On *Shorea robusta*. Bilaspur. *Fl. & Fr.*: April - June.

2. Luisia trichorhiza (Hook.) Blume, Mus. Bot. 1: 63. 1849; Hook. *f.*, Fl. Brit. India 6: 23. 1890. *Vanda trichorhiza* Hook., Exot. Fl. 1: t. 72. 1823.

Herbs, epiphytic. Stems stout, 10-20 cm long, unbranched. Leaves terete, 10-15 cm long, slightly tapering towards the apex. Flowers in 4-5-flowered spikes, *ca* 10 mm across. Sepals green with faint purple lines, unequal; lateral sepals obliquely ovate. Petals pale yellowish green with faint purple lines, oblong. Labellum dull purple, obovate-oblong, longer than sepals, grooved. Column purple, stout.

Mandla (Datt and Kapoor, 1991). *Fl. & Fr.*: March - April.

3. Luisia zeylanica Lindl., Fol. Orchid. Luisia 3. 1853. *L. teretifolia auct. non* Gaud., 1826: Hook. *f.*, Fl. Brit. India 6: 22. 1890. *Cymbidium tenuifolium* Wight, Icon. Pl. Ind. Orient. 5(1): t. 1689. 1851.

Herbs, epiphytic. Stems terete, sheathed. Leaves cylindrical, falcate, 5-13 cm long, acute at apex, sheathing at base. Flowers in extra - axillary, condensed, 2-4-flowered racemes, fleshy, shortly pedicellate; bracts small, oblong, persistent. Sepals pale green, ovate, fleshy; lateral sepals cymbiform. Petals greenish yellow with pink tinge, oblong, slightly longer than sepals, glabrous or sparsely gland-dotted. Labellum with dark maroon horizontal bands, 3-lobed, concave at base; mid lobe rhomboid, larger than lateral lobes, 3-lobulate, swollen on the dorsal side; lateral lobes erect, thin, auricular. Capsules oblong, *ca* 2 cm long.

On trees like *Terminalia chebula* and *Madhuca longifolia*. Bastar, Mandla, Raigarh. *Fl. & Fr.*: Feb. - April.

18. MALAXIS Sol. *ex* Sw.

Mostly terrestrial, rarely epiphytes. Stems erect or creeping, often with a pseudobulb. Leaves one to many, exarticulate, sheathing at base,

membranous. Flowers in terminal, dense, few to many-flowered, erect racemes, small, not resupinate. Sepals and petals free, spreading, reflexed, recurved or incurved. Labellum superior, entire or 3-lobed, sessile, not spurred, erect or spreading, usually embracing the column by basal auricles; mid lobe incised. Column very short, flat, terete, without foot, with or without fleshy arms. Anthers terminal, sessile, 2-celled; pollinia 4, in pairs, ovoid, waxy, free or cohering by viscid mass, without any appendage. Fruit a small capsule.

About 300 species; subcosmopolitan; 4 in M.P.

1a. Stems 20-30 cm high; labellum reniform ...4. *M. rheedii*

1b. Stems usually under 20 cm high; labellum ovate or ovate-oblong:

2a. Leaves 12-22 cm long; labellum not auriculate ...2. *M. latifolia*

2b. Leaves up to 9 cm long; labellum auriculate:

3a. Leaves 3-4, acuminate; petals brownish green with yellow purplish tinge; labellum notched at apex ...1. *M. acuminata*

3b. Leaves 2 or 3, obtuse; petals reddish purple; labellum deeply 2-fid at apex ...3. *M. mackinnonii*

1. Malaxis acuminata D. Don, Prodr. Fl. Nepal. 29. 1825. *Microstylis wallichii* Lindl., Gen. Sp. Orchid. Pl. 20. 1830; Hook. *f.*, Fl. Brit. India 5: 686. 1888.

Herbs, terrestrial. Roots fibrous. Stems erect, ribbed, 10-20 cm high, sheathed; sheaths ovate-lanceolate, acute. Leaves ovate-lanceolate, 6-9 x 3-4.5 cm, greenish purple, acuminate at apex. Flowers in 5-8 cm long, erect racemes, shortly pedicellate; bracts lanceolate, reflexed. Sepals oblong-ovate, recurved; lateral sepals shorter than dorsal sepal. Petals brownish green with yellow-purplish tinge, linear, longer than sepals, recurved. Labellum dark brown, ovate, discoid, notched at apex, with lanceolate auricles. Capsules *ca* 1 cm long.

In moist shady places on rocks. Hoshangabad. *Fl. & Fr.*: July Feb.

2. Malaxis latifolia Sm. in Rees, Cycl. 22: n 3. 1812. *M. plicata* Roxb., Fl. Ind. 3: 456. 1832. *Microstylis congesta* Rchb. *f.* in Walp., Ann. Bot. Syst. 6: 206. 1861; Hook. *f.*, Fl. Brit. India 5: 689. 1888. *M. latifolia* J.J. Sm., Orch. Java 6: 248. 1905.

Herbs, terrestrial. Stems stout, erect, pseudobulbous, 5-15 cm high. Leaves 4 or 5, ovate or lanceolate, 12-22 x 4-7 cm, purplish, acuminate at apex, sessile or petiolate. Flowers in dense, up to 20 cm long, stout spikes, small; bracts subulate-lanceolate, as long as the ovary. Sepals incurved; dorsal sepal oblong, recurved; lateral sepals oblong, larger than dorsal sepal, deflexed. Petals yellowish green flushed with purple, linear. Labellum ovate-oblong, concave, with a fold under the column, 3-lobed; mid lobe ovate; lateral lobes broad, obtuse. Columnar arms short, erect. Capsules ellipsoid, erect, transversely wrinkled.

Hoshangabad, Surguja (Tiwari and Maheshwari, 1963). *Fl. & Fr.*: June Dec.

3. Malaxis mackinnonii (Duthie) Ames, Orchidaceae 6: 289. 1920. *Microstylis mackinnonii* Duthie in J. Asiat. Soc. Bengal 71: 37. 1902. *M. cardonii* Prain, Bengal Pl. 2: 1004. 1903.

Herbs, terrestrial, pseudobulbous. Stems 10-17 cm high, swollen and covered with sheaths at base. Leaves 2 or 3, ovate, up to 6 x 4 cm, purple-coloured beneath, obtuse at apex, cordate or amplexicaul at base, horizontal, fleshy. Flowers in erect racemes, very small; scapes reddish purple; bracts subulate, persistent. Sepals ovate-lanceolate, reflexed; lateral sepals shorter. Petals reddish purple, linear, shorter than sepals, reflexed. Labellum divided by a raised rim; apical portion deeply 2-fid and protruded; basal portion falcately ovate-lanceolate. Column with fleshy, rounded arms.

Hoshangabad, Shahdol (Saxena, 1972). *Fl.*: July.

4. Malaxis rheedii Sw. in Vet. Akad. Nya Handl. Stockh. 21: 235. 1800. *Microstylis rheedii* (Sw.) Lindl., Gen. Sp. Orchid. Pl. 21. 1830, *p.p.*; Hook. *f.*, Fl. Brit. India 5: 690. 1890. *M. versicolor* Lindl., Gen. Sp. Orchid. Pl. 21. 1830. *Malaxis versicolor* Abeywickr. in Ceylon J. Sci., Biol. Sci. 2: 147. 1959.

Herbs, terrestrial, slender, stoloniferous. Stems succulent, covered with sheaths at base. Leaves ovate-oblong or elliptic, 5-17 x 2-6.5 cm, shortly

acuminate at apex, narrowed into sheathing petiole, with wavy margins, glabrous. Flowers in 10-25 cm long, erect racemes; bracts lanceolate, acuminate, deflexed. Dorsal sepal oblong, obtuse; lateral sepals ovate, curved. Petals orange-yellow, linear, reflexed. Labellum reniform, reflexed. Column yellow, somewhat constricted in the middle. Capsules dark brown, obovate, *ca* 1.5 cm long.

In moist places. Balaghat, Chhindwara, Hoshangabad, Surguja. *Fl. & Fr.*: July - Oct.

Notes: Tiwari and Maheshwari (1963) have reported *Malaxis cylindrostachya* (Lindl.) Kuntze based on Hook. *f.*, Fl. Brit. India 5: 689. 1888 who has reported its occurrence in Central India.

19. NERVILIA Commerson *ex* Gaud., *nom. cons.*

Herbs, perennial, terrestrial. Tubers present. Leaves solitary, appearing after flowering, broadly cordate or heart-shaped, glabrous or variously pubescent, petiolate. Flowers in erect racemes bearing 1, 2 or several flowers, erect, horizontal, resupinate. Sepals and petals similar, spreading. Labellum inferior, inserted at the base of column and embracing it, entire or 3-lobed, not spurred. Column long, slender, straight or slightly curved, without foot. Anthers terminal, imperfectly 2-celled; pollinia 2, yellow, 2-fid, without glands. Fruit a capsule.

About 80 species; tropical and subtropical regions of Old World; 3 in M.P.

1a. Flowers in few to many-flowered raceme:

2a. Leaves broadly ovate, with 10-15 cm long petiole; petals green; labellum 3-lobed ...1. *N. aragoana*

2b. Leaves orbicular, with *ca* 2 cm long petiole; petals creamy white; labellum entire or shallowly 3-lobed ...2. *N. plicata*

1b. Flowers solitary ...3. *N. prainiana*

1. Nervilia aragoana Gaud., Voy. Uranie 422. t. 35. 1829. *Pogonia flabelliformis* Lindl., Gen. Sp. Orchid. Pl. 415. 1840; Hook. *f.*, Fl. Brit. India 6: 121. 1890. *P. nervilia* Blume, Mus. Bot. 1: 32. 1849. *P. carinata*

Lindl., Gen. Sp. Orchid. Pl. 414. 1840; Hook. *f.*, Fl. Brit. India 6: 121. 1890. *P. scottii* Rchb. *f.* in Flora 55: 276. 1872; Hook. *f.*, Fl. Brit. India 6: 120. 1890. *Nervilia scottii* (Rchb. *f.*) Schlechter in Engl., Bot. Jahrb. 45: 404. 1911.

Small herbs, terrestrial. Tubers white, globose to subglobose. Leaves broadly ovate, *ca* 8 cm across, abruptly caudate at apex, cordate at base, undulate on margins, glabrous; petioles 10-15 cm long. Flowers in lax, few to many-flowered, 10-20 cm long racemes, drooping, shortly pedicellate; bracts linear-lanceolate, glabrous, deflexed. Sepals linear, subequal, acute, entire, glabrous, 3-nerved. Petals green, similar to sepals, sometimes narrower at base. Labellum obovate, *ca* 12 mm long, 3-lobed; mid lobe ovate, crenulate, densely pubescent along the nerves; lateral lobes erect, embracing the column. Column *ca* 7 mm long, dilated above.

In sal forests. Balaghat, Raipur. *Fl. & Fr.*: July Sept.

2. Nervilia plicata (Andr.) Schlechter in Engl., Bot. Jahrb. 45: 403. 1911. *Arethusa plicata* Andr., Bot. Repos. 5: t. 321. 1803. *Pogonia plicata* (Andr.) Lindl., Gen. Sp. Orchid. Pl. 415. 1840; Hook. *f.*, Fl. Brit. India 6: 119. 1890. *P. velutina* Par. & Rchb. *f.* in Trans. Linn. Soc. London 30: 142. 1874; Hook. *f.*, Fl. Brit. India 6: 119. 1890. *P. biflora* Wight, Icon. Pl. Ind. Orient. 5(1): t. 1758. 1851; Hook. *f.*, Fl. Brit. India 6: 119. 1890. *Nervilia discolor* Schlechter in Engl., Bot. Jahrb. 45: 403. 1911.

Small herbs, terrestrial, leafless during flowering. Tubers globose. Leaves appearing just above the ground, orbicular, 10-12 cm across, with dark purple blotches above, cordate at base, entire or broadly dentate, pubescent above; petioles *ca* 2 cm long. Flowers in 2-3-flowered racemes, erect or suberect; bracts ovate-lanceolate, entire. Sepals oblong-lanceolate, spreading. Petals creamy white, oblong-lanceolate, shorter and narrower than sepals. Labellum rounded, entire or slightly cleft at the tip, slightly saccate at base. Column 10-12 mm long, erect, curved, clavate at apex.

Hoshangabad. *Fl.*: July.

3. Nervilia prainiana (King & Pantl.) Seidenf. & Smitin., Orch. Thailand 730. 1965; Seidenf. in Dansk. Bot. Ark. 32(2): 149. 1978. *Pogonia prainiana* King & Pantl. in J. Asiat. Soc. Bengal 65: 129. 1896. *Nervilia monantha* Blatt. & McCann in J. Bombay Nat. Hist. Soc. 35: 724. 1932. **Fig. 5.**

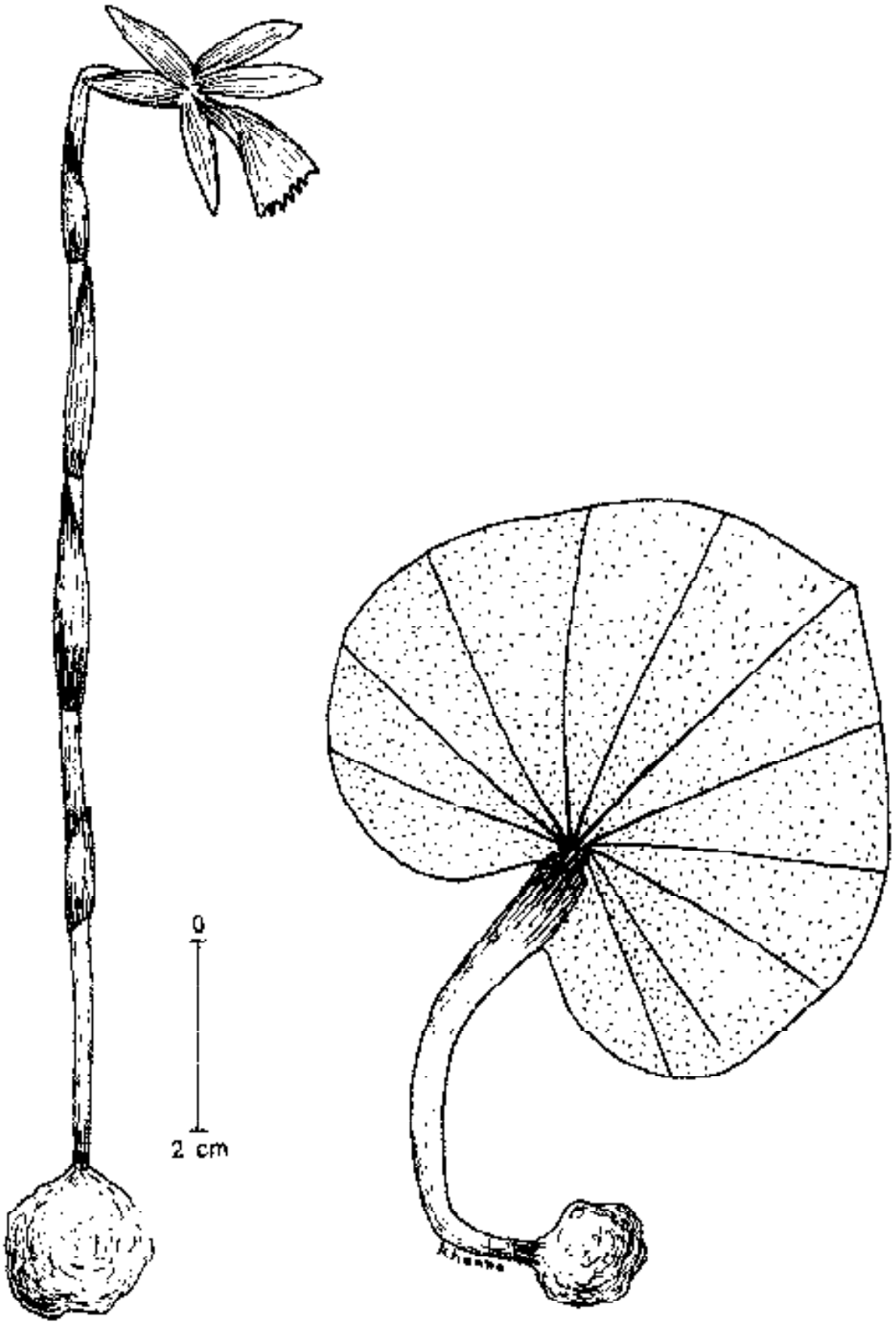

Fig. 5. Nervilia prainiana (King & Pantl.) Seidenf. & Smitin.

Herbs, terrestrial. Tubers ovate, fleshy. Leaves flat on the ground, reniform-cordate or broadly infundibuliform, 4-7 cm across, glandular pubescent above. Flowers solitary on 5-8 cm long peduncle; bracts triangular, small. Sepals and petals more or less similar, greenish white, linear-oblanceolate. Petals yellow, slightly shorter than sepals. Labellum pale pink, more or less tubular, obscurely 3-lobed, rarely saccate; mid lobe 3-4-lobulate, fimbriate, wrinkled, with hairy outgrowths; lateral lobes oblong, connivent around the column. Column clavate, glabrous. Capsules broadly fusiform, ribbed.

Hoshangabad. *Fl. & Fr.*: July Oct.

20. OBERONIA Lindl., *nom. cons.*

Epiphytes, erect or pendulous. Stems close together. Leaves distichous, laterally compressed, ensiform, linear or oblong, fleshy. Flowers in terminal, short or long, usually curved racemes or spikes, small, sessile or shortly pedicellate, bracteate. Sepals free, nearly equal, erect or reflexed. Petals usually narrower than sepals, sometimes toothed. Labellum superior, entire or 3-lobed, sessile on the base of column, fimbriate, often with basal lobes embracing the column. Column very short, without foot. Anthers terminal, incumbent; pollinia 4, in pairs, yellow, waxy, ecaudiculate. Fruit a small capsule.

About 330 species; tropical regions of Old World; 2 in M.P.

1a. Leaves more than 7 cm long; petals orange; labellum obcordate, with large lateral lobes ...1. *O. ensiformis*

1b. Leaves up to 7 cm long; petals yellow; labellum oblong, with small lateral lobes ...2. *O. falconeri*

1. **Oberonia ensiformis** (Sm.) Lindl., Fol. Orchid. Oberon. 4. 1859; Hook. *f.*, Fl. Brit. India 5: 679. 1888. *Malaxis ensiformis* Sm. in Rees, Cycl. 22: 14. 1812.

Herbs, epiphytic. Stems *ca* 6 cm long. Leaves linear-ensiform, falcately recurved, up to 20 x 2 cm, acuminate at apex, coriaceous. Flowers in dense, cylindrical, erect racemes; racemes shorter than leaves; bracts sheathing. Sepals broadly ovate, subacute. Petals orange, more or less similar to sepals, ovate, subacute. Labellum obcordate, twice as long as

the sepals, 3-lobed, hairy on margins; mid lobe obreniform, with 2 rounded lobules at apex.

Shahdol (Saxena, 1972). *Fl.*: Jan.

2. Oberonia falconeri Hook. *f.* in Hook., Icon. Pl. t. 1780. 1888 & Fl. Brit. India 5: 678. 1888. *Iridorchis falconeri* (Hook. *f.*) Kuntze, Revis. Gen. Pl. 2: 669. 1891. **Fig. 6.**

Herbs, epiphytic. Leaves oblong-lanceolate, subfalcate, 2-7 x 0.7-1 cm, acute at apex, coriaceous. Flowers in lax, 5-10 cm long, erect or curved racemes, spiral or subverticillate, shortly pedicellate; rhachis stout; bracts hyaline, oblong-lanceolate, glabrous, irregularly denticulate. Sepals yellow, entire, faintly 1-nerved. Petals yellow, oblong-ovate, subfalcate, gland-dotted, 1-nerved. Labellum greenish yellow, oblong, *ca* 2 mm long, 3-lobed; mid lobe oblong, broad, 2-lobulate at apex; lateral lobes small, tooth-like. Column yellow, oblong, small. Capsules obovoid, ribbed, shortly stipitate.

On *Diospyros* sp., *Shorea robusta* and dead tree branches. Balaghat, Bastar, Bilaspur, Mandla, Raigarh, Surguja. *Fl. & Fr.*: Aug. Feb.

21. PACHYSTOMA Blume

Herbs, terrestrial, arising from subterranean, simple or branched, tuberous, nodose rhizomes. Leaves 1 or 2, appearing after flowering, plaited, convolutive. Flowers in erect, hairy racemes, rather small, resupinate, pedunculate, brightly coloured; scapes with many sheaths. Sepals subequal, connivent; lateral sepals swollen at base and adnate to the base of column. Petals subequal, slightly smaller than dorsal sepal. Labellum firmly connate with the base of column and forming a very short pouch with it, with 5, longitudinal, tuberculate ribs on the inner side, 3-lobed, sessile; mid lobe short; lateral lobes oblong, erect. Column slender, curved, without or with a short foot. Anthers dorsal, 4-celled; pollinia 8, pyriform. Fruit a capsule.

About 11 species; China and Indo-Malesia to W. Pacific regions; one in M.P.

Pachystoma pubescens Blume, Bijdr. 376. 1825. *Apaturia senilis* Lindl., Gen. Sp. Orchid. Pl. 130. 1831. *Pachystoma senile* (Lindl.) Rchb. *f.* in Bonplandia 3: 251. 1855; Hook. *f.*, Fl. Brit. India 5: 812. 1890. *Kurkutti, Safed musli.*

Fig. 6. Oberonia falconeri Hook. *f.*

Herbs, terrestrial, erect, leafless while flowering. Rhizomes horizontal, subcylindrical. Leaves narrowly oblong-lanceolate, up to 30 x 1 cm, acute at apex, entire. Flowers in 30-40 cm long, erect racemes, erect at first, drooping after fertilization, pedicellate; bracts lanceolate, membranous. Sepals acute, shortly pubescent; dorsal sepal oblong, abruptly toothed at tip; lateral sepals oblong-lanceolate, subsaccate at base. Petals narrowly spathulate, more or less beaked at tip, sparsely pubescent. Labellum greenish yellow, 3-lobed, saccate; mid lobe oblong-orbicular, 5-lamellate; lateral lobes oblong, erect. Column curved, pubescent, without foot.

Mandla (Tiwari and Maheshwari, 1963). *Fl. & Fr.*: Feb. - Aug.

22. PAPILIONANTHE Schlechter

Epiphytes. Roots long, flexuous. Leaves terete. Flowers in axillary, 1-few-flowered racemes, small to large, often showy. Sepals unequal. Petals attached by a very broad base to the foot of the column. Labellum variously 3-lobed; mid lobe 2-fid at apex; lateral lobes forming a tube round the column; spur infundibuliform, often recurved. Column short, stout, non-pyramidal, with a distinct foot; foot continuous with the labellum, without articulation. Pollinia 2. Fruit a capsule.

About 11 species; S.E. Asia and Malay Archipelago; one in M.P.

Papilionanthe teres (Roxb.) Schlechter in Orchis 9: 78. 1915. *Dendrobium teres* Roxb., Fl. Ind. 3: 485. 1832. *Vanda teres* (Roxb.) Lindl., Gen. Sp. Orchid. Pl. 217. 1833; Hook. *f.*, Fl. Brit. India 6: 49. 1890.

Stems single or branched, subscandent, terete, smooth. Leaves few, alternate, distant, terete, 15-20 cm long, fleshy. Flowers in 3-6-flowered, up to 30 cm long racemes, fragrant; racemes borne opposite the leaf base and in upper part of stem. Sepals light red, often mixed with white, undulate; dorsal sepal broadly elliptic, blunt; lateral sepals broadly oblong. Petals rose-coloured, rarely white, larger than lateral sepals, wide spreading. Labellum adnate to the foot of column, longer than sepals, 3-lobed, hairy at base; mid lobe yellow at base with red speckles, fan-shaped, broad, deeply 2-fid; lateral lobes obtusely triangular, forming a tube round the column; spur infundibuliform, laterally compressed, puberulous inside. Column short, with a distinct foot. Capsules narrowly fusiform.

Indore. *Fl. & Fr.*: Sept. Dec.

23. PELATANTHERIA Lindl.

Epiphytes. Stems non-pseudobulbous, erect or pendulous, short or long. Leaves flat or terete, articulate, coriaceous or fleshy. Flowers in extra-axillary, many-flowered, erect or pendulous racemes or panicles, rather small, fleshy, resupinate. Sepals and petals similar, free, spreading. Labellum adnate to the base of column by posterior margins, immobile, 3-lobed, spurred; mid lobe triangular or hastate, small; lateral lobes more or less triangular, acute; spur conical or cylindrical, often longitudinally septate. Column short, with a short foot. Anther rostrate; pollinia 4, in 2 pairs, borne on a common, slender caudicle; gland small. Fruit a capsule.

About 8 species; India to Taiwan and W. Malesia; one in M.P.

Pelatantheria insectifera (Rchb. *f.*) Ridl. in J. Linn. Soc. London (Bot.) 32: 373. 1896; Seidenf. & Arora in Nord. J. Bot. 2(1): 23. 1982. *Sarcanthus insectifera* Rchb. *f.* in Bot. Zeit. 159. 1857; Hook. *f.*, Fl. Brit. India 6: 68. 1890.

Epiphytes, *ca* 40 cm high. Stems robust. Leaves crowded, distichously spreading, oblong-obovate or lanceolate, 3.5-5 x 1-1.5 cm, obtusely 2-lobed at apex, amplexicaul at base, coriaceous. Flowers in few-flowered, decurved, subsessile racemes; racemes shorter than leaves; bracts minute, caducous. Sepals oblong-ovate. Petals greenish white with red-brown stripes. Labellum white, pink or purple, 3-lobed; mid lobe triangular, ovate or cordate, larger than the sepals; lateral lobes short, rounded; spur conical, longitudinally septate; dorsal callus large. Capsules *ca* 2 cm long.

In deciduous forests. Bastar, Bilaspur, Raigarh. *Fl. & Fr.*: July - Feb.

24. PERISTYLUS Blume, *nom. cons.*

Herbs, terrestrial, erect, usually growing from tubers. Stems with basal sheath. Leaves few to many, thin, exarticulate, convolutive. Flowers in terminal spikes or racemes, small or large, resupinate, bracteate. Sepals free, unequal or subequal; dorsal sepal often galeate; lateral sepals sometimes mucronate. Petals free, subequal, entire. Labellum connate with the margins of column at base, entire or 3-lobed, shortly spurred. Column

short, without foot, flanked by staminodes. Anthers erect, 2-celled; pollinia 2, usually 2-lobed, granular, with short caudicles and exserted, naked gland. Stigmatic lobes separate, sessile; rostellum short, subulate or tooth-like. Fruit a capsule, slightly beaked.

About 70 species; Asia to Pacific regions; 6 in M.P.

1a. Leaves usually clustered near the middle of stem; spur shorter than sepals, globose, ellipsoid or scrotiform:

2a. Labellum distinctly 3-lobed:

3a. Tubers hairy; leaves ovate, ovate-elliptic or elliptic-obovate, more than 2 cm broad:

4a. Racemes 20-30 cm long; petals longer than sepals; labellum as long as petals ...1. *P. constrictus*

4b. Racemes up to 15 cm long; petals more or less equal to sepals; labellum longer than petals ...2. *P. goodyeroides*

3b. Tubers glabrous; leaves lanceolate or oblong-lanceolate, up to 2 cm broad ...3. *P. lawii*

2b. Labellum entire or obscurely 3-lobed:

5a. Inflorescence a raceme; petals greenish white; labellum obscurely 3-lobed ...4. *P. parishii*

5b. Inflorescence a spike; petals white or cream-coloured; labellum entire ...5. *P. plantagineus*

1b. Leaves more or less scattered on the stem; spur as long as or longer than sepals, linear or subclavate ...6. *P. stocksii*

1. Peristylus constrictus (Lindl.) Lindl., Gen. Sp. Orchid. Pl. 300. 1835, '*constricta*'. *Herminium constrictum* Lindl. in Edward's Bot. Reg. 18: sub t. 1499. 1832-1833. *Habenaria constricta* (Lindl.) Hook. *f.*, Fl. Brit. India 6: 161. 1890.

Herbs, terrestrial, 30-50 cm high. Tubers oblong, hairy. Stems stout, covered with sheaths at base. Leaves 5-6, clustered near the middle of stem, more or less whorled, ovate or ovate-elliptic, 5-12 x 3-6 cm, acute at apex, narrowed to sheath at base, inflated at the mouth. Flowers in many-flowered, cylindrical, 20-30 cm long racemes; bracts large, erect, lanceolate. Sepals oblong, subequal; lateral sepals spreading. Petals yellowish or greenish white, ovate-lanceolate, longer than sepals. Labellum as long as the petals, 3-lobed to about the middle; mid lobe lanceolate, shorter; lateral lobes linear; spur globose. Capsules fusiform.

Bilaspur, Chhindwara, Hoshangabad, Raipur, Rajnandgaon. *Fl. & Fr.*: July - Sept.

2. Peristylus goodyeroides (D. Don) Lindl., Gen. Sp. Orchid. Pl. 299. 1835. *Habenaria goodyeroides* D. Don, Prodr. Fl. Nepal. 25. 1825; Hook. *f.*, Fl. Brit. India 6: 161. 1890.

Herbs, terrestrial, robust, *ca* 20 cm high. Tubers 1-2, globose or oblong. Leaves 4-6, spirally arranged at about the middle of stem, ovate, elliptic-obovate, subequal, 5-8 x 2-4 cm, acute at apex, sheathing at base. Flowers in dense, up to 15 cm long racemes, fragrant; peduncles bracteate; bracts lanceolate, longer than flowers, persistent. Sepals unequal; dorsal sepal ovate-oblong, obtuse, forming a hood with the petals; lateral sepals oblong, mucronate, papillose. Petals greenish white, trapeziform, more or less equal to sepals in length, blunt. Labellum longer than petals, 3-lobed; mid lobe broader; lateral lobes linear-oblong, falcate, slightly longer than mid lobe; spur globose, minute.

In sandy humus soil. Bilaspur, Hoshangabad. *Fl. & Fr.*: July - Nov.

3. Peristylus lawii Wight, Icon. Pl. Ind. Orient. 5(1): t. 1695. 1851. *Habenaria lawii* (Wight) Hook. *f.*, Fl. Brit. India 6: 162. 1890.

Small herbs, terrestrial, 10-30 cm high. Tubers 1-2, ovate-oblong. Stems terete, stout, covered with oblong, infundibuliform sheaths. Leaves 3-4, clustered about the middle of stem, lanceolate or oblong-lanceolate, 6-9 x 1-2 cm, acute at apex, sheathing at base, entire, glabrous. Flowers in 8-15 cm long spikes, sessile; bracts lanceolate, acuminate, conduplicate. Sepals white, subequal; dorsal sepal ovate-oblong; lateral sepals lanceolate or oblong, entire, conduplicate. Petals greenish white, obovate, broader than

lateral sepals, obtuse. Labellum 3-lobed about the middle, clawed; lobes subequal; spur small, scrotiform. Capsules fusiform, ribbed.

In moist places. Bilaspur, Hoshangabad, Mandla, Seoni. *Fl. & Fr.*: July - Sept.

4. Peristylus parishii Rchb. *f.* in Trans. Linn. Soc. London 30:139. 1874. *Habenaria parishii* (Rchb. *f.*) Hook. *f.*, Fl. Brit. India 6: 161. 1890.

Herbs, terrestrial, woody, 50-65 cm high. Leaves clustered around the stem, oblong-ovate, 6-12 cm long, acute or acuminate at apex. Flowers in several-flowered, 10-20 cm long racemes; bracts lanceolate, acuminate, longer or shorter than ovary. Dorsal sepal larger than lateral ones; lateral sepals linear-oblong. Petals greenish white, broadly ovate, longer than sepals, more or less acute. Labellum obscurely 3-lobed, spurred; mid lobe oblong, obtuse; lateral lobes deltoid; spur globose or ellipsoid, broadly fusiform, shorter than sepals.

Rewa (Tiwari and Maheshwari, 1963). *Fl. & Fr.*: Aug. Sept.

5. Peristylus plantagineus (Lindl.) Lindl., Gen. Sp. Orchid. Pl. 300. 1835, *'plantaginea'. Herminium plantagineum* Lindl. in Edward's Bot. Reg. 18: t. 1499. 1832-1833. *Habenaria wightii* Trimen, Syst. Cat. Fl. Pl. Ceylon 91. 1885; Hook. *f.*, Fl. Brit. India 6: 162. 1890. *H. elata* (Dalzell) Alston in Trimen, Handb. Fl. Ceylon 6: 280. 1931. *Peristylus elatus* Dalzell in Hook., J. Bot. Kew Gard. Misc. 3: 344. 1851. **Fig. 7.**

Herbs, terrestrial, tuberous, 30-60 cm high. Stems robust, leafy about the middle, lower portion covered with lanceolate, more or less infundibuliform sheaths. Leaves usually 4-8, oblong-lanceolate, 7-13 x 2.5-4 cm, acute at apex, subamplexicaul at base, entire, minutely papillose. Flowers in 10-20 cm long, erect spikes, sessile, densely arranged; bracts unequal, lanceolate, acuminate. Sepals brown, subequal, glabrous; dorsal sepal oblong-ovate; lateral sepals oblong, longer, incurved. Petals white or cream-coloured, obliquely orbicular, obtuse, glabrous. Labellum broadly ovate, entire; spur very small, scrotiform. Column very short, base continuous into labellum. Capsules fusiform, ribbed.

Common in sal forests. Balaghat, Jabalpur, Raipur, Rajnandgaon, seoni, Surguja. *Fl. & Fr.*: Aug. Dec.

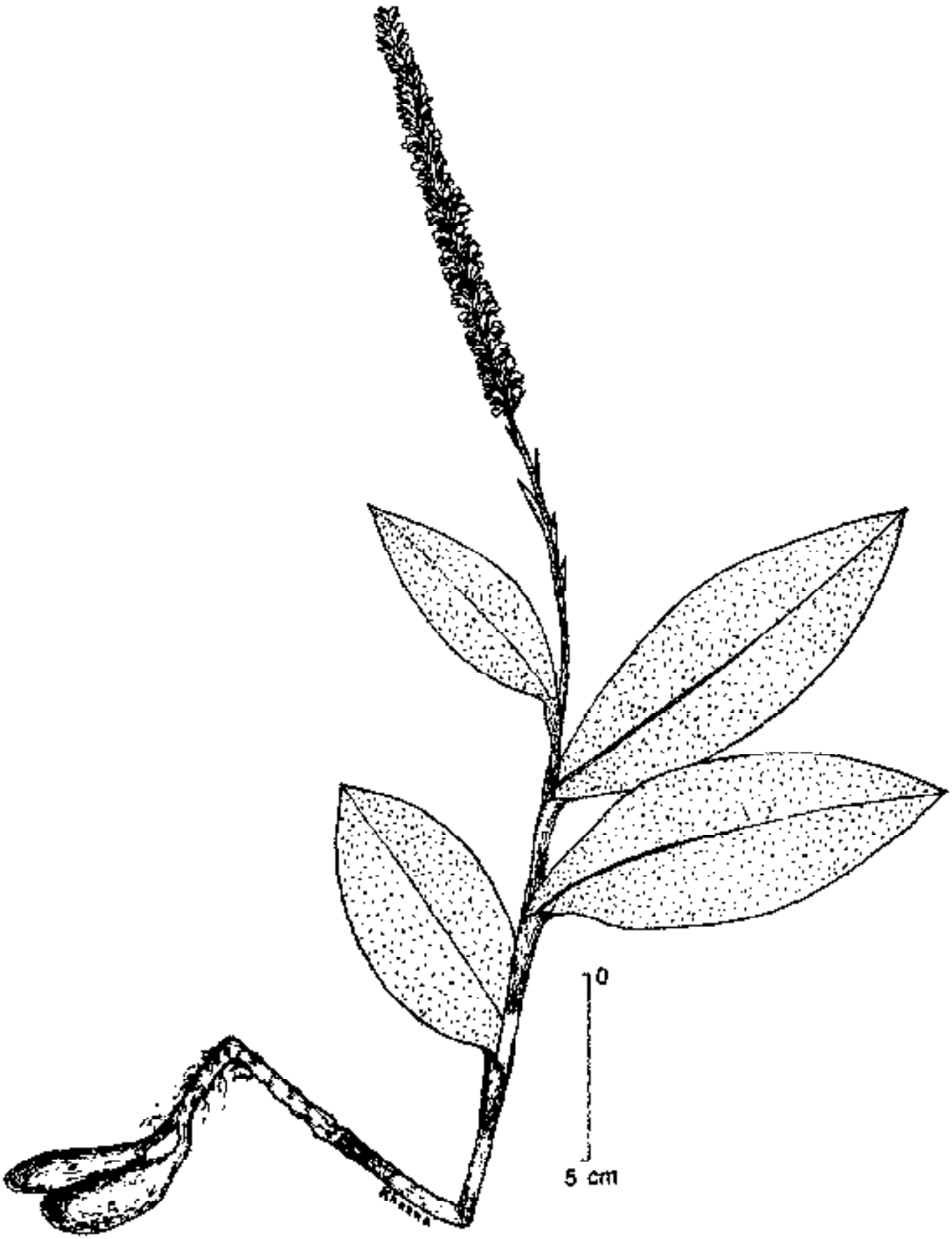

Fig. 7. Peristylus plantagineus (Lindl.) Lindl.

6. Peristylus stocksii (Hook. *f.*) Kraenzl., Orchid. Gen. Sp. 1: 513. 1898. *Habenaria stocksii* Hook. *f.*, Fl. Brit. India 6: 158. 1890.

Herbs, terrestrial, up to 30 cm high. Tubers 1-2, oblong or ellipsoid. Leaves more or less scattered on the stem, obovate-elliptic or elliptic-lanceolate, 5-10 x 1-2.5 cm, acute at apex, sheathing at base, wavy on margins. Flowers in many-flowered spikes, sessile; bracts ovate, glabrous. Sepals green, unequal, more or less fleshy; dorsal sepal elliptic-oblong, concave, forming a hood with petals over column; lateral sepals obliquely ovate, spreading. Petals yellowish green, ovate-oblong, somewhat fleshy. Labellum green, 3-lobed, clawed; mid lobe oblong, straight; lateral lobes oblong, incurved; spur green, smaller than ovary. Capsules ribbed.

As forest undergrowth. Hoshangabad. *Fl. & Fr.*: July Aug.

25. PHAIUS Lour.

Herbs, terrestrial. Stems leafy, pseudobulbous at base; pseudobulbs pluriarticulate. Leaves plaited, convolutive, membranous. Flowers in lax, few to many-flowered pedunculate racemes, large, resupinate; racemes axillary, arising from the side of the pseudobulb or at the apex of the stem. Sepals and petals slightly differing, free, spreading. Labellum adnate to the base of column and embracing it, 3-lobed, spurred, with longitudinal ridges on the upper surface. Column long, slender, usually without foot. Anthers incompletely 4-celled; pollinia 8, in 2 groups of 4 each, with a waxy caudicle. Fruit a capsule.

About 30 species; Indo-Malesia to S. China and tropical Australia; one in M.P.

Phaius tancarvilleae (Banks *ex* L'Herit.) Blume, Mus. Bot. 2: 177. 1856; Seidenf. & Arora in Nord. J. Bot. 2(1): 24. 1982; Khanna *et al.* in J. Econ. Tax. Bot. 23(3): 712. 1999. *Limodorum tancarvilleae* Banks *ex* L' Herit., Sert. Angl. 28. 1789. *Phaius wallichii* Lindl. in Wallich, Pl. Asiat. Rar. 2: 46. t. 158. 1831; Hook. *f.*, Fl. Brit. India 5: 816. 1890.

Large herbs, terrestrial. Roots vrmiform. Stems stout, leafy; pseudobulbs large, ovoid. Leaves 2-4 to each pseudobulb, elliptic-lanceolate, 30-60 x 6-15 cm, acuminate at apex, strongly ribbed, long petiolate. Flowers in many-flowered, long pedunculate racemes; racemes arising

from the side of pseudobulb; peduncles green, *ca* 40 cm or more long, with sterile bracts; floral bracts orbicular-ovate, acuminate. Sepals and petals white or sometimes rosy yellow or brown, lanceolate, acuminate-acute, spreading. Labellum yellow, 3-lobed, erect; mid lobe usually red, orbicular, crenate; lateral lobes crenate, recurved; spur terete, curved, conical, sometimes 2-fid. Column more or less straight, without foot. Capsules oblong, 5-6 cm long.

Gwalior. *Fl. & Fr.*: April - Sept.

26. PHOLIDOTA Lindl. *ex* Hook.

Herbs, epiphytic, with creeping rhizome. Pseudobulbs uninodal, single or aggregated. Leaves solitary or paired, plaited, articulate, convolutive, more or less coriaceous. Flowers in terminal, many-flowered, drooping racemes, small, resupinate, borne alternatively in two ranks, hidden in imbricating bracts; rhachis conspicuously zigzag; bracts large, cymbiform, distichous. Sepals slightly differing, concave; dorsal sepal rounded; lateral sepals cymbiform, keeled, acute. Petals free, narrowly linear. Labellum deeply concave, 3-lobed, saccate, with prominent thickenings on the inner side. Column short, broadly winged; foot absent. Anthers 2-celled; pollinia 4, in 2 pairs, waxy, with short caudicles. Fruit a capsule.

About 29 species; Indo-Malesia and W. Pacific regions; one in M.P.

Pholidota imbricata Lindl. in Hook., Exot. Fl. sub. t. 138. 1825; Hook. *f.*, Fl. Brit. India 5: 845. 1890. *Cymbidium imbricatum* Roxb., Fl. Ind. 3: 460. 1832.

Herbs, epiphytic, pendulous. Pseudobulbs ovoid-conical, large, in clusters, covered by bracts. Leaves solitary, arising from top of pseudobulb, elliptic-oblanceolate, 15-20 x 3-6 cm, plaited, entire, coriaceous. Flowers in *ca* 20 cm long, pendulous racemes, arranged in 2 rows; rhachis zigzag; bracts convolute. Sepals subequal; dorsal sepal broadly ovate; lateral sepals ovate, cymbiform, with a median wing. Petals white with pink or yellow tinge, linear, subfalcate, acute, 1-nerved. Labellum pale pink, 3-lobed, deeply saccate; mid lobe with a shallow, median sinus, 2-lobulate, lobules auricular; lateral lobes broadly triangular, erect; sac with 3, longitudinal ridges inside. Capsules ellipsoid.

Surguja. *Fl. & Fr.*: June - Dec.

27. PLATANTHERA Rich., *nom. cons.*

Herbs, terrestrial, erect. Rhizomes short; tubers present. Stems simple. Leaves exarticulate, convolutive, entire, gradually passing into bracts towards the top of stem. Flowers in terminal, few to many-flowered, erect racemes or spikes, resupinate. Sepals more or less unequal. Petals forming a hood or helmet with the dorsal sepal. Labellum entire or 3-lobed, spurred. Column short, with a pulvinate stelid. Anthers erect, inserted by a broad base, emarginate at apex; pollinia 2, clavate, with a long caudicle and gland; rostellum broad, short. Fruit a capsule.

About 85 species; mostly in Northern hemisphere; 2 in M.P.

1a. Petals usually broadly ovate; labellum greenish yellow, entire ...1. *P. latilabris*

1b. Petals linear-oblong; labellum white, 3-lobed, dissected into filiform segments ...2. *P. susannae*

1. Platanthera latilabris Lindl., Gen. Sp. Orchid. Pl. 289. 1835. *Habenaria latilabris* (Lindl.) Hook. *f.*, Fl. Brit. India 6: 153. 1890.

Herbs, terrestrial, 40-50 cm high. Tubers spindle-shaped, stout. Stems with infundibuliform sheaths towards lower portion. Leaves ovate or oblong, 3-6 x 1.5-2 cm, acuminate at apex, sheathing at base, smooth, sessile. Flowers in many-flowered, narrow, cylindrical spikes, moderately densely arranged; bracts lanceolate. Sepals ciliolate; dorsal sepal broader than lateral ones; lateral sepals broadly ovate, deflexed. Petals yellowish green, variable in shape, usually broadly ovate, more or less equal to lateral sepals, fleshy. Labellum greenish yellow, linear, longer than sepals, entire, with recurved edges; spur cylindrical, laterally compressed, curved. Capsules ribbed.

Mandla. *Fl. & Fr.*: July - Sept.

2. Platanthera susannae (L.) Lindl., Gen. Sp. Orchid. Pl. 295. 1835. *Orchis susannae* L., Sp. Pl. 939. 1753. *O. gigantea* Sm., Exot. Bot. 2: 79. t. 100. 1805. *Habenaria gigantea* D. Don, Prodr. Fl. Nepal. 24. 1825. *H. susannae* (L.) R. Br. *ex* Spreng., Syst. Veg. 3: 622. 1826; Hook. *f.*, Fl. Brit. India 6: 137. 1890.

Herbs, terrestrial, stout, up to 1.5 m high. Tubers ellipsoid or ovoid. Stems with infundibuliform sheaths towards lower portion. Leaves ovate-oblong, 8-15 x 3.5-6 cm, deep green above, paler beneath, acute at apex, sheathing at base, entire, glabrous. Flowers in terminal, 2-6-flowered, *ca* 20 cm long racemes, fragrant, subsessile; bracts oblong-lanceolate, entire, longer than the ovary. Sepals white; dorsal sepal ovate-elliptic, revolute; lateral sepals obliquely oblong, revolute. Petals white, linear-oblong, acute, fleshy. Labellum white, fan-shaped, 3-lobed, fimbriately dissected into 10-16, thin, narrow, linear-filiform segments, fleshy; mid lobe linear-spathulate; lateral lobes very broad, truncate; spur pale green, obtuse. Column white, oblong. Capsules ellipsoid, ribbed.

In moist shady places of mixed forests. Balaghat, Bastar, Hoshangabad, Mandla, Raipur, Rajnandgaon. *Fl. & Fr.*: Sept. Dec.

28. POMATOCALPA Breda, Kuhl & Hasselt

Epiphytes. Stems short or long. Leaves oblong or lorate, articulate. Flowers in dense, more or less branched, many-flowered, short or long, erect or decurved racemes, small, not resupinate; racemes borne on nodes. Sepals and petals free, slightly differing. Labellum connate with column, immobile, more or less bucket-shaped, 3-lobed; mid lobe triangular or rounded, straight or curved, fleshy; lateral lobes small, erect; spur shortly saccate, usually with a widened top, front wall with a fleshy thickening, back wall with an erect tongue or lamella directed towards the mouth of spur. Column short, without foot. Pollinia 4, paired, connected to a globose body. Fruit a capsule.

About 60 species; China to Malesia, Australia and Polynesia; one in M.P.

Pomatocalpa ramosum (Lindl.) Summerh. in Kew Bull. 1948: 56. 1948. *Saccolabium ramosum* Lindl., Gen. Sp. Orchid. Pl. 224. 1833. *Cleisostoma ramosum* (Lindl.) Hook. *f.*, Fl. Brit. India 6: 72. 1890.

Epiphytes. Roots tufted. Stems 2.5-8 cm long. Leaves oblong, 7.5-12.5 x 0.8-1.3 cm, channelled, primose at apex. Flowers in erect, leaf-opposed panicles, star-shaped. Dorsal sepal spathulate, erect; lateral sepals obovate, spreading. Petals buff-coloured or yellow flushed with red, spathulate, equal, spreading. Labellum white, with pink or yellow tinge, 3-

lobed; mid lobe thick, ovate, 2-lobulate; lateral lobes subulate; disk with a scale about the middle, hairy at base; spur white, cylindrical, incurved, hairy inside; callus at the mouth of the spur flat, pubescent. Column broad. Pollinia unequal. Capsules fusiform, ridged.

Bastar (Tiwari and Maheshwari, 1963). *Fl. & Fr.*: April - May.

29. RHYNCHOSTYLIS Blume

Epiphytes. Stems non-pseudobulbous, short, thick. Leaves distichous, articulate, thick, stiff, unequally 2-lobed and toothed at apex, sessile. Flowers in dense, cylindrical, long, erect or drooping racemes, resupinate, showy. Sepals and petals free, slightly differing, spreading, fleshy; lateral sepals adnate to the column foot. Petals smaller than sepals. Labellum adnate to the column foot, immobile, entire or slightly 3-lobed, spurred; spur reverse, laterally compressed, without thickenings. Column short with a short foot. Anthers beaked, incumbent, 2-celled; pollinia 2, globose, cleft, placed on a common, long, apically spathulate caudicle, with a distinct, small gland. Fruit a capsule.

About 15 species; tropical Asia; one in M.P.

Rhynchostylis retusa (L.) Blume, Bijdr. 286. 1825; Hook. *f.*, Fl. Brit. India 6: 32. 1890. *Epidendrum retusum* L., Sp. Pl. 953. 1753. *Saccolabium guttatum* Lindl., Gen. Sp. Orchid. Pl. 220. 1833. *Aerides guttatum* Roxb., Fl. Ind. 3: 471. 1832.

Epiphytes. Roots long, thick. Stems stout, sheathed. Leaves alternate, linear, strap-shaped, 12-28 x 2-3 cm, recurved, unequally 2-lobed at apex, sheathing at base. Flowers in axillary, dense, cylindrical, drooping racemes; bracts ovate-lanceolate, persistent. Dorsal sepal ovate-oblong, obtuse, glabrous, entire; lateral sepals obliquely ovate, larger than the dorsal one. Petals pinkish violet or white with purple spots, ovate-elliptic, narrower than sepals, obtuse. Labellum pink-purple, slightly 3-lobed, bent inwards; spur large, pubescent inside. Capsules oblong-obovate, *ca* 2 cm long, ridged, stipitate.

On a number of trees like *Mangifera indica, Diospyros* sp., *Bischofia* sp. and *Syzygium* sp. Balaghat, Bastar, Betul, Bilaspur, Hoshangabad, Raigarh. *Fl. & Fr.*: July - Feb.

30. SPIRANTHES Rich., *nom. cons.*

Herbs, terrestrial, erect. Roots cylindrical or tuberous, fleshy. Leaves few, radical, narrow, sheathing at base or petiolate. Flowers in terminal, glandular pubescent spikes, small, more or less spirally arranged, resupinate. Sepals and petals more or less similar; dorsal sepal forming a hood with the petals; lateral sepals more or less decurrent on ovary to form a mentum at base. Labellum entire or obscurely 3-lobed, concave or cymbiform at base, with appendages or thickenings. Column terete, short, oblique to the ovary, with or without a foot. Anthers erect, 2-celled; pollinia 2, granular, deeply furrowed, with their filaments coherent to a narrow, viscid gland. Fruit a capsule.

About 42 species; N. temperate regions, few in tropical America, Malesia, Australia and Pacific regions; one in M.P.

Spiranthes sinensis (Pers.) Ames, Orchidaceae 2: 53. 1908. *Neottia sinensis* Pers., Syn. Pl. 2: 511. 1807. *N. australis* R. Br., Prodr. 319. 1810. *Spiranthes australis* (R. Br.) Lindl. in Bot. Reg. 10: sub t. 823. 1825; Hook. *f.*, Fl. Brit. India 6: 102. 1890.

Herbs, terrestrial, slender, 20–40 cm high. Roots fasciculate. Leaves clustered at the base of flowering shoot, linear-lanceolate, 6-10 x 0.5-0.7 cm, acute at apex, sheathing at base. Flowers in *ca* 20 cm long, spirally twisted, erect, glandular pubescent spikes, fragrant, resupinate; bracts oblong-lanceolate, glandular pubescent. Dorsal sepal greenish white, oblong-lanceolate; lateral sepals obliquely oblong. Petals white, oblong or spathulate, cohering with the dorsal sepal, wavy on margins. Labellum oblong, obscurely 3-lobed, truncate, fleshy, with 2 lateral calli at base; mid lobe flabellate, reflexed, retuse at tip; lateral lobes narrow, erect. Column greenish white. Capsules fusiform, pubescent.

In damp marshy places of hill slopes usually under shade. Sidhi. *Fl. & Fr.*: March - April.

31. THUNIA Rchb. *f.*

Epiphytes or terrestrials, tufted. Stems slender, erect, terete; pseudobulbs absent. Leaves numerous, distichous, plaited, articulate, membranous. Flowers in terminal, dense, few to many-flowered, 2-seriate,

noding racemes, large, resupinate; bracts large, membranous, spathaceous. Sepals and petals more or less similar, free, divaricate; sepals not forming mentum. Labellum 3-lobed; mid lobe large, expanded, crispate or fimbriate; lateral lobes short, rolled around the column; spur short, obtuse or emarginate. Column slender, with 2 narrow wings near apex, without foot. Anthers 2-celled; pollinia 8, attached in 2 groups of 4 each to a membrane; rostellum 3-fid. Fruit a capsule.

About 6 species; India to Myanmar; one in M.P.

Thunia alba (Lindl.) Rchb. *f.* in Bot. Zeit. 1852: 764. 1852. *Phajus albus* Lindl., Gen. Sp. Orchid. Pl. 128. 1831; Hook. *f.*, Fl. Brit. India 5: 818. 1890, *p.p.*

Herbs, lithophytic, erect, tufted, up to 1 m high. Leaves alternate, elliptic or elliptic-lanceolate, 10-13 x 1.6-1.8 cm, acute at apex, entire, sessile. Flowers in compact, somewhat compressed racemes, cymbiform, pedicellate; racemes terminating from a cluster of apical leaves; bracts ovate-oblong, spathaceous. Sepals oblong-elliptic, acute, more or less equal. Petals pale-coloured, oblong-elliptic, slightly smaller than sepals. Labellum shorter than sepals and petals, fimbriate at apex, spurred; mid lobe with longitudinal ridges; spur linear, 5-7 mm long, obtuse or emarginate. Capsules *ca* 3 cm long.

On rocks and boulders. Surguja. *Fl. & Fr.*: July - April.

32. TROPIDIA Lindl.

Herbs, terrestrial, erect, glabrous. Rhizomes branched. Stems simple or branched, crowded. Leaves plaited, exarticulate, convolutive. Flowers in terminal or axillary, dense, few or many-flowered spikes, small, sometimes resupinate; bracts persistent. Sepals free; dorsal sepal and petals slightly differing; lateral sepals connate at base, forming a mentum with the base of labellum. Labellum superior, recurved at top, shortly spurred, sessile on the base of column, with 2, longitudinal keels on the inner side. Column short, stout; rostellum 2-fid. Anthers short, erect; pollinia 2, granular, 2-partite, with a short or long, narrow, common caudicle; gland small. Fruit a capsule.

About 22 species; Indo-Malesia to Taiwan, W. Pacific regions and C. America to W. Indies; one in M.P.

Tropidia angulosa Blume, Coll. Orchid. 122. 1858; Hook.*f.*, Fl. Brit. India 6: 92. 1890. *Govindovia nervosa* Wight, Icon. Pl. Ind. Orient. 6: t. 2090. 1853. *Tropidia bellii* Blatt. & McCann in J. Bombay Nat. Hist. Soc. 35: 730. 1932.

Herbs, terrestrial. Stems erect, slender, with tubular sheaths. Leaves 2, elliptic to broadly ovate, 7.5-12 x 1-1.8 cm, acuminate at apex, sheathing at base, shortly petiolate. Flowers in terminal, dense, solitary, many-flowered, conical, erect spikes, resupinate; bracts lanceolate. Sepals oblong-lanceolate. Petals white or pale yellow, obliquely ovate-oblong. Labellum shortly connate with column at base, sigmoid, oblanceolate-oblong; spur cylindrical, blunt. Column short. Capsules clavate-cylindrical.

In humus of forest floor. Bastar. *Fl. & Fr.*: Aug. Dec.

33. VANDA W. Jones *ex* R. Br.

Epiphytes. Roots thick, vermiform. Stems monopodial, long, non-pseudobulbous, densely or rather remotely leafy. Leaves distichous, flat, articulate. Flowers in axillary, few to many-flowered, erect racemes, usually large, resupinate. Sepals and petals free, spreading, narrowed at base, crisped on edges. Labellum smaller than sepals, immobile, 3-lobed, saccate or spurred; mid lobe large, erect or recurved, usually with longitudinal ridges; lateral lobes erect; spur short, infundibuliform. Column short, thick; foot short or absent. Pollinia 2, cleft or 4, borne on a short caudicle and gland. Fruit a capsule.

About 35 species; Indo-Malesia, Australia and Philippine Islands; 3 in M.P.

1a. Labellum without ridges; spur vermiform at tip; capsules up to 3 cm long ...3. *V. testacea*

1b. Labellum with ridges; spur not vermiform at tip; capsules more than 3 cm long:

2a. Leaves 15-20 cm long; racemes longer than leaves; sepals and petals spreading ...2. *V. tessellata*

2b. Leaves up to 10 cm long; racemes not exceeding the leaves; sepals and petals incurved ...1. *V. cristata*

1. Vanda cristata Lindl., Gen. Sp. Orchid. Pl. 216. 1833; Hook. *f.*, Fl. Brit. India 6: 53. 1890.

Epiphytes. Stems 8-15 cm long, sheathed. Leaves linear, conduplicate, 8-12 cm long, unequally 2-lobed at apex, dilated and sheathed at base, coriaceous. Flowers in axillary, 2-5-flowered racemes; racemes not exceeding the leaves. Sepals oblong, unequal, obtuse, incurved. Petals whitish blue, oblong, narrower than sepals, incurved. Labellum adnate to the base of the column, blue with brown stripes, longer than sepals, 3-lobed; mid lobe oblong, with two divaricate, oblong lobules and a horn-like, fleshy beak pointing downwards, with 5, carunculate ridges on upper surface; lateral lobes triangular, erect; spur conical, obtuse. Column short, without foot. Capsules narrowly clavate, 4-5 cm long.

In deciduous forests. Bastar, Bilaspur, Mandla. *Fl. & Fr.*: March May.

2. Vanda tessellata (Roxb.) Hook. *ex* G. Don in Loud., Hort. Brit. 372. 1830. *Epidendrum tessellatum* Roxb., Pl. Coromandel 1: 34. t. 42. 1795. *Vanda roxburghii* R. Br. in Bot. Reg. 6: t. 506. 1821; Hook. *f.*, Fl. Brit. India 6: 52. 1890. *Cymbidium tesseloides* Roxb., Fl. Ind. 3: 463. 1832, '*tessaloides*' *Badang.*

Epiphytes. Stems thick, 30-50 cm long, sheathed. Leaves alternate, linear, recurved, 10-18 x 1-2 cm, praemorse at apex, thick, coriaceous, keeled. Flowers in axillary, up to 10 - flowered, zigzag, 15-20 cm long racemes, fragrant; bracts triangular, obtuse, 1-veined. Sepals unequal; dorsal sepal obovate, faintly 3-fid, waxy on margins; lateral sepals obovate, obtuse. Petals yellowish green, oblong, shorter than sepals, obtuse. Labellum white or yellow with violet tips, infundibuliform, 3-lobed, spurred; spur conical, 6-7 mm long. Column cylindrical, fleshy. Capsules clavate, 6-7 cm long, ribbed; stipe 1.5-3.5 cm long.

Common on a number of roadside trees like *Mangifera indica, Madhuca longifolia, Diospyros melanoxylon, Butea monosperma* and *Terminalia alata.* Balaghat, Bastar, Betul, Bilaspur, Chhatarpur, Damoh, Durg, Hoshangabad, Indore, Jabalpur, Mandla, Narsimhapur, Raigarh, Raipur, Rajnandgaon, Rewa, Satna, Seoni, Sidhi, Surguja. *Fl. & Fr.*: Throughout the year.

3. Vanda testacea (Lindl.) Rchb. *f.* in Gard. Chron. 2: 166. 1877. *Aerides testaceum* Lindl., Gen. Sp. Orchid. Pl. 238. 1833. *Vanda parviflora* Lindl. in Edward's Bot. Reg. 30: Misc. 45. 1844; Hook. *f.*, Fl. Brit. India 6: 50. 1890. **Fig. 8.**

Epiphytes. Stems thick, 10-20 cm long, sheathed. Leaves alternate, linear or linear-oblong, 10-17 x 1-1.5 cm, 3-toothed at apex, coriaceous, keeled. Flowers in axillary, 3-15 cm long, erect racemes; peduncles stout, terete, with few sterile sheathing bracts; bracts brown, ovate or ovate-oblong, scabrid, 3-nerved. Sepals unequal; dorsal sepal oblong-oblanceolate; lateral sepals obovate. Petals yellow, spathulate, narrow, concave. Labellum 3-lobed, spurred, reflexed, sessile; spur yellow, narrow, *ca* 2 mm long, vermiform at tip. Column short, with a short foot. Capsules oblong-fusiform, 2-3 cm long, winged.

On *Shorea robusta* and *Madhuca longifolia*. Balaghat, Bastar, Bilaspur, Durg, Mandla, Raipur, Rajnandgaon, Surguja. *Fl. & Fr.*: Sept. April.

34. ZEUXINE Lindl., *orth. et nom. cons.*

Herbs, terrestrial. Stems ascending-erect, arising from creeping base. Leaves exarticulate, often membranous, sessile on a broad sheath or petiolate. Flowers in terminal, few to many-flowered spikes, small, resupinate, slightly opened, bracteate. Sepals free, slightly dissimilar; dorsal sepal forming a hood with the petals; lateral sepals enclosing the base of the labellum. Petals narrow, unequal-sided. Labellum sessile, saccate at base; sac containing two glands inside, dilated at apex into a small, entire or wing-like terminal lobe. Column short, with or without appendages on the front. Anthers erect, membranous, 2-celled; pollinia 2, pyriform, granular, entire or 2-partite, with or without a caudicle, attached by a gland to the rostellum. Fruit a small capsule.

About 77 species; tropical and subtropical regions of Old World; one in M.P.

Zeuxine strateumatica (L.) Schlechter in Fedde, Repert. Beih. 1: 77. 1911. *Orchis strateumatica* L., Sp. Pl. 943. 1753. *Spiranthes strateumatica* Lindl. in Bot. Reg. 10: sub. t. 823. 1825. *Pterygodium sulcatum* Roxb., Fl. Ind. 3: 452. 1832. *Zeuxine sulcata* Lindl., Gen. Sp.

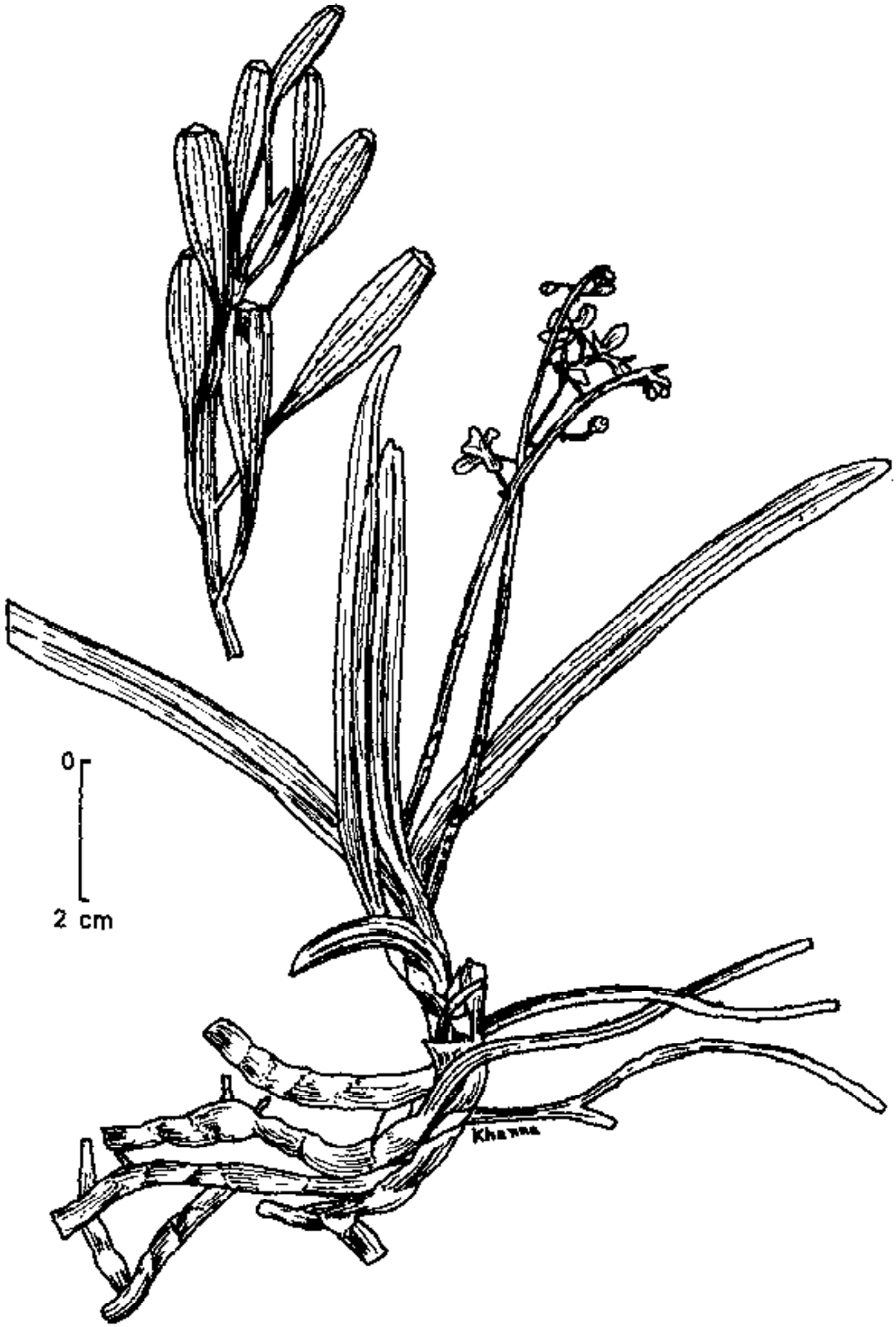

Fig. 8. Vanda testacea (Lindl.) Rchb. *f.*

Orchid. Pl. 485. 1840; Hook. *f.*, Fl. Brit. India 6: 106. 1890. *Adenostylis strateumatica* Ames, Orchidaceae 2: 59. 1908. **Fig. 9.**

Herbs, terrestrial, 20-25 cm high. Stems erect, fleshy, arising from short creeping rhizome. Leaves alternate, erect, linear or linear-lanceolate, variable, lower ones 3-6 cm long, upper ones smaller, acute at apex, sessile. Flowers in terminal, dense, 2-8 cm long, erect or slightly decurved spikes; bracts ovate-lanceolate, erect, hyaline. Sepals white, unequal, obtuse, membranous; dorsal sepal ovate-oblong, concave; lateral sepals linear-oblong. Petals white, oblong-elliptic, entire, glabrous. Labellum cymbiform, as long as lateral sepals, minutely glandular papillate, slightly saccate at base, terminating in a hammer-headed, simple or 2-lobed limb. Column very short. Capsules ellipsoid or broadly ovoid, ribbed.

In moist sandy soil. Balaghat, Gwalior, Narsimhapur, Raigarh, Rewa, Sagar, Shahdol, Sidhi, West Nimar. *Fl. & Fr.*: Dec. March.

134. ZINGIBERACEAE

(V. Mudgal and K.K. Khanna)

About 49 genera and 1090 species; tropical regions especially Indo-Malesia; 7 genera and 23 species in M.P.

1a. Inflorescence compact, with barren bracts (coma); floral bracts connate each other forming pouch ...3. *Curcuma*

1b. Inflorescence lax or compact, without barren bracts (coma); floral bracts not connate:

2a. Ovary 1-locular; ovules on parietal placentae ...5. *Globba*

2b. Ovary 3-locular; ovules on axile placentae:

3a. Lateral staminodes large, petaloid ...6. *Hedychium*

3b. Lateral staminodes small or absent, never petaloid:

4a. Flowers in lax spikes, racemes or panicles:

5a. Inflorescence on a leafless scape arising directly from rhizome ...4. *Elettaria*

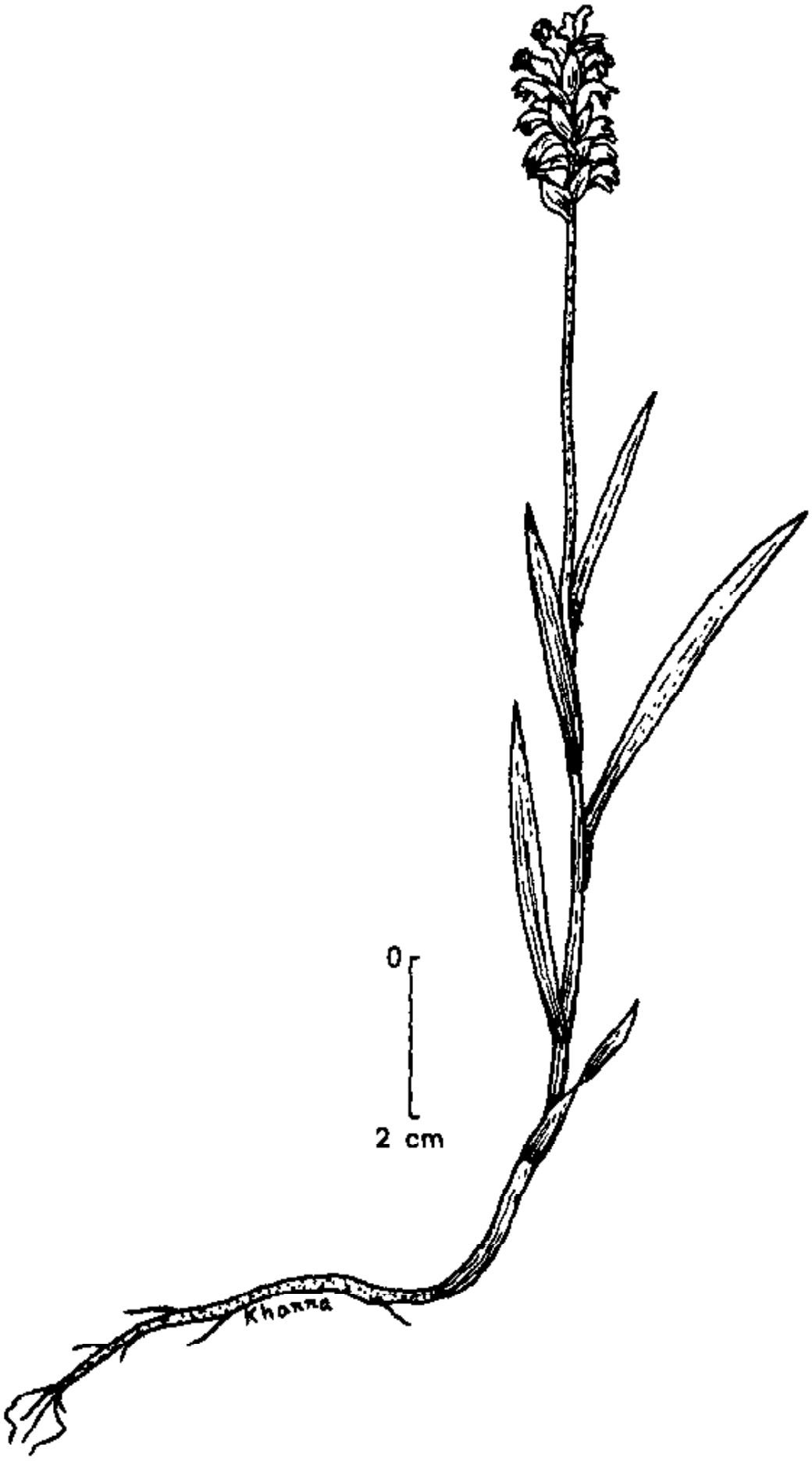

Fig. 9. Zeuxine strateumatica (L.) Schlechter

5b. Inflorescence on a leafy shoot, never arising directly from rhizome ...1. *Alpinia*

4b. Flowers in dense, cone like spikes:

6a. Connective-crest petaloid, broad at tip ...2. *Amomum*

6b. Connective-crest not petaloid, beak like at tip ...7. *Zingiber*

1. ALPINIA Roxb., *nom. cons.*

Herbs. Rootstocks tuberous or creeping. Stems leafy. Leaves usually distichous. Flowers in terminal, lax spikes, racemes or panicles, sometimes with sterile bracts at base; fertile bracts subtending a cincinnus of 2-4 flowers; bracteoles present or absent. Calyx tubular or infundibuliform, unilaterally split, 3-toothed. Corolla often showy, 3-lobed; upper lobe broader and more concave than lateral ones. Stamens perfect one; filaments flattened; anther cells diverging at apex, sometimes with an orbicular crest; staminodes minute or absent. Ovary 3-locular; ovules few or many on axile placenta in each locule; style filiform. Fruit a capsule, dry or fleshy. Seeds globose or angular; aril membranous.

About 250 species; subtropical Asia to Pacific regions; 2 in M.P.

1a. Lamina 4-6 cm broad; filaments twice as long as the anther ...1. *A. calcarata*

1b. Lamina 9-11 cm broad; filaments more or less equal to anther length ...2. *A. malaccensis*

1. Alpinia calcarata Roscoe in Trans. Linn. Soc. London 8: 347. 1807; Baker in Hook. *f.*, Fl. Brit. India 6: 254. 1892. *Languas calcarata* (Roscoe) Alston in Trimen, Handb. Fl. Ceylon 6: 282. 1931.

Herbs, erect, slender, 1-1.5 m high. Leaves linear-lanceolate, 8-50 x 4-6 cm, long acuminate at apex, tapering at base, entire, glabrous, sessile; ligules membranous. Flowers in terminal panicles; rhachis pubescent; bracts white, cymbiform. Calyx infundibuliform. Corolla white, showy. Labellum variegated with red or yellow, oblong, emarginate at apex, spurred at base. Staminodes teeth-like. Capsules red, globose.

Cultivated. Hoshangabad, Indore. *Fl. & Fr.*: April - June.

2. **Alpinia malaccensis** (Burm. *f.*) Roscoe in Trans. Linn. Soc. London 8: 345. 1807; Baker in Hook. *f.*, Fl. Brit. India 6: 255. 1892. *Maranta malaccensis* Burm. *f.*, Fl. Ind. 2. 1768. *Catimbium malaccense* (Burm. *f.*) Holttum in Gard. Bull. Singap. Strait. Settl. 13: 155. 1950. *Alpinia nutans* Roscoe var. *sericea* Baker in Hook. *f.*, Fl. Brit. India 6: 256. 1892.

Herbs, robust, *ca* 1.5 m high. Leaves narrowly lanceolate, 50-65 x 9-11 cm, acuminate at apex, usually pubescent beneath or along the margin and midrib; ligules *ca* 1 cm long, hairy, coriaceous, entire; petioles pubescent. Flowers in erect or slightly curved panicles, shortly pedicellate; bracteoles white, caducous with the opening of flower. Calyx white. Corolla white. Labellum yellow-orange with scarlet lines, with 2 fleshy swellings at base; tube glabrous. Lateral staminodes subulate. Capsules orange-red, globose.

Bastar (Mooney, 1942). *Fl. & Fr.*: April - May.

2. AMOMUM Roxb., *nom. cons.*

Large herbs. Rootstocks extensive. Leaves sheathing, glaucous-pubescent beneath. Flowers in dense spikes borne near the base of a leafy shoot; bracts coriaceous, imbricating, each subtending a single flower; bracteoles usually tubular. Calyx tubular, 3-toothed. Corolla 3-lobed; lobes oblong, dorsal lobe broader than lateral ones; tube cylindrical, usually shorter, never much exceeding calyx. Stamens perfect one; filament well developed; connective often produced into a well developed, petaloid crest; staminode small or absent, with subulate teeth. Ovary 3-locular; ovules many on axile placenta in each locule; style filiform. Fruits winged or covered with fleshy spines.

About 90 species; Asia to Australia; one in M.P.

Amomum dealbatum Roxb., Fl. Ind. (Carey & Wallich ed.) 1: 42. 1820; Baker in Hook. *f.*, Fl. Brit. India 6: 239. 1892.

Herbs, *ca* 1 m high. Rootstocks tuberous. Leaves distichous, oblong-lanceolate, 23-40 x 5-10 cm, softly pubescent beneath. Flowers in dense spikes borne on short, stout peduncles, densely covered with bracts when young; bracts imbricating. Calyx minutely pubescent. Labellum with red

or yellow band in the centre, crisped on margin. Crest subquadrate. Fruits oblong, with 9, crenulate wings.

Bastar, Hoshangabad. *Fl. & Fr.*: June Dec.

The fruits are used as substitute for cardamom.

3. CURCUMA L.

Herbs, acaulescent, rhizomatous. Rhizomes fleshy, branched, with tuber-bearing roots. Leaves large. Flowers in dense spikes arising from the centre of previously formed leafy shoots or on separate, lateral peduncles appearing before leaves; spikes surrounded by a crown of barren, coloured bracts (coma); floral bracts connate each other for about half their length forming pouches and subtending cincinnus of 2-7 flowers. Calyx tubular, unilaterally split, minutely toothed or lobed. Corolla 3-lobed; lobes ovate or oblong; tube infundibuliform. Stamens fertile one; filament short, broad; anthers spurred at base; connective produced into a small crest; lateral staminodes oblong, petaloid, connate with the filament. Ovary 3-locular; ovules many on axile placenta; style filiform. Fruit a capsule, globose, ovoid or ellipsoid, 3-valved. Seeds ovoid or oblong.

About 40 species; tropical Asia; 9 in M.P.

1a. Spikes lateral, separate from the leafy shoot, usually appearing before the leaves:

2a. Coma bracts pink or red:

3a. Flowers longer than bracts ...5. *C. ferruginea*

3b. Flowers shorter or equal to bracts:

4a. Leaves 30-60 cm long; labellum emarginate ...3. *C. aromatica*

4b. Leaves up to 30 cm long; labellum 2-fid ...7. *C. neilgherrensis*

2b. Coma bracts purple:

5a. Rhizomes greenish white or greenish yellow inside; leaves with purple band above on either side of the midrib ...9. *C. zedoaria*

5b. Rhizomes white-pale yellow inside; leaves uniformly green, without any purple band ...2. *C. angustifolia*

1b. Spikes central, amidst leaves, arising from the centre of previously formed leafy shoot:

6a. Rhizomes small; tubers at the ends of fleshy fibres, white inside:

7a. Floral bracts purple; corolla purple ...4. *C. decipiens*

7b. Floral bracts greenish white; corolla yellow ...8. *C. pseudomontana*

6b. Rhizomes large; tubers sessile, yellow inside:

8a. Labellum yellow throughout; ovary villous throughout; capsules globose ...1. *C. amada*

8b. Labellum white with a central yellow band; ovary hairy only towards apex; capsules ovoid ...6. *C. longa*

1. Curcuma amada Roxb. in Asiat. Res. 11: 341. 1810; Baker in Hook.*f*., Fl. Brit. India 6: 213. 1890. - *Amada, Ama-haldi.*

Herbs, up to 1 m high. Rhizomes pale yellow inside. Leaves oblong-elliptic or oblanceolate, 16-45 x 7-16 cm, acuminate or subacuminate at apex, ending in a short, twisted cusp, narrowed at base, white or hyaline on margins, glabrous. Flowers in spikes arising from the centre of leafy tuft, exserted; coma bracts pinkish; floral bracts white. Calyx very thin, puberulous. Corolla white or pale yellow. Labellum yellow. Ovary villous. Capsules globose.

In moist places between rock boulders or near streams. Balaghat, Bastar, Bhopal, Bilaspur, Hoshangabad, Indore, Raipur, Rajnandgaon, Satna, Surguja, West Nimar. *Fl. & Fr.*: July - Oct.

Rhizomes are considered edible, carminative, cooling, and applied to sprains and muscular swellings.

2. Curcuma angustifolia Roxb. in Asiat. Res. 11: 338. t. 3. 1810; Baker in Hook.*f*., Fl. Brit. India 6: 210. 1890. *Tikhur.*

Herbs. Rhizomes white-pale yellow inside, aromatic; roots ending in tubers; tubers ovoid, white inside. Leaves oblong-lanceolate, 25-60 x 6-15 cm, subcaudate at apex, glabrous or young ones pubescent beneath; sheaths green or purple, cuspidate. Flowers in lateral, 8-14 cm long spikes, as long as or slightly longer than bracts; peduncles *ca* 10 cm long; coma bracts purple. Corolla-lobes yellow. Labellum yellow, emarginate. Ovary villous.

In sandy alluvial soil of river bank, sometimes as forest undergrowth. Balaghat, Bastar, Bilaspur, Seoni, Shivpuri. *Fl. & Fr.*: May - Oct.

Rhizomes are digestive and demulcent. Root powder yields starch and used as substitute to true arrow root in confectionary.

3. Curcuma aromatica Salisb., Parad. Lond. t. 96. 1807; Baker in Hook. *f.*, Fl. Brit. India 6: 210. 1890. *C. zedoaria* Roxb. in Asiat. Res. 11: 332. 1810, *non* (Christm.) Roscoe, 1807. - *Banhaldi.*

Herbs. Rhizomes white-yellow, smelling like camphor; roots ending in yellow, oblong tubers. Leaves broadly lanceolate, 30-60 x 15-20 cm, uniformly green or with pale to deep purple band along midrib above, acuminate at apex, narrowed at base, pubescent beneath, long petiolate. Flowers in lateral spikes; peduncles *ca* 25 cm long; coma bracts pink; lower floral bracts green, upper ones with pink tips. Corolla pinkish white. Labellum yellow, emarginate. Lateral staminodes pinkish white.

In forest clearings. Bastar, Chhatarpur, Raipur, Sidhi. *Fl. & Fr.*: May Aug.

Rhizomes are tonic, carminative and yield orange-red dye used as substitute for turmeric. They are also externally applied to sprains, burns and swellings.

4. Curcuma decipiens Dalzell in Hook., J. Bot. Kew Gard. Misc. 2: 144. 1850; Baker in Hook. *f.*, Fl. Brit. India 6: 215. 1890.

Herbs. Rhizomes small; tubers white inside, small, almond-like. Leaves broadly elliptic, 15-30 x 7-12 cm, acuminate at apex, rounded or subcordate at base, membranous, usually glabrous; petioles as long as the lamina. Flowers in spikes arising from the centre of previously formed leafy tuft,

paired; coma bracts purple, numerous, oblong; floral bracts purple, ovate, saccate. Calyx obtusely toothed. Corolla purple; lobes oblong-lanceolate. Labellum obovate, 2-fid, crisped on margins.

Hoshangabad. *Fl. & Fr.*: June Oct.

5. Curcuma ferruginea Roxb. in Asiat. Res. 11: 336. 1810 & Fl. Ind. (Carey & Wallich ed.) 1: 27. 1820; Baker in Hook. *f.*, Fl. Brit. India 6: 213. 1890; Mudgal and Khanna in J. Econ. Tax. Bot. 19: 709. 1995.

Large herbs. Tubers pale yellow, fragrant inside, sessile. Leaves 4-5 in tuft, 40-45 cm long, with faint red-brown tinge on upper surface near the petiolar end of lamina; sheaths red or rusty red. Flowers in lateral, *ca* 12 cm long spikes; coma bracts bright red; floral bracts rusty red. Corolla lobes red. Labellum obscurely emarginate; tube longer than bracts.

Raipur. *Fl.*: June.

6. Curcuma longa L. Sp. Pl. 2. 1753, *pro max. parte*; Baker in Hook. *f.*, Fl. Brit. India 6: 214. 1890; Burtt in Notes Roy. Bot. Gard. Edinburgh 35: 209. 1977. *C. domestica* Val. in Bull. Jard. Bot. Buitenz. ser. 2, 27: 31. 1918. *Haldi*.

Herbs. Rhizomes bright yellow or orange inside, aromatic. Leaves tufted, oblong-lanceolate, 60-80 cm long, acuminate at apex, narrowed at base, entire, glabrous, petiolate. Flowers in 10-15 cm long spikes arising from the centre of leafy tuft and generally appearing with the leaves, sometimes flowers abortive and replaced by bracts; coma bracts with pink tinge; floral bracts pale green. Corolla white. Labellum white with a central yellow band. Ovary hairy towards apex. Capsules ovoid.

Cultivated. Bhopal, Indore and other districts of the state. *Fl. & Fr.*: Sept. - Nov.

Rhizome is the source of commercial turmeric, and used for colouring food preparations and fabric. It is also used as antiseptic, carminative, tonic and applied to swellings, cuts and sprains.

7. Curcuma neilgherrensis Wight, Icon. Pl. Ind. Orient. t. 2006. 1853; Baker in Hook. *f.*, Fl. Brit. India 6: 210. 1890. *C. angustifolia* Dalzell & Gibson, Bombay Fl. 274. 1861, *non* Roxb., 1810.

Herbs. Rhizomes white inside, small, globose to ellipsoid. Leaves lanceolate or oblong-lanceolate, 12-30 x 4-6 cm, acuminate at apex, obtuse or cuneate at base, entire, tuberculate pubescent, shortly petiolate. Flowers in lateral, dense spikes, usually appearing before the leaves; coma bracts pink; floral bracts yellowish green, oblong-lanceolate. Calyx lobed. Corolla bright yellow; lobes lanceolate. Labellum broadly ovate or suborbicular, 2-fid.

Bhopal (Oommachan, 1977). *Fl.*: July - Aug.

8. Curcuma pseudomontana J. Graham, Cat. Pl. Bombay 210. 1839. *C. montana auct. non* Roxb., 1820; Baker in Hook. *f.*, Fl. Brit. India 6: 214. 1890, *p.p.*

Herbs, aromatic. Rhizomes yellow inside, faintly aromatic; tubers white inside, subglobose or ellipsoid, stipitate. Leaves oblong-lanceolate, 12-35 x 4.5-10 cm, uniformly green, acuminate at apex, tapering at base. Flowers in spikes arising from the centre of previously formed leafy tuft, 2-3 in each bract; peduncles 20-25 cm long, enclosed within leafy sheath; coma bracts white with purplish tips; floral bracts greenish white. Corolla yellow; lobes obovate. Labellum yellow, obovate. Capsules ovoid.

As undergrowth in moist shady places of sal forests. Balaghat, Hoshangabad, Mandla, Raipur. *Fl. & Fr.*: Aug. - Sept.

9. Curcuma zedoaria (Bergius) Roscoe in Trans. Linn. Soc. London 8: 354. 1807 & Monandr. Pl. Scitam. t. 109. 1824; Baker in Hook. *f.*, Fl. Brit. India 6: 210. 1890. *Amomum zedoaria* Bergius, Mater. Med. 41. 1778. *Gainji.*

Herbs. Rhizomes greenish white or yellowish green inside, aromatic. Leaves oblong, 30-45 x 7-10 cm, with deep purple band along the midrib near the petiolar end, acuminate at apex, narrowed at base, glabrous. Flowers in lateral spikes appearing before the leaves; peduncles 8-18 cm long; coma bracts bright purple; floral bracts green with purple tinge, all the bracts turning whitish with age. Calyx whitish green. Corolla white or pale yellow. Labellum yellow, emarginate. Lateral staminodes pale yellow. Capsules ovoid. Seeds oblong.

As undergrowth in sal forests and wastelands. Raipur. *Fl. & Fr.*: Sept. Jan.

Rhizomes are carminative, cooling, diuretic, antiseptic and used as condiments.

4. ELETTARIA Maton

Large herbs, perennial, erect. Rootstocks thick. Leaves distichous, lanceolate, oblong or elliptic, entire; ligules membranous. Flowers in erect or prostrate, flexuous panicles arising directly from the rootstock and separately from the leaves; bracts distant, each subtending 2-7-flowered cincinnus; bracteoles tubular. Calyx 3-lobed, membranous. Corolla-tube equalling the calyx. Labellum oblong-obovate. Stamens fertile one; filament short; anthers usually not crested, sometimes with a short, erect crest; lateral staminodes small, subulate. Ovary 3-locular; ovules many on axile placenta. Fruit a capsule.

About 6 species; India to W. Malesia; one in M.P.

Elettaria cardamomum (L.) Maton in Trans. Linn. Soc. London 10: 254. 1811; Baker in Hook. *f.*, Fl. Brit. India 6: 251. 1892. *Amomum cardamom* L., Sp. Pl. 1. 1753. *Alpinia cardamomum* (L.) Roxb. in Asiat. Res. 11: 355. 1810. *Choti-elaichi.*

Herbs. Rootstocks branched, fleshy or woody. Leaves oblong-lanceolate, gradually tapering at apex, entire, glabrous above, pubescent beneath, subsessile. Flowers in erect or prostrate panicles; bracts linear-oblong, persistent. Calyx tubular, unilaterally split. Corolla white. Labellum white with violet stripes, emarginate at apex. Anthers obscurely crested. Capsules subtrigonous.

Bhopal (Oommachan, 1977). *Fl. & Fr.*: Jan. onwards.

Seeds are aromatic, stimulant, carminative and used as condiments for flavouring dishes.

5. GLOBBA L.

Herbs, erect. Rhizomes slender, creeping. Leaves distichous, oblong, lanceolate or elliptic-oblong. Flowers in terminal, few to several-flowered spikes, panicles or cincinni; buds often replaced by bulbils. Calyx campanulate or infundibuliform, 3-lobed. Corolla 3-lobed; lobes spreading

or deflexed; tube slender, exceeding the calyx. Labellum deflexed. Stamens fertile one; filament long, incurved with 2 dorsal appendages; anthers oblong, winged or spurred; lateral staminodes petaloid. Ovary 1-locular; ovules many on parietal placenta; style filiform. Fruit a capsule. Seeds small, with white, lacerate aril.

About 70 species; E. Asia; 3 in M.P.

1a. Bracts persistent; anthers with a 2-fid wing on either sides; capsules oblong ...1. *G. marantina*

1b. Bracts caducous; anthers not winged; capsules globose:

2a. Leaves glabrous beneath; capsules verrucose ...2. *G. orixensis*

2b. Leaves pubescent beneath; capsules smooth ...3. *G. racemosa*

1. Globba marantina L., Mant. Pl. 170. 1771; Baker in Hook. *f.*, Fl. Brit. India 6: 206. 1890. *G. bulbifera* Roxb. in Asiat. Res. 11: 358. 1810; Baker in Hook. *f.*, Fl. Brit. India 6: 206. 1890.

Herbs, 30-50 cm high..Leaves oblong or broadly lanceolate, 7-25 x 3-7 cm, acute at apex, minutely puberulous beneath, usually sessile; ligules membranous. Flowers in 6-16 cm long panicles; bracts lax, foliaceous, basal ones subtending ovoid bulbils, remainder subtending few-flowered cincinni. Corolla yellow; lobes ovate. Labellum deeply 2-fid. Lateral staminodes little longer than petals. Ovary sparsely hairy. Capsules oblong, smooth.

In moist places of sal and mixed forests. Balaghat, Bastar, Bilaspur, Mandla, Raigarh, Raipur, Rajnandgaon, Seoni. *Fl. & Fr.*: Sept. - Oct.

Rhizomes are referred as medicinal.

2. Globba orixensis Roxb. in Asiat. Res. 11: 358. 1810 & Pl. Coromandel t. 229. 1815; Baker in Hook. *f.*, Fl. Brit. India 6: 201. 1890.

Herbs. Stems 30-90 cm high. Leaves oblong or elliptic-oblong, 20-25 x 5-10 cm, subcaudate at apex, glabrous beneath. Flowers in narrow

panicles; ultimate branches 2-3-flowered at apex; bulbils absent; bracts small, caducous. Corolla orange-yellow; lobes broadly ovate, longer than staminodes; tube about twice the length of the calyx. Labellum with reddish brown spots at the throat, obovate, shallowly 2-lobed, as long as the corolla-lobe. Capsules globose, verrucose.

Bastar (Mooney, 1942). *Fl. & Fr.*: July - Oct.

3. Globba racemosa Sm., Exot. Bot. 2: 115. t. 117. 1805; Baker in Hook. *f.*, Fl. Brit. India 6: 201. 1890.

Herbs, up to 1 m high. Leaves oblong-lanceolate, 15-30 x 6-9 cm, long acuminate at apex, pubescent beneath. Flowers in narrow, 8-20 cm long panicles, ultimate branches 2-5-flowered; bracts 1-1.5 cm long, caducous. Corolla bright yellow; tube puberulous, 1.5-2 cm long. Labellum obovate, 2-fid with deep sinus; lateral lobes apiculate. Ovary glabrous, tuberculate. Capsules globose, smooth.

In sal forests. Balaghat, Bastar, Bilaspur, Mandla, Raigarh, Raipur, Rajnandgaon, Surguja. *Fl. & Fr.*: Aug. - Sept.

6. HEDYCHIUM J. Koenig

Herbs. Rootstocks horizontal, tuberous. Stems elongated. Leaves distichous, oblong or lanceolate. Flowers in terminal, capitate spikes or cincinni; bracts oblong, imbricating, subcoriaceous; bracteoles tubular. Calyx tubular, 3-toothed. Corolla 3-lobed; lobes reflexed; tube long, usually exceeding the calyx. Labellum 2-fid. Stamens fertile one; filament long, slender; connectives not produced or appendaged; staminodes petaloid. Ovary 3-locular; ovules many on axile placenta in each locule; style filiform. Fruit a capsule, 3-valved. Seeds small, with lacerate aril.

About 50 species; Indo-Malesia and Madagascar; one in M.P.

Hedychium coronarium J. Koenig in Retz., Observ. Bot. 3: 73. 1783; Baker in Hook. *f.*, Fl. Brit. India 6: 225. 1892. **Fig. 10.**

Herbs, *ca* 1 m high. Leaves lanceolate, 25-40 x 2.5-5 cm, acuminate at apex, attenuate at base, glabrous above, sparsely pubescent or glabrous beneath, more or less sessile; ligules membranous. Flowers in terminal,

Fig. 10. Hedychium coronarium J. Koenig

10-20 cm long, dense spikes; bracts closely imbricating, each subtending 3 or 4 flowers. Calyx shorter than bracts. Corolla white; lobes linear; tube longer than bracts. Labellum white with yellow tinge. Staminodes white. Capsules globose-oblong, glabrous. Seeds with crimson aril.

In moist places. Bilaspur, Seoni, Surguja. *Fl. & Fr.*: Aug. - Feb.

Rhizomes yield edible starch; used as tonic, antirheumatic and applied to swellings. Stems yield raw material for paper manufacture.

7. ZINGIBER Boehmer, *nom. cons.*

Herbs, rhizomatous. Roots often ending in globose tubers. Leaves distichous, sessile or subsessile. Flowers in radical or terminal spikes; bracts usually large, imbricating, usually 1-flowered; bracteoles open to the base. Calyx 3-lobed; lateral lobes often joined together partly by their adjacent sides and to the labellum; tube cylindrical. Stamens fertile one; filaments short; connectives produced into an elongated, beak-like crest; lateral staminodes adnate to the labellum or absent. Ovary 3-locular; ovules many on axile placenta in each locule; style filiform. Fruit a capsule. Seeds arillate.

About 85 species; Indo-Malesia to E. Asia and tropical Australia; 6 in M.P.

1a. Spikes terminal on leafy stem ...1. *Z. capitatum*

1b. Spikes radical or from the base of the leafy stem:

2a. Flowering peduncles absent or up to 3 cm long:

3a. Lateral lobes of labellum well developed ...2. *Z. cernuum*

3b. Lateral lobes of labellum very small or absent:

4a. Spikes oblong, up to 5 cm long; stamens yellow ...5. *Z. roseum*

4b. Spikes globose, 5-9 cm long; stamens red ...6. *Z. rubens*

2b. Flowering peduncles 15-50 cm long:

5a. Spikes ovoid; bracts green; labellum dark purple with yellow spots ...3. *Z. officinale*

5b. Spikes cylindrical-ellipsoid; bracts red-brown; labellum pale creamy white, unspotted ...4. *Z. purpureum*

1. Zingiber capitatum Roxb. in Asiat. Res. 11: 348. 1810; Baker in Hook. *f.*, Fl. Brit. India 6: 248. 1892. *Gerkan, Ranala.*

Herbs, perennial, up to 1.5 m high. Rhizomes yellow, aromatic. Leaves linear, 10-35 x 1.5-2.5 cm, entire, pubescent beneath, sessile; ligules short. Flowers in terminal, 8-10 cm long spikes; peduncles hairy; bracts green turning red, lanceolate, pubescent. Calyx tubular. Corolla yellow; lateral lobes oblong. Labellum obovate. Anthers with incurved beak; lateral staminodes red. Ovary pubescent. Capsules bright red, oblong.

In sal and mixed forests. Balaghat, Bastar, Bilaspur, Mandla, Raigarh, Rajnandgaon, Sagar, Sidhi, Surguja. *Fl. & Fr.*: Aug. - Oct.

2. Zingiber cernuum Dalzell in Hook., J. Bot. Kew Gard. Misc. 4: 342. 1852; Baker in Hook. *f.*, Fl. Brit. India 6: 245. 1892.

Herbs, *ca* 1 m high. Stems glabrous, slightly curved. Leaves oblong-lanceolate, 50-60 x 6-8 cm, acuminate at apex, entire. Flowers in densely flowered, ovoid spikes; peduncles up to 3 cm long, close to the ground; bracts greenish yellow, ovate-oblong, obtuse, glabrous. Labellum white with red blotches, 3-lobed. Capsules deep red, trigonous, *ca* 4 x 1.5 cm, smooth. Seeds black, oblong, striated.

In moist shady places. Dhar, Jhabua (Samvatsar, 1996). *Fl. & Fr.*: Dec. Jan.

3. Zingiber officinale Roscoe in Trans. Linn. Soc. London 8: 348. 1807; Baker in Hook. *f.*, Fl. Brit. India 6: 246. 1892. *Amomum zingiber* L., Sp. Pl. 1. 1753. - *Adrak.*

Herbs, *ca* 1 m high. Rhizomes stout, tuberous, aromatic. Leaves linear-lanceolate, 10-30 cm long, acuminate at apex, glabrous, sessile; ligules membranous. Flowers in ovoid, 4-5 cm long spikes; bracts green, suborbicular, cuspidate. Calyx inflated. Corolla greenish yellow. Labellum

dark purple, often with yellow spots. Anthers dark purple, with *ca* 6 mm long beak; lateral staminodes ovate. Ovary glabrous.

Cultivated. Bhopal, Chhatarpur, Indore (Oommachan, 1977; Khanna *et al.*, 1991). *Fl.*: Sept. Oct.

The rhizomes commonly known as 'adrak' are extensively employed for flavouring food and confectionaries. These are also used for bronchitis, lumbago, rheumatic pain, swelling and as carminative.

4. Zingiber purpureum Roscoe in Trans. Linn. Soc. London 8: 348. 1807. *Z. cassumunar* Roxb. in Asiat. Res. 11: 347. t. 5. 1810; Baker in Hook. *f.*, Fl. Brit. India 6: 248. 1892. *Z. montanum auct. non* (J. Koenig) Link *ex* A. Dietr., 1831: Ramamoorthy in Saldanha & Nicolson, Fl. Hassan Distr. 769. 1976. - *Bailada*.

Herbs, *ca* 1 m high. Rhizomes yellow inside. Leaves oblong-lanceolate, 25-55 x 6-12 cm, pubescent beneath, subsessile; ligules short, 2-lobed; sheath pubescent. Flowers in cylindrical ellipsoid, *ca* 5 cm long spikes; bracts red-brown, pubescent. Calyx unilaterally split, glabrous. Corolla creamy white; lobes linear-lanceolate. Labellum creamy white, obovate. Anthers subsessile, with *ca* 1 cm long beak; lateral staminodes oblong, acute. Ovary pubescent. Capsules ovoid.

In sal forests. Bastar, Raigarh, Raipur, Rajnandgaon. *Fl. & Fr.*: Aug. Jan.

Tubers are given as tonic to bullocks while the rhizomes are used as condiments for flavouring dishes, and as stimulant and carminative.

5. Zingiber roseum (Roxb.) Roscoe in Trans. Linn. Soc. London 8: 348. 1807; Baker in Hook. *f.*, Fl. Brit. India 6: 244. 1892. *Amomum roseum* Roxb., Pl. Coromandel t. 126. 1800.

Herbs, *ca* 1 m high. Leaves oblong-lanceolate, 25-55 x 6-12 cm, entire, pubescent beneath. Flowers in radical, oblong, up to 5 cm long spikes; peduncles very short; bracts bright red, outer ones hairy. Calyx tubular; lobes yellow or with red tinge. Corolla bright red; tube pubescent. Labellum white with pale red streaks throughout, pale yellow on margins, oblong, recurved, crisped; basal lobe small. Stamens yellow, as long as labellum. Capsules bright red, ellipsoid-ovoid.

In shady places of sal forests. Balaghat, Bastar, Bilaspur, Hoshangabad, Raipur, Surguja. *Fl. & Fr.*: Sept. - Jan.

6. Zingiber rubens Roxb. in Asiat. Res. 11: 348. 1810 & Fl. Ind. (Carey & Wallich ed.) 1: 51. 1820; Baker in Hook. *f.*, Fl. Brit. India 6: 243. 1892.

Herbs, *ca* 1 m high. Stems sparsely hairy. Leaves oblong-lanceolate, 20-60 x 7-12 cm, hairy along midrib beneath, sometimes with minute glands in the fresh plant; ligules membranous. Flowers in globose, 5-9 cm long spikes; bracts red, ovate-oblong, 3-5 cm long; bracteoles lanceolate. Calyx reddish, spathaceous-membranous, pubescent. Corolla-lobes linear, acuminate; tube slightly inflated, 3.5-4.5 cm long. Labellum white with red spots, linear-oblong, undulate on margins. Stamens red, arching over labellum. Capsules reddish, ellipsoid.

Bastar (Saxena and Khotele, 1976). *Fl.*: Aug. Sept.

135. COSTACEAE

(V. Mudgal and K.K. Khanna)

Four genera and about 110 species; tropical regions; one species in M.P.

COSTUS L.

Herbs, perennial. Rootstocks creeping, tuberous. Leaves simple, spirally arranged, with broad, tubular sheath. Flowers in usually terminal, dense, globose or ovoid heads or spikes; bracts spirally arranged, overlapping, each subtending 1 or 2 flowers. Calyx tubular or infundibuliform, 3-toothed. Corolla divided into 3, subequal lobes; tube longer or shorter than calyx. Labellum showy. Stamens fertile one; filament and connective forming a petaloid process; lateral staminodes absent. Ovary 3-locular, with 2 septal glands near the apex; ovules many on axile placenta; style filiform. Fruit a capsule, globose, irregularly dehiscent. Seeds obovoid; aril short.

About 90 species; tropical regions of America, Africa, Asia and Australia; one in M.P.

Costus speciosus (J. Koenig) Sm. in Trans. Linn. Soc. London 1: 249. 1791; Baker in Hook. *f.*, Fl. Brit. India 6: 249. 1892. *Banksea speciosa* J. Koenig in Retz., Observ. Bot. 3: 75. 1783. *Keo-kanda.*

Herbs, erect, rhizomatous, *ca* 1 m high. Leaves oblong-lanceolate, 18-30 x 5-9 cm, entire, glabrous or appressed hairy above, pubescent or villous beneath, shortly petiolate or subsessile. Flowers in terminal, ovoid heads; bracts greenish to bright red, oblong-ovate. Calyx tubular. Corolla white. Labellum white with yellow centre. Stamens yellow at apex; connectives petaloid. Capsules bright red.

Common in shady places along rivers or drains, sometimes in sal forests or deforested lands. Balaghat, Bastar, Bilaspur, Damoh, Hoshangabad, Raigarh, Raipur, Rajnandgaon, Rewa, Shahdol, Sidhi, Surguja, West Nimar. *Fl.* & *Fr.*: Aug. May.

Tubers are edible and considered good for digestion and health. Roots are astringent, purgative, stimulant, anthelmintic and referred as antidote to snake bite.

135a. MARANTACEAE*

(V. Mudgal and K.K. Khanna)

About 31 genera and 550 species; tropical regions, especially America; one genus with 2 species in M.P.

PHRYNIUM Willd., *nom. cons.*

Herbs, erect. Rootstocks creeping. Leaves radical, sessile, rarely 2 in a sheath, large, long petiolate. Inflorescence a dense, capitate spike, borne laterally on the petiole; bracts present. Sepals 3. Corolla 3-lobed; lobes subequal; tube cylindrical. Stamens basally connate in a tube; one fertile, bearing a single marginal anther cell. Ovary 3-locular; ovule solitary in

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*Possibly due to restricted distribution and rare occurrence in M.P., the family has escaped the attention and has not been given under Key to the families in Flora of M.P. Vol. I. However, for the purpose, it should be placed after lead 205a on page 117 and can be differentiated from Cannaceae by leaves being ligulate and presence of solitary ovule in each locule.

each locule; style hooked above; stigma capitate. Fruit a capsule, globose, indehiscent.

About 20 species; tropical regions of Old World; 2 in M.P.

1a. Leaves single per shoot; bracts not fibrous above middle; calyx-lobes glabrous; ovary glabrous ...1. *P. placentarium*

1b. Leaves several per shoot; bracts breaking into fibres above middle; calyx-lobes sparsely pubescent; ovary densely pilose ...2. *P. pubinerve*

1. Phrynium placentarium (Lour.) Merr. in Philipp. J. Sci. 15: 230. 1919. *Phyllodes placentaria* Lour., Fl. Cochinch. 1: 13. 1790. *Phrynium parviflorum* Roxb., Fl. Ind. (Carey & Wallich ed.) 1: 7. 1820; Baker in Hook. *f.*, Fl. Brit. India 6: 259. 1892. *Maranta parviflora* A. Dietr., Sp. Pl. 1: 30. 1831.

Herbs, perennial, up to 2 m high. Rootstocks tuberous. Stems slender. Leaves solitary, radical, oblong-ovate, 20-50 x 5-25 cm, cuspidate or acuminate at apex, glossy, glabrous; petioles up to 1 m long. Flowers small, white, in spicate heads; heads sessile; bracts green, oblong-lanceolate, 2-3 cm long. Calyx-lobes 3, lanceolate. Corolla white, 3-lobed; lobes 3.5-6 mm long; tube 8-10 mm long. Outer staminodes orange-yellow, subequal; staminal tube *ca* 2 mm long. Fruits reddish brown, oblong or ellipsoid.

Rare. In moist shady places on hill slopes or under dense sal forests. Bastar. *Fl. & Fr.*: July - Sept.

2. Phrynium pubinerve Blume, Enum. Pl. Javae 1: 38. 1827. *P. capitatum auct. non* Willd., 1797: Baker in Hook. *f.*, Fl. Brit. India 6: 258. 1892.

Herbs, erect. Rootstocks tuberous. Leaves several, oblong or oblong-lanceolate, 30-45 x 15-23 cm, acuminate at apex, rounded or cuneate at base, glabrous, articulated, long petiolate; petioles stout, terete, longer than lamina, spike bearing petiole 60-90 cm long. Inflorescence a capitate spike, sessile on the side of petiole above the middle; outer bracts 2, large, rigid, with incurved scarious tips, breaking up into tufts of fibres, inner bracts closely imbricate. Flowers purple. Calyx-lobes linear, sparsely pubescent. Corolla infundibuliform above; lobes lanceolate or spathulate, hairy at tip;

tube slender. Staminal column 5-lobed, outer 2 lobes larger. Capsules 3-lobed, turbinate.

Rare. Bastar (Mooney, 1942). *Fl. & Fr.*: Aug. Sept.

136. MUSACEAE

(V. Mudgal and K.K. Khanna)

Two genera and about 42 species; tropical regions of Old World; 2 genera and 3 species in M.P.

1a. Plants not stoloniferous; pseudostems swollen at base; offsets (stools) absent ...1. *Ensete*

1b. Plants stoloniferous; pseudostems not swollen at base; offsets (stools) present ...1. 2. *Musa*

1. ENSETE Bruce *ex* Horaninow

Large herbs. Pseudostems swollen at base. Leaves simple, alternate, large, acute, acuminate or retuse at apex, glabrous, petiolate; sheaths convolute, persistent, forming a pseudostem. Flowers in clusters arranged in pedunculate spikes, zygomorphic, subtended by a large, usually caducous bract; upper clusters male; lower clusters female. Calyx 3-lobed. Two petals connate with the calyx or absent; posterior petal free. Stamens usually 5. Ovary inferior, 3-locular; ovules many in each locule; style filiform; stigma 6-lobed. Fruit a berry.

About 7 species; tropical regions of Old World; one in M.P.

Ensete superbum (Roxb.) Cheesman in Kew Bull. 1947: 100. 1948. *Musa superba* Roxb., Pl. Coromandel 3: 17. t. 223. 1811 & Fl. Ind. 1: 667. 1832; Baker in Hook. *f.*, Fl. Brit. India 6: 261. 1892.

Herbs. Pseudostems purple-brown, swollen at base. Leaves oblong-lanceolate, 2-3 x 0.4-0.8 m, glabrous, long petiolate; midrib pale red beneath. Flowers yellowish, in clusters of 20-30 in each bract; bracts maroon, *ca* 20 cm long. Berries elongated, trigonous. Seeds brown, subangular.

Hoshangabad (Oommachan and Masih, 1992). *Fl. & Fr.*: Aug. Oct.

2. MUSA L.

Large herbs or shrubs, often arborescent, stoloniferous. Pseudostems present, composed of tightly convolute leaf sheaths. Leaves simple, spiral, forming a compact crown, very large, petiolate; midrib thick, with lateral, parallel nerves. Flowers in spikes, mostly unisexual, subtended by coloured, spathaceous bracts; male flowers towards the terminal portion while female flowers towards the basal portion of peduncle. Calyx 3-5-lobed or toothed. Two petals usually connate with the calyx; posterior petal free. Stamens fertile 5, 6th small, rudimentary or as staminode. Ovary inferior, 3-locular; ovules many in each locule; style filiform; stigma lobulate. Fruit a berry, fleshy, indehiscent.

About 35 species; tropical Asia; 2 in M.P.

1a. Plants 2-6 m high; male flowers many in a bract ...1. *M. paradisiaca*

1b. Plants up to 2 m high; male flowers few in a bract ...2. *M. rosacea*

1. Musa paradisiaca L., Sp. Pl. 1043. 1753; Cheesman in Kew Bull. 1948: 145. 1948. *M. paradisiaca* L. subsp. *sapientum* (L.) K. Schum. in Engl., Pflanzenr. 4(45): 20. 1900. *M. paradisiaca* L. var. *sapientum* (L.) Kuntze, Revis. Gen. Pl. 2: 692. 1891. *M. sapientum* L., Syst. Nat. ed. 10. 1303. 1759; Baker in Hook. *f.*, Fl. Brit. India 6: 262. 1892. - *Kela*.

Herbs, 2-4 m high. Pseudostems cylindrical. Leaves oblong, 1-2.5 x 0.4-0.7 m, undulate, glabrous. Flowers in terminal, solitary, drooping spikes; bracts ovate, up to 25 cm long, coriaceous, caducous. Calyx 3-5-lobed, tubular. Corolla membranous. Berries oblong, 6-16 cm long, 3-5-angled.

Cultivated throughout the state. *Fl. & Fr.*: April - Oct., often in other months too.

The fruits are edible, sweet, tonic and highly delicious. These are also given in colitis, diarrhoea, hypertension and cardiac diseases. The pseudostems and flowers are consumed as vegetables after cooking while the leaves are used as plates and for wrapping edibles.

2. Musa rosacea Jacq., Pl. Hort. Schoenbr. 4: 22. t. 445. 1804; Baker in Hook. *f.*, Fl. Brit. India 6: 263. 1892.

Herbs, up to 2 m high. Pseudostems cylindrical. Leaves linear-oblong, 0.75-1 x 0.2-0.25 m. Flowers in erect or drooping spikes; bracts pale red, ovate-lanceolate, few-flowered; male flowers more numerous than female. Calyx yellowish white, 5-toothed. Berries linear-oblong, slightly incurved, obscurely 4-5 angled, many-seeded. Seeds tuberculate.

Balaghat, Bilaspur (Lal and Kumar, 1983), Dhar, Jhabua (Samvatsar, 1996). *Fl. & Fr.*: July - Nov.

136a. STRELITZIACEAE*

(Anand Kumar and Ramesh Kumar)

Three genera and about 107 species; tropical regions of S. America, S. Africa and Madagascar; 2 genera and 2 species in M.P.

1a. Plants with pseudostems; flowers pedicellate; fruits fleshy, indehiscent; seeds exarillate ...1. *Heliconia*

1b. Plants with true stems; flowers sessile or subsessile; fruits dry, dehiscent; seeds arillate ...2. *Ravenala*

1. HELICONIA L., *nom. cons.***

Herbs, perennial. Leaf-sheaths embracing each other, forming a pseudostem; lamina lanceolate or lanceolate-oblong. Flowers dichlamydeous, cincinnate; cincinni combined into a 2-seriate or by torsion of the common rhachis forming false omnifarious spike, each with a large, basal, vaulted or navicular persistent bract (spathe). Flowers pedicellate. Calyx and corolla basally united into a short tube. Fertile stamens 5; staminode 1. Ovary 3-locular; ovule solitary in each locule. Fruits fleshy or juicy, indehiscent. Seeds 0-3, exarillate.

About 100 species; tropical regions of America and S.W. Pacific region, cultivated elsewhere; one in M.P.

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*Possibly due to exotic and ornamental nature of the plants, the family has not been included under Key to the families given in Flora of M.P. Vol. I. However for the purpose, it should be placed after lead 203a on page 117 and can be differentiated from Musaceae by leaves being distichous and fruit a capsule.

** Sometimes treated under a separate family Heliconiaceae.

Heliconia rostrata Ruiz & Pav., Fl. Peruv. 3: 71. t. 305. 1802.

Herbs, up to 1.75 m high. Pseudostems 50-90 cm long. Lamina lanceolate-oblong, 50-70 x 10-18 cm, acuminate at apex, rounded at base, more or less inequilateral; petioles 40-70 cm long, sheathing at base. Inflorescence pendulous, 25-40 cm long; rhachis bright red; floral spathes bright red at base, yellow at apex, navicular, acute at apex; pedicels 0.5-1 cm long. Posticous tepal adhering to the adjacent margins of the two other ones. Fruits fleshy.

Exotic. Cultivated in gardens for attractive inflorescence. Indore (Khanna *et al.*, 1991). *Fl. & Fr.*: Sept. Nov.

Note: Khanna *et al.* (1991) have erroneously cited this species as *Strelitzia reginae* Aiton.

2. RAVENALA Adans.

Trees. Stems true. Leaves distichous, crowded into a fan-shaped terminal crown, large; petioles long. Flowers monochlamydeous, cincinnate; cincinni combined into 2-seriate inflorescences arising singly in the axils of the lower leaves; single cincinni with a large navicular bract (spathe). Outer 3 tepals free, equal or one of them broader; 2 lateral inner ones subequalling the outer ones; the third shorter. Fertile stamens 5 or sometimes 6; anthers linear. Ovary 3-locular; ovules many in each locule; style apex 3-dentate. Fruit a capsule. Seeds many, arillate.

A monotypic genus; Madagascar.

Ravenala madagascariensis Sonn., Voy. Indes Orient. 3: 244. 1782; Baker in Hook. *f.*, Fl. Brit. India 6: 198. 1890. *Traveller's tree.*

Trees, 3-6 m high. Stems 0.8-1.5 m long. Leaves distichous, spreading out fan-wise; lamina ovate-oblong, 1.25-2.25 x 0.5-0.75 m, truncate at apex, broadly rounded-subcordate at base; petioles 1.25-2.5 m long, sheathing at base. Inflorescence arising from the axils of 1-4 of the lower leaves; peduncles 0.5-1.25 m long, bracteate, bearing 10-12, 25-40 cm long spathes; cincinni 10-15-flowered; floral bracts 20-25 cm long. Flowers sessile. Outer tepals 3, yellow; inner tepals 3, free. Anthers longer than the filaments. Capsules loculicidally 3-valved. Seeds with a blue or purple, fimbriate aril.

Exotic. Cultivated in gardens as an ornamental tree. Bhopal (Oommachan, 1977). *Fl. & Fr.*: Oct. Dec.

137. CANNACEAE

(V. Mudgal and K.K. Khanna)

One genus with about 25 species; tropical and subtropical America, widely cultivated elsewhere; 3 species in M.P.

CANNA L.

Herbs, perennial, erect, rhizomatous. Leaves simple, alternate, pinnately nerved; petioles sheathing. Flowers in terminal racemes or panicles, bisexual, zygomorphic, large, brightly coloured. Sepals 3, small, subequal, persistent. Petals 3, basally connate and adnate to staminal column, shorter than petaloid staminodes. Stamens 3, petaloid; outer one sterile, imbricate; inner 2 more or less connate; anther solitary, 1-celled, adnate to a petaloid structure. Ovary inferior, 3-locular; ovules many on axile placenta in each locule; style flattened; stigma simple. Fruit a capsule, 3-valved, warty.

1a. Staminodes 2 ...1. *C. coccinea*

1b. Staminodes 3:

2a. Labellum unspotted; staminodes yellow ...2. *C. flaccida*

2b. Labellum spotted; staminodes bright red ...3. *C. indica*

1. Canna coccinea Mill., Gard. Dict. ed. 8. n. 3. 1768.

Herbs. Rhizomes tuberous. Stems slender, 1-1.5 m high. Leaves oblong-lanceolate, 20-50 x 10-13 cm, acute at apex, tapering at base. Flowers in simple, lax racemes; bracts green, orbicular. Sepals with red tinge, lanceolate. Petals scarlet, lanceolate. Labellum with yellow spots. Staminodes 2, narrow, usually emarginate. Capsules globose.

Cultivated. Hoshangabad (Oommachan and Masih, 1992). *Fl. & Fr.*: Throughout the year.

2. Canna flaccida Salisb., Icon. Stirp. Rar. t. 2. 1791.

Herbs. Rhizomes creeping. Stems up to 2 m high. Leaves ovate-lanceolate, 20-45 x 10-12 cm, acuminate at apex, tapering at base. Flowers in simple, lax racemes; bracts lanceolate, *ca* 3 cm long. Sepals oblong or lanceolate, acuminate. Petals broadly linear-lanceolate, up to 8 x 1.5 cm, reflexed. Labellum yellow, broadly elliptic, up to 8 cm long. Staminodes 3, yellow, obovate. Capsules ellipsoid, *ca* 5 cm long.

Cultivated. Bhopal (Oommachan, 1977). *Fl. & Fr.*: Throughout the year.

3. Canna indica L., Sp. Pl. 1. 1753. *C. orientalis* Roscoe, Monandr. Pl. Scitam. t. 12. 1826. *C. indica* L. var. *orientalis* (Roscoe) Baker in Hook. *f.*, Fl. Brit. India 6: 260. 1892.

Herbs. Rhizomes creeping. Stems glabrous. Leaves ovate-elliptic or oblong, 30-50 x 10-15 cm, acuminate at apex, tapering at base, entire, glabrous. Flowers in 15-20 cm long panicles, paired, large, showy; bracts ovate to narrowly linear, 4-6 cm long; bracteoles up to 1 cm long. Sepals lanceolate. Petals yellow, orange or red. Staminodes 3, brightly red, spathulate-oblanceolate, up to 6 cm long, one staminode shorter. Capsules warty.

Cultivated throughout the state. *Fl. & Fr.*: Often throughout the year.

138. HAEMODORACEAE

(K.K. Khanna)

In view of the inclusion of *Sansevieria* in earlier literature under Haemodoraceae, the family has been treated as a separate one under Key to the families on pages 116, 117 and 119 of Flora of Madhya Pradesh Vol. 1. But as per recent concept, the genera included in the family Haemodoraceae do not occur in Madhya Pradesh, the family stands deleted from the Flora of Madhya Pradesh.

139. IRIDACEAE

(K.K. Khanna)

About 60 genera and 800 species; tropical and temperate regions; one species in M.P.

BELAMCANDA Adans., *orth. et nom. cons.*

Herbs. Rhizomes creeping. Leaves equitant, for the greater part crowded in the lower half of the stem. Flowers many in each spathe, actinomorphic, pedicellate; spathes in a corymbiform inflorescence, with green, spathe-like floral leaves under the main branches, upper spathes membranously scarious; bracts scarious. Perianth petaloid; segments 6; tube very short. Stamens 3, inserted at the base of perianth-tube; filaments filiform, free. Ovary 3-locular, shortly beaked; ovules many in each locule; style filiform, with 3, elongated, erect or recurved arms. Fruit a capsule, membranous, loculicidal, 3-valved; valves reflexed. Seeds subglobose.

Two species; E. Asia; one in M.P.

Belamcanda chinensis (L.) DC. in Redoute, Liliac. 3: t. 121. 1805; Hook. *f.*, Fl. Brit. India 6: 277. 1892. *Ixia chinensis* L., Sp. Pl. 36. 1753.

Herbs, erect. Stems in the upper part corymbosely branched. Leaves distichous, obliquely linear-lanceolate, sword-like; lower ones 30-150 cm long; upper ones small, glaucous. Spathes 6-10-flowered; pedicels 2-4 cm long. Perianth yellow or orange with red spots inside; segments oblong. Ovary glabrous; style much exceeding the stamens, shorter than perianth. Capsules oblong, trigonous, *ca* 2.5 cm long.

Cultivated. Balaghat, Raigarh, Surguja. *Fl. & Fr.*: Sept. Dec.

140. AMARYLLIDACEAE

(R.D. Dixit and J.N. Srivastava)

About 85 genera and 1100 species; tropical and subtropical regions; 3 genera and 8 species in M.P. (*Amaryllis belladona* L. is sometimes cultivated in gardens).

1a. Stamens united by a membranous corona ...2. *Pancratium*

1b. Stamens not united by a membranous corona:

2a. Flowers solitary ...3. *Zephyranthes*

2b. Flowers 2 or more ...1. *Crinum*

1. CRINUM L.

Herbs. Bulbs tunicate. Leaves elongate or ensiform, fleshy. Flowers large, in umbels, bisexual; bracts spathaceous; bracteoles linear. Perianth infundibuliform or hypocrateriform; lobes 6, linear or oblong; tube long. Stamens 6, adnate to the throat of perianth-tube. Fruits subglobose, irregularly dehiscent.

About 130 species; tropical and subtropical regions; 4 in M.P.

1a. Perianth hypocrateriform; lobes linear:

2a. Leaves flat; umbels 15-20-flowered ...1. *C. asiaticum*

2b. Leaves concave or channelled; umbels 6-12-flowered ...2. *C. defixum*

1b. Perianth infundibuliform; lobes lanceolate or oblong-lanceolate:

3a. Leaves broadly oblong; flowers white with pinkish tinge ...3. *C. latifolium*

3b. Leaves linear; flowers pure white ...4. *C. pratense*

1. Crinum asiaticum L., Sp. Pl. 292. 1753; Hook. *f.*, Fl. Brit. India 6: 280. 1892. *Kanwal, Pindur.*

Herbs, perennial, stout, stoloniferous. Bulbs ovoid, 5-7 cm across; neck covered with old leaf sheaths. Leaves clustered, linear-lanceolate, 30-100 cm long, coriaceous, flat, with green sheathing base. Flowers white, in 15-20-flowered umbels, fragrant at night; pedicels 0.5-2.5 cm long; bracts greenish, ovate-lanceolate, *ca* 6 cm long. Perianth hypocrateriform; lobes linear, *ca* 7 cm long, reflexed; tube 8-10 cm long. Stamens red. Fruits 2-2.5 cm across, 1-2-seeded.

Along streams and in dry forest floors. Raipur, Rajnandgaon. *Fl. & Fr.*: May - Oct.

Roots are diaphoretic, emetic and used as substitute of Ipecac. Bulbs are useful in liver and urinary troubles.

2. Crinum deflxum Ker-Gawl. in J. Sci. Arts 3: 105. 1817; Hook. *f.*, Fl. Brit. India 6: 281. 1892. *Vishamandala.*

Herbs, perennial, erect, stout, stoloniferous. Bulbs ovoid, *ca* 5 cm across; neck covered with leaf-scars. Leaves clustered at tip of short caudex, linear-oblong or linear-lanceolate, 40-90 cm long, concave or channelled above, obtuse or acute at apex. Flowers white, in 6-12-flowered umbels. Perianth hypocrateriform; lobes linear, 7-10 cm long, spreading; tube 8-12 cm long. Stamens scarlet. Fruits *ca* 2.5 cm across.

In marshy and muddy places along streams and roadside ditches Bhopal, Bilaspur, Raipur, Rajnandgaon. *Fl. & Fr.*: July - Oct.

Bulbs are diaphoretic, emollicent and useful in burns but poisonous to cattles.

3. Crinum latifolium L., Sp. Pl. 291. 1753; Hook. *f.*, Fl. Brit. India 6: 283. 1892. *Madhoparnika*.

Large herbs. Bulbs globose, 12-15 cm across. Leaves numerous, broadly oblong, lorate, 15-30 cm long, bright green, obtuse at apex, glabrous, coriaceous. Flowers white with pinkish tinge, fragrant, in 8-10, rarely 20-flowered umbels, on 15-20 cm long stalk. Perianth infundibuliform; lobes oblong-lanceolate, up to 10 cm long; tube 7-10 cm long. Fruits *ca* 4.5 cm across.

Along streams in open places, also introduced in the gardens and parks. Mandla. *Fl. & Fr.*: April - Dec.

Bulbs are useful in rheumatic troubles while extract of leaves in earache.

4. Crinum pratense Herb., Amaryllidaceae 256. 1837; Hook. *f.*, Fl. Brit. India 6: 282. 1892.

Herbs, perennial, scapigerous. Bulbs ovoid or spherical, *ca* 10 cm across. Leaves linear, 30-60 cm long, channelled, suberect, obtuse or subacute at apex, entire or ciliolate. Flowers white, fragrant, in 6-12-flowered umbels; scape up to 30 cm long. Perianth infundibuliform; lobes lanceolate, about as long as the tube; tube 7-9 cm long.

Along river banks in open places. *Fl. & Fr.*: July Oct.

2. PANCRATIUM L.

Herbs, perennial. Rootstocks bulbous. Leaves linear-lanceolate, often 2-farious. Flowers large, solitary or in umbels, sessile or pedicellate, subtended by 1-4, membranous spathes; bracts linear, hyaline. Perianth infundibuliform; lobes 6, narrow; tube short or long. Stamens 6, adnate on the throat of perianth; filaments filiform, united below by coronal membrane into a dentate or lobed cup; anthers oblong or linear. Ovary 3-locular; style filiform. Fruits subglobosely triangular. Seeds angular; testa lax, black.

About 20 species; Africa, Mediterranean region and S. Asia; 2 in M.P.

1a. Bulbs with neck; perianth-tube 8-10 cm long; staminal cup broad ...1. *P. verecundum*

1b. Bulbs without neck; perianth-tube2-4 cm long; staminal cup narrow ...2. *P. zeylanicum*

1. Pancratium verecundum Aiton, Hortus Kew. 1: 412. 1789; Hook. *f.*, Fl. Brit. India 6: 285. 1892.

Herbs, stout, up to 1 m high. Bulbs globose, *ca* 5 cm across. Leaves linear-lanceolate or oblanceolate, 50-60 cm long, flat, thin, acute to acuminate at apex, smooth on margins. Spathe membranous. Flowers white, in 3-8-flowered umbels, fragrant; scape 30-50 cm long, compressed. Perianth-lobes subequal; tube 8-10 cm long. Staminal cup with 2-fid teeth between the short filaments.

Planted in gardens, sometimes occurring as an escape. Indore, Raipur. *Fl. & Fr.*: July - Oct.

The plant is used as an adulterant of *Urginea indica* Kunth, a drug used as cardiotonic, diuretic and expectorant.

2. Pancratium zeylanicum L., Sp. Pl. 290. 1753; Hook. *f.*, Fl. Brit. India 6: 285. 1892.

Herbs. Bulbs globose, 3-5 cm across. Leaves 2-farious, linear-lanceolate, 15-25 cm long, fleshy; sheath enlarged at base. Spathe as long as perianth-tube. Flowers white, fragrant, solitary or in few-flowered

umbels, sessile. Perianth-lobes lanceolate; tube 2-4 cm long. Staminal cup subequally 12-toothed; teeth large; filaments longer than cup.

Planted in gardens. Raipur. *Fl. & Fr.*: April - May.

The extract of bulb is useful in ear troubles.

3. ZEPHYRANTHES Herb., *nom. cons.*

Herbs. Bulbs tunicate. Leaves linear or lorate. Flowers solitary, pedicellate; scape fistular; bracts spathaceous, entire or 2-fid. Perianth infundibuliform, straight or somewhat declinate; lobes 6, equal or unequal, narrowed at base; tube short or long, dilated upwards. Stamens 6, adnate to perianth-throat, erect or somewhat declinate. Ovary 3-locular; ovules many in each locule; style filiform; stigma 3-fid. Fruit a capsule, subglobose.

About 71 species; tropical and subtropical America; 2 in M.P.

1a. Flowers pink; scape 30-45 cm long ...1. *Z. carinata*

1b. Flowers yellow; scape up to 20 cm long ...2. *Z. flava*

1. Zephyranthes carinata Herb. in Curtis, Bot. Mag. t. 2594. 1825. *Z. grandiflora* Lindl. in Bot. Reg. 11: t. 902. 1825-1826.

Herbs, perennial. Bulbs subglobose, covered with old leaf bases. Leaves linear-lanceolate, 40-50 x 0.8-1 cm, plicate, many-nerved. Flowers pink, solitary; scape 30-45 cm long.

Cultivated in gardens, sometimes as an escape. Bilaspur. *Fl. & Fr.*: June Sept.

2. Zephyranthes flava G. Nichols., Ill. Dict. Gard. 4: 239. 1887.

Herbs, perennial, slender. Bulbs covered with old leaf bases. Leaves linear, 30-40 x 0.5-0.8 cm, plicate. Flowers yellow, solitary; scape up to 20 cm long.

Cultivated in gardens, sometimes as an escape (weed). Raipur, Indore. *Fl. & Fr.*: May Oct.

141. HYPOXIDACEAE

(R.D. Dixit and J.N. Srivastava)

About 7 genera and 120 species; cosmopolitan; 2 genera and 3 species in M.P.

1a. Leaves plicate; perianth borne on the tip of stipe from ovary hidden in leaf bases; fruits indehiscent ...1. *Curculigo*

1b. Leaves flat; perianth attached directly to the top of exposed ovary; fruits dehiscent ...2. *Hypoxis*

1. CURCULIGO Gaertn.

Herbs, perennial, slender, acaulescent, tuberous. Leaves radical, plicate, oblong-lanceolate, acuminate at apex, sheathing at base, entire. Flowers solitary on a short scape. Perianth petaloid, spreading, borne on a long, narrow stipe. Stamens at the base of perianth; anthers erect, sometimes cohering. Ovary inferior, hidden amongst leaf bases; style filiform. Fruits indehiscent, more or less succulent. Seeds subglobose.

About 15 species; tropical Southern hemisphere; 2 in M.P.

1a. Leaves more than 5 cm broad; flowers pedicellate; scape more than 5 cm long ...1. *C. crassifolia*

1b. Leaves less than 5 cm broad; flowers sessile; scape less than 5 cm long ...2. *C. orchioides*

1. Curculigo crassifolia (Baker) Hook. *f.*, Fl. Brit. India 6: 279. 1892. *Molineria crassifolia* Baker in J. Linn. Soc. London (Bot.) 17: 121. 1878.

Herbs. Leaves elliptic-lanceolate, plicate, coriaceous, glabrous above, white tomentose beneath, long petiolate. Scape stout, densely tomentose. Flowers in racemes, pedicellate; racemes large, oblong, dense; bracts glabrous or woolly. Perianth 6-lobed; outer lobes hairy outside. Ovary silky at top. Fruits oblong. Seeds black, globose, granulate.

Hoshangabad (Mukherjee and Mallick, 1988). *Fl. & Fr.*: April - Aug.

2. Curculigo orchioides Gaertn., Fruct. Sem. Pl. 1: 63. t. 16. 1788; Hook. *f.*, Fl. Brit. India 6: 279. 1892. *Kali Musli, Kunwa, Kuapar, Masali.* **Fig. 11.**

Herbs. Rootstocks tuberous, elongate, covered with fleshy roots and remains of old leaves. Leaves very variable, linear or linear-lanceolate, 10-40 x 1-3 cm, thin but firm in texture, subsessile to petiolate; sheaths persistent, fibrous. Scape short, hidden by leaf sheaths. Flowers appear almost at the ground level, bisexual, 1-3 opening at a time, yellow, on a beak-like hypanthium. Perianth 6-lobed; lobes oblong-elliptic, outer ones hairy outside, inner ones sparsely hairy along nerves. Stamens 6. Fruits subulate to ovoid. Seeds many, globose.

In sal and mixed forests. Throughout the state. *Fl. & Fr.*: May Sept.

Tuberous roots are used for skin diseases, as tonic, diuretic, demulcent, in piles, diarrhoea, jaundice and asthma.

2. HYPOXIS L.

Small herbs, perennial. Rootstocks cormous. Leaves radical, simple, spreading, linear, acute, flat, strongly nerved. Scape slender, hairy above. Flowers solitary or in racemes. Perianth petaloid; lobes 6, subequal. Stamens 6, at the base of perianth; anthers erect. Ovary inferior, elongate, hairy, 3-locular, not beaked. Fruit a capsule. Seeds many, subglobose, tuberculate.

About 80 species; tropical and subtropical regions especially Southern hemisphere; one in M.P.

Hypoxis aurea Lour., Fl. Cochinch. 1: 200. 1790; Hook. *f.*, Fl. Brit. India 6: 277. 1892. *Bhuin khajur.* **Fig. 12.**

Herbs, slender, 10-30 cm high. Corms covered with remains of old leaves and fleshy root fibres. Leaves linear, 8-17 x 0.2-0.5 cm, acute at apex, sheathing at base, glabrous or hairy. Scape filiform, 5-10 cm long. Perianth yellow, sessile; lobes on top of the ovary, elliptic-lanceolate. Capsules green, cylindrical-turbinate.

Occasional. On hill slopes. Hoshangabad. *Fl. & Fr.*: June Aug.

Rootstocks are used as tonic, especially aphrodisiac.

Fig. 11. Curculigo orchioides Gaertn.

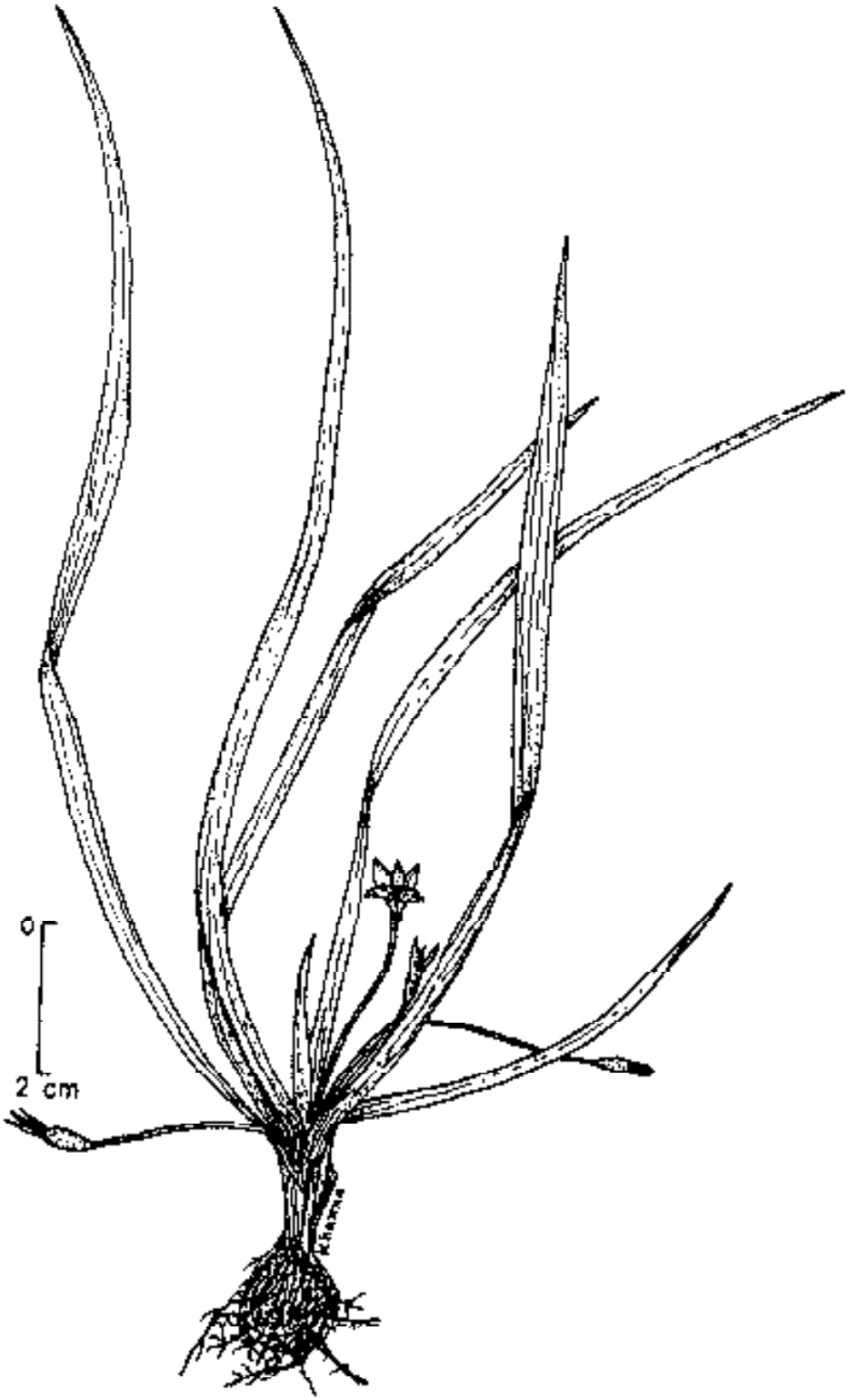

Fig. 12. Hypoxis aurea Lour.

142. AGAVACEAE

(R. Prasad and R.D. Dixit)

About 18 genera and 580 species; tropical and subtropical regions especially arid America; 7 genera and 11 species in M.P.

1a. Ovary superior:

2a. Ovules solitary:

3a. Stems present; fruit a berry ...3. *Dracaena*

3b. Stems absent or very short; fruit a coccus ...6. *Sansevieria*

2b. Ovules numerous:

4a. Flowers large; tepals almost free; fruit a capsule or berry ...7. *Yucca*

4b. Flowers comparatively smaller; tepals connate at base; fruit a berry ...2. *Cordyline*

1b. Ovary inferior:

5a. Inflorescence a spike; flowers zygomorphic ...5. *Polianthes*

5b. Inflorescence a panicle; flowers actinomorphic:

6a. Stamens longer than the perianth; style filiform, not thickened ...1. *Agave*

6b. Stamens shorter than the perianth; style thickened below the middle ...4. *Furcraea*

1. AGAVE L.

Herbs, undershrubs or shrubs, stout, usually with subterranean stolons. Stems short, more or less concealed by leaf-bases. Leaves radical or crowded on short stem, fibrous, always with an apical spine, with or without marginal spines, sessile; young leaves firmly appressed against each other. Inflorescence often bulbiferous. Flowers in terminal, pedunculate spikes or panicles along the rhachis of inflorescence, solitary, geminate or cymose, proterandrous. Perianth tubular or infundibuliform; tepals 6,

subequal, erect, patent or reflexed after anthesis, long persisting; tube short, apically widened. Stamens 6, inserted in or below the top of the perianth-tube, deflexed inwards in bud, finally far exserted. Ovary terete, fusiform, beaked or not, 3-locular. Fruit a capsule, globose or ellipsoid, longitudinally furrowed. Seeds numerous, black, flat.

About 300 species; S. United States to tropical S. America; 4 in M.P.

1a. Leaves in a close globose rosette, up to 90 cm long ...2. *A. angustifolia*

1b. Leaves in a lax rosette, more than 90 cm long:

2a. Tepals constricted from about the middle to a ligulate tip ...4. *A. sisalana*

2b. Tepals not constricted towards the tip:

3a. Leaves broader at about the middle, oblong-lanceolate ...1. *A. americana*

3b. Leaves not broader in the middle, linear ...3. *A. cantula*

1. Agave americana L., Sp. Pl. 323. 1753. *Ketaki, Vilayagi kumvar.*

Large herbs or undershrubs, perennial. Trunk short, stout. Leaves in a lax rosette, stout, oblong-lanceolate, 0.9-1.8 m long, 15-20 cm broad, glaucous, with recurved tips; marginal prickles dark brown, mostly pointing downwards, terminal spine dull brown. Scape with 5-8 m high panicles; primary branches almost horizontal. Fascicles of flowers crowded at the end of subsidiary ascending branches. Tepals amber-coloured, ovate-lanceolate, obtuse. Capsules oblong-clavate.

Cultivated as ornamental in parks and gardens. Bhopal (Oommachan, 1977). *Fl. & Fr.*: Jan. - June.

Fibres are obtained from the leaves.

2. Agave angustifolia Haw., Syn. Pl. Succ. 72. 1812. *A. wightii* J. R. Drumm. & Prain in Bengal Agric. Bull. 8: 15. 1906 & Agric. Ledger 13: 91. 1906.

Perennials. Trunk conspicuous, stout. Leaves many, forming a stiff rosette, ensiform or linear-lanceolate, 50-90 cm long, *ca* 7.5 cm broad in the middle, broadly amplexicaul at base, fleshy; marginal spines spreading, with a small brown cushion, sharply recurved or parallel to the leaf edge, terminal spine pale. Scape 2-4 m long. Flowers in terminal, elongate to pyramidal panicles. Tepals lanceolate, obtuse, connate at base. Capsules brown, broadly turbinate.

Chhatarpur (Roy *et al.*, 1992), Dhar (Samvatsar, 1996), Hoshangabad, (Oommachan and Masih, 1992), Jhabua (Samvatsar, 1996). *Fl. & Fr.*: July Dec.

3. Agave cantula Roxb., Fl. Ind. 2: 167. 1832. *A. americana auct. non* L., 1753: Hook. *f.*, Fl. Brit. India 6: 277. 1892. *Chota Guial, Guial.*

Undershrubs, perennial, stout, scapigerous. Stems short, woody. Leaves in a lax rosette, linear-lanceolate, *ca* 1 m long, *ca* 6 cm broad, patent, recurved, remotely spinescent - dentate; marginal spines falcate, very sharp, pointing forward, terminal spine acicular, reddish or dark brown. Scape 3-4 m long. Flowers greenish, in terminal umbels. Tepals 6, bluntly linear-lanceolate, constricted in the middle.

Cultivated. Dhar (Samvatsar, 1996), Hoshangabad (Oommachan and Masih, 1992), Jhabua (Samvatsar, 1996). *Fl. & Fr.*: July Sept.

4. Agave sisalana Perrine in U. S. Sennate Document 300: 36. 1838. *A. rigida* Mill. var. *sisalana* Woodr. in J. Bombay Nat. Hist. Soc. 12: 522. 1899.

Shrubs. Stems stout, *ca* 3.8 cm high. Leaves in a lax rosette, linear-lanceolate, 1-1.5 x 0.2-0.25 m, dark green; marginal spines absent or if present, tiny, weak, scattered, pale, terminal spine dark brown. Scape 3-4 m long. Fascicles of flowers crowded. Tepals narrowly ligulate.

Cultivated. Dhar (Samvatsar, 1996). *Fl. & Fr.*: Jan. - April.

2. CORDYLINE Comm. *ex* R. Br., *nom. cons.*

Trees. Stems woody, branched. Leaves crowded on the top of the branches, linear or lanceolate, sessile or petiolate. Flowers in large panicles;

floral bracts small, scarious; pedicels articulate near their top. Tepals 6, oblong, basally connate or cohering, free above, equal or inner ones longer. Stamens 6, inserted on the perianth; anthers medifixed. Ovary sessile, 3-locular; style filiform; stigma capitate or 3-lobed. Fruits globose or 3-lobed, fleshy. Seeds shining black.

About 15 species; India, Australia and tropical America; one in M.P.

Cordyline terminalis Kunth in Abh. Acad. Berl. 30. 1820; Hook. *f.*, Fl. Brit. India 6: 331. 1892. - *Palm lily.*

Small trees, up to 3 m high. Stems simple or sometimes branched. Leaves crowded or close together at the end of the stem, linear-lanceolate, 30-100 x 5-12 cm, abruptly narrowed at apex to an aristate point, narrowed to channelled clasping petiole, green or variously coloured, many-nerved. Flowers small, yellowish white, lilac or reddish, in 30-60 cm long panicles. Perianth *ca* 1.5 cm long; segments erect, about as long as the tube.

Planted in gardens and parks. Bhopal (Oommachan, 1977). *Fl. & Fr.*: Dec. March.

3. DRACAENA Vand. *ex* L.

Tall shrubs, erect or subscandent, woody. Leaves alternate or crowded, entire, either with strong costae or many fine parallel nerves, sessile or petiolate. Flowers in terminal racemes, panicles, heads or umbels; bracts small. Perianth corolline, campanulate, infundibuliform or tubular, 6-lobed. Stamens 6, adnate to the base of perianth-tube. Ovary 3-locular; ovule solitary; style filiform; stigma capitate. Fruit a berry, 2 or 3-lobed.

About 40 species; tropical regions of Old World to Canary Islands; one in M.P.

Dracaena elliptica Thunb., Diss. Bot. Dracaena 6. 1808; Hook. *f.*, Fl. Brit. India 6: 330. 1892.

Undershrubs, up to 1 m high. Stems terete, 2-2.5 cm thick, simple or branched. Leaves thick, green or blotched with white or black or all purple, scattered or crowded, acuminate or caudate, narrowed into a short rather slender petiole at the base. Flowers greenish yellow or purple, in panicles.

decurved; pedicels slender. Perianth 6-lobed to the middle; lobes erect. Berries orange-red, pisiform, 2-3-lobed.

Usually cultivated in gardens. Bhopal (Oommachan, 1977). *Fl. & Fr.*: March Sept.

4. FURCRAEA Venten.

Shrubs. Stems short or long, woody, marked with scars of fallen leaves. Leaves densely crowded, squarrose, lanceolate or linear-lanceolate, acute, tough-fibrous, entire or spinous-dentate. Flowers in terminal, large, much branched panicles, solitary or fascicled along the rhachis, pendulous, shortly pedicellate. Perianth constricted above the ovary, choriphyllous; tepals 6, free, erecto-patent, subequal. Stamens 6, inserted at the base of tepals. Ovary 3-locular; ovules many. Fruit a capsule, ellipsoid, trigonous, loculicidal, 3-valved. Seeds numerous, flat.

About 20 species; tropical America; one in M.P.

Furcraea foetida (L.) Haw., Syn. Pl. Succ. 73. 1812. *Agave foetida* L., Sp. Pl. 323. 1753. *Furcraea gigantea* Venten. in Bull. Soc. Philom. 1: 65. 1793.

Shrubs. Leaves *ca* 2 m long, scarcely armed. Scape with 3-5 m long panicle. Flowers *ca* 5 cm long, pendent on slender pedicels. Hypanthium slender, slightly pulvinate on the pedicels. Tepals white, free; outer tepals narrowly elliptic, *ca* 2.8 cm long, obtuse; inner tepals elliptic, subequal. Stamens adpressed to the stylar column; filaments flattened, much dilated in the middle; anthers oblong, versatile.

Cultivated. Indore (Rao and Sastry, 1964). *Fl. & Fr.*: Jan. - Oct.

Fibres obtained from the leaves are used for cordage.

5. POLIANTHES L.

Herbs, with subterraneous tubers. Leaves partly radical or crowded at the stem-base, partly distant along an erect stem, narrow. Flowers bisexual, germinate along rhachis of a terminal, erect, many-flowered spike. Perianth gamophyllous, long persistent; segments 6, subequal, rounded; tube

long, widened upwards, curved forwards. Stamens 6. Ovary 3-locular. Fruit a capsule, oblong.

About 13 species; Mexico; one in M.P.

Polianthes tuberosa L., Sp. Pl. 316. 1753.

Tubers bulb-shaped. Stems simple, 60-100 cm tall. Leaves radical or on the lower part of the stem, 20-30 cm long. Flowers white, fragrant, in long, terminal, simple spikes. Capsules with persistent perianth on the top. Seeds flat.

Planted as ornamental. Jabalpur (Oommachan and Shrivastava, 1996). *Fl. & Fr.*: April June.

6. SANSEVIERIA Thunb., *nom. cons.*

Herbs or undershrubs. Rootstocks creeping. Leaves basal, erect, flat, terete or semiterete, entire, sessile, fleshy. Flowers in terminal, erect, short or long, simple or branched racemes, fascicled in the axils of scarious bracts; pedicels articulate. Perianth gamophyllous; segments 6. Stamens 6, inserted at the top of perianth-tube; filaments filiform; anthers medifixed. Ovary superior, sessile by a broad base, 3-locular; ovules 3; style filiform; stigma slightly thickened, entire. Fruit a berry, 1-3-seeded.

About 12 species; dry tropical regions and S. Africa, Madagascar, S. Asia and Arabia; one in M.P.

Sansevieria hyacinthoides (L.) Druce, Rep. Bot. Exch. Cl. Brit. Isles 1913(3): 423. 1914, '*Sanseviera*': Wijnands in Taxon 22:113. figs. 2 & 3. 1973; Nicolson *et al.*, Reg. Veget. 119: 271. 1988. *Aloe hyacinthoides* L. β *guineensis* L., Sp. Pl. 321. 1753. *Aletris hyacinthoides* (L.) L. β *guineensis* (L.) L., Sp. Pl. ed. 2. 456. 1762. *Sansevieria thyrsiflora* Thunb., Prodr. Pl. Cap. 1: 65. 1794, *nom. illeg. Sanseverinia thyrsiflora* Pentagna, Instit. Bot. 3: 643. 1787.

Herbs or undershrubs, perennial. Rootstocks thick, creeping. Leaves in a basal rosette, lanceolate, 30-50 x 6-8 cm, smooth, acute or obtuse and usually with a white, withered, up to 16 mm long point at apex, dull green, marked on both sides with numerous closely placed transverse pale

green bands; margin yellow or brownish red, sometimes whitish. Scape 45-75 cm long. Flowers greenish white. Perianth *ca* 3.5 cm long; lobes linear, revolute, obtuse; tube *ca* 1.8 cm long.

Planted in gardens, also found naturalised in wastelands. Bilaspur. *Fl. & Fr.*: Feb. March.

7. YUCCA L.

Robust plants. Stems short, woody. Leaves crowded at the top of the stem, linear-lanceolate, rigid, often with a spiny apex. Flowers in terminal, many-flowered panicles with ascending branches. Tepals in fertilized flowers persistent (in non-fertilized flowers fall off soon), free or shortly connate at base, conniving into a campanulate perianth, ovate-oblong, somewhat fleshy. Stamens 6, inserted on the torus, much shorter than the perianth. Ovary sessile or shortly stipitate, 3-locular; ovules many; style short, with a well developed central channel. Seeds black.

About 40 species; subtropical regions of N. America; 2 in M.P.

1a. Leaves-margins pale, with numerous short teeth; panicles 30-60 cm long; fruits oblong, 7-10 cm long ...1. *Y. aloifolia*

1b. Leaves-margins brown, smooth or nearly so; panicles 1-2 m long; fruits ellipsoid, up to 6.5 cm long ...2. *Y. gloriosa*

1. Yucca aloifolia L., Sp. Pl. 319. 1753.

Trunk simple, sometimes branched, usually *ca* 1 m, rarely up to 5 m or more high. Leaves 60-75 x 6-8 cm, very sharp pointed, bright green. Panicles including peduncle 30-60 cm long; pedicels 1.2-3.5 cm long. Perianth white, 3.5-5 cm long. Fruits oblong, 7-10 cm long; pulp purple.

Cultivated in gardens. Bilaspur. *Fl. & Fr.*: Nov. - May.

Flowers and fruits are edible.

2. Yucca gloriosa L., Sp. Pl. 319. 1753.

Trunk 1-3 m high. Leaves 60-75 x 4-5 cm; tip short, stiff, red. Panicles 1-2 m long; pedicels 1.2-4 cm long. Perianth white or cream-coloured, 4-5.2 cm long. Stamens 6, embracing the ovary. Fruits ellipsoid, 5-6.5 cm long, hard, dry.

Occasionally planted in gardens. Bilaspur, Bhopal (Oommachan, 1977). *Fl. & Fr.*: March Aug.

Fibres are used for making carpet and mats.

143. TACCACEAE

(M.I. Hanfi)

One genus with about 10 species; tropical regions; one species in M.P.

TACCA J.R. Forster & G. Forster, *nom. cons.*

Herbs, perennial. Rootstocks tuberous or creeping. Leaves radical, simple, lobed or laciniate, costate, penninerved. Flowers in umbels, on a leafless scape; involucre of 2-6 spathaceous bracts and long filiform bracteoles. Perianth urceolate or subcampanulate, 6-lobed in 2 series. Stamens 6, adnate at the base of the perianth-lobes; filaments very short, dilated or appendaged on each side at base, dilated into an inflexed hood above the anthers with 2 ribs or horns on the inner surface; anthers sessile within the hood. Ovary 1-locular; ovules many on 3 parietal placentae, anatropous or subamphitropous; style short, included; stigmas 3, broad or petaloid, reflexed like an umbrella over the style. Fruits indehiscent, baccate or at length 3-valved, 3-6-ribbed. Seeds numerous, ovoid, longitudinally striate.

Tacca leontopetaloides (L.) Kuntze, Revis. Gen. Pl. 2: 704. 1891. *Leontice leontopetaloides* L., Sp. Pl. 313. 1753. *Tacca pinnatifida* J. R. Forster & G. Forster, Char. Gen. Pl. 69, t. 35. 1775; Hook. *f.*, Fl. Brit. India 6: 287. 1892.

Herbs, erect, *ca* 1 m high. Rootstocks tuberous. Leaves *ca* 80 cm across, 3-partite, each irregularly pinnatifid, glabrous; petioles *ca* 40 cm long, grooved, glabrous. Flowers in drooping, *ca* 8 cm across umbels, green, *ca* 1 cm across; bracts *ca* 3 x 1 cm; bracteoles several, filiform,

ca 10 cm long. Perianth green, *ca* 1 cm long; segments oblong. Stamens 6, included; filaments expanded at base, dilated and hooded above anthers at top. Ovary glabrous; style short; stigmas 3, 2-lobed. Berries ovoid, *ca* 2 x 1.2 cm, with persistent perianth. Seeds numerous, striate.

In sal and mixed forest clearings. Balaghat, Bastar, Bilaspur, Hoshangabad, Indore, Mandla, Raigarh, Raipur, Rajnandgaon, Seoni. *Fl. & Fr.*: July Nov.

144. DIOSCOREACEAE

(K.K. Khanna)

About 8 genera and 630 species; tropical and subtropical regions, few in N. temperate zone; one genus and 15 species in M.P.

DIOSCOREA L.

Twiners, perennials, sometimes annuals, usually dioecious, frequently with small, axillary bulbils, with one or more subterranean, stalkless or long stalked tubers. Stems slender or stout, twining to the right or to the left, sometimes angled or winged. Leaves simple or palmately compound, alternate or opposite, entire, lobed or digitately 3-9-foliolate, petiolate. Flowers unisexual, spicate, racemed or panicled. Male flowers frequently in small cymes racemosely arranged along the axis, sometimes flowers solitary in a spike. Perianth campanulate, rotate or urceolate; tepals 6, in 2 whorls of 3 each, shortly connate. Stamens 6, all fertile or the inner as staminodes, free around a pistillode or connate in a central column. Pistillode thick, fleshy or absent. Female flowers in spike or spike like racemes. Tepals 6, free, small. Staminodes 6 or 3 or absent. Ovary inferior, 3-locular; ovules 2 in each locule; style short; stigma terminal, entire or 2-fid. Fruit a capsule, 3-lobed, loculicidal; lobes flat, wing-like. Seeds compressed, with a membranous wing around or at base.

About 600 species; tropical and subtropical regions; 15 in M.P.

1a. Stems twining to the left:

2a. Leaves simple:

3a. Plants unarmed; stems glabrous; seeds winged at base only ...3. *D. bulbifera*

3b. Plants armed; stems pubescent with T-shaped hairs; seeds winged around ...4. *D. esculenta*

2b. Leaves 3-5-foliolate:

4a. Fertile stamens 6 ...7. *D. hispida*

4b. Fertile stamens 3:

5a. Stems tomentose; leaves usually 3-foliolate, rarely 5-foliolate; flowers sessile ...13. *D. tomentosa*

5b. Stems glabrous; leaves 3-5-foliolate; flowers pedicellate ...10. *D. pentaphylla*

1b. Stems twining to the right:

6a. Stems densely pubescent ...11. *D. pubera*

6b. Stems glabrous:

7a. Plants armed:

8a. Stems winged or angled ...1. *D. alata*

8b. Stems terete:

9a. Leaves up to 10 cm long; capsules green, without brown flecks ...5. *D. glabra*

9b. Leaves more than 10 cm long; capsules stramineous, with brown flecks 14. *D. wallichii*

7b. Plants unarmed:

10a. Stems 6-angled ...6. *D. hamiltonii*

10b. Stems terete, neither angled nor winged:

11a. Leaves coriaceous ...12. *D. spicata*

11b. Leaves not coriaceous:

12a. Leaves usually ovate, cordate at base:

13a. Leaves glaucous beneath, more than 8 cm long, veins prominent ...2. *D. belophylla*

13b. Leaves not glaucous beneath, up to 8 cm long, veins not prominent ...15. *D. wightii*

12b. Leaves otherwise, obtuse or rounded at base:

14a. Leaves with a cartilaginous margin, veins not prominent; male spikes 8-20 cm long ...9. *D. oppositifolia*

14b. Leaves without a cartilaginous margin, veins prominent; male spikes up to 6 cm long ...8. *D. intermedia*

1. Dioscorea alata L., Sp. Pl. 1033. 1753; Hook. *f.*, Fl. Brit. India 6: 296. 1892; Prain & Burkill in Ann. Roy. Bot. Gard. Calc. 14(2): 302. 1938. *Bhainsdhate*.

Climbers. Tubers usually solitary, polymorphic, globose, cylindrical or pyriform, with white, yellow or purple flesh. Stems twining to the right, usually 4-winged, sometimes only angled, usually with broad based prickles. Bulbils numerous. Leaves usually opposite, sometimes alternate, ovate, 8-16 x 5-9 cm, hastate or subcordate at base with acute or rounded lobes, 5-costate; petioles 6-10 cm long. Male flowering axes 1 or 2 together, on leafless branches. Stamens 6. Female flowering axis solitary, narrowly winged. Capsules reddish brown when dry. Seeds winged around.

Bastar (Saxena and Khotele, 1976). *Fl. & Fr.*: Oct. Dec.

2. Dioscorea belophylla (Prain) Voigt *ex* Haines, For. Fl. Chota Nagpur 530. 1910; Prain & Burkill in Ann. Roy. Bot. Gard. Calc. 14(2): 348. 1938. *D. nummularia* var. *belophylla* Prain, Bengal Pl. 2: 1065, 1067. 1903. *D. glabra auct. non* Roxb., 1832: Hook. *f.*, Fl. Brit. India 6: 294. 1892, *p.p.*

Climbers. Tubers small, subfusiform. Stems twining to the right, glabrous. Bulbils present. Leaves simple, usually opposite, sometimes alternate, variable in shape, usually ovate, 8-12 x 3-8 cm, acuminate at apex, cordate at base, entire, glabrous, glaucous beneath. Male spikes lax-flowered, unilaterally 1 to 3-nate on special leafless stem. Tepals oblong or elliptic-oblong. Stamens 6, all fertile. Female spikes solitary or 2 together, axillary from leafy branches. Capsules *ca* 2 cm long, broader than long, pendulous. Seeds winged around.

In mixed forests. Bastar, Bilaspur, Hoshangabad. *Fl. & Fr.*: Aug. Dec.

3. Dioscorea bulbifera L., Sp. Pl. 1033. 1753; Prain & Burkill in Ann. Roy. Bot. Gard. Calc. 14(1): 111. 1936. *D. sativa* Thunb., Fl. Jap. 151. 1784, *non* L., 1753; Hook. *f.*, Fl. Brit. India 6: 295. 1892. *Dang kanda*. **Fig. 13.**

Large climbers. Tubers solitary, globose-pyriform, 10-15 cm across, subsessile. Stems twining to the left, terete, grooved. Bulbils abundant, axillary, rounded. Leaves simple, alternate, broadly ovate-cordate, 10-30 x 8-28 cm, subcaudate at apex, cordate at base, glabrous. Male flowering axes 1-4, on up to 1 m long leafless branches, pendulous. Flowers white, pink or brownish white, fragrant. Stamens 6, fertile. Female flowering axes 1 or 2 from a leaf axil, directed downwards. Capsules oblong, slightly widened upwards; wings rounded, 20-22 x 7-10 mm. Seeds winged at base.

Common in mixed and sal forests and on slopes of embankments. Balaghat, Bastar, Bilaspur, Damoh, Dhar, Durg, Hoshangabad, Indore, Jabalpur, Mandla, Panna, Raigarh, Raipur, Rajnandgaon, Rewa, Satna, Seoni, Sidhi, Surguja. *Fl. & Fr.*: July - Nov.

Tubers and bulbils are edible.

4. Dioscorea esculenta (Lour.) Burkill in Gard. Bull. Straits Settl. 1: 396. 1917; Prain & Burkill in Ann. Roy. Bot. Gard. Calc. 14(1): 80. 1936. *Oncus esculentus* Lour., Fl. Cochinch. 1: 194. 1790. *Dioscorea aculeata auct. non* L., 1753: Hook. *f.*, Fl. Brit. India 6: 296. 1892. *D. fasciculata* Roxb., Fl. Ind. 3: 801. 1832; Hook. *f.*, Fl. Brit. India 6: 296. 1892. *D. sativa* L., Sp. Pl. 1033. 1753, *p.p., non* sensu Hook. *f.*, Fl. Brit. India 6: 291. 1892, *quoad plant masul.*

Climbers. Tubers few to many, mixed with thorny roots. Stems twining to the left, armed with prickles, pubescent with T-shaped hairs. Leaves simple, alternate, broadly ovate, 10-15 x 10-14 cm, acute or acuminate at apex, cordate at base, entire, with stipule-like spines. Male and female spikes solitary, axillary. Male flowers 1-2 together; bracts ovate, scarious. Tepals broadly lanceolate; inner ones shorter. Stamens inserted near the margin. Female flowers solitary. Staminodes 6. Capsules reflexed. Seeds winged around.

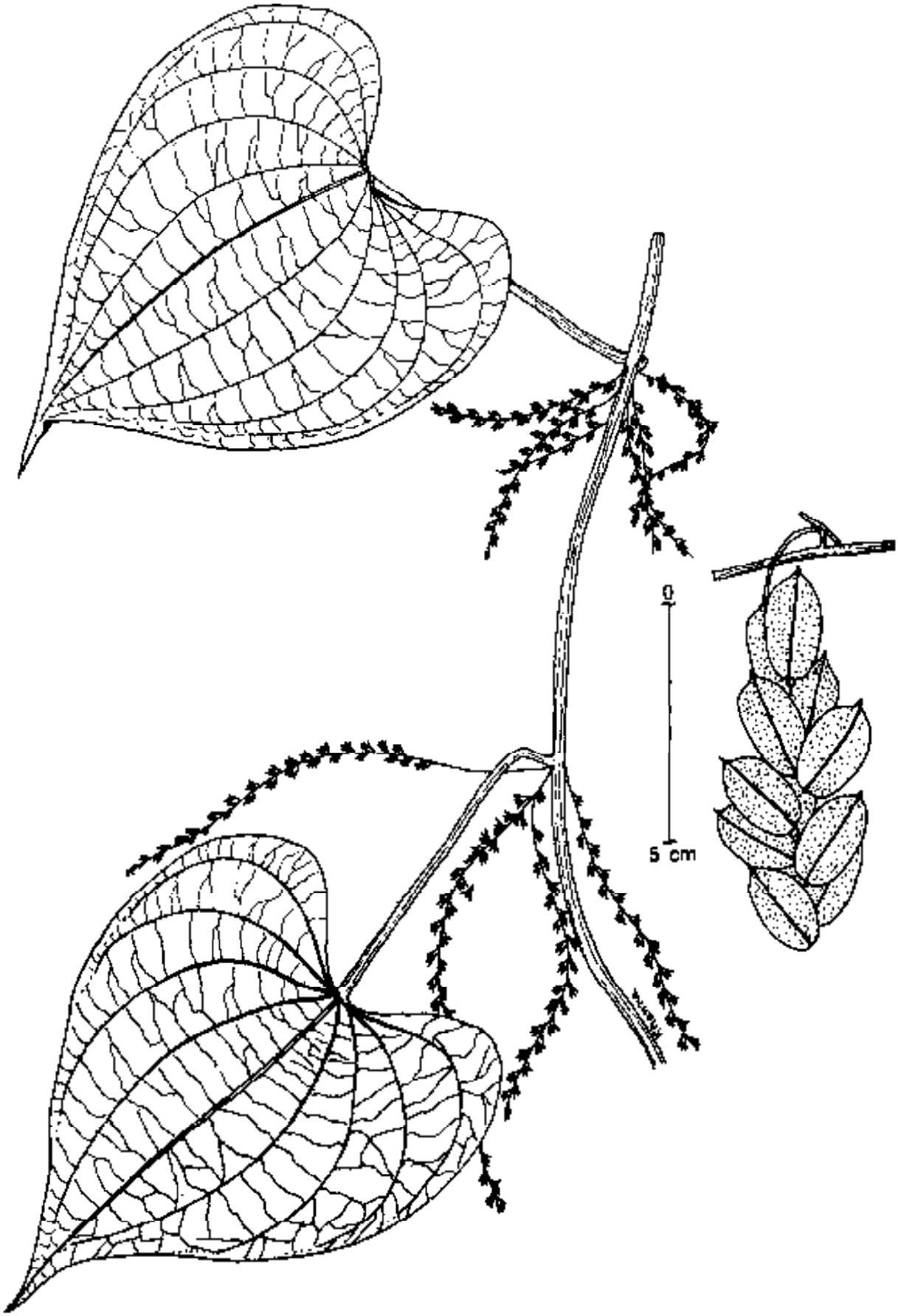

Fig. 13. Dioscorea bulbifera L.

Bhopal (Oommachan, 1977). *Fl. & Fr.*: Aug. Feb.

Tubers are eaten after boiling.

5. Dioscorea glabra Roxb., Fl. Ind. 3: 804. 1832; Hook. *f.*, Fl. Brit. India 6: 294. 1892, *p.p.*; Prain & Burkill in Ann. Roy. Bot. Gard. Calc. 14(2): 354. 1938. *D. nummularia* Roxb., Fl. Ind. 3: 803. 1832, *non* Lam., 1789. *D. laurifolia* Curtis in J. Str. Br. Royal Asiat. Soc. 25: 149. 1894, *non* Wallich, 1831-32. *D. oppositifolia* Backer, Handb. Fl. Java 3: 115. 1924, *p.p. non* L., 1753.

Climbers. Tubers cylindrical, *ca* 4 cm long, with white flesh, on up to 50 cm long stalk. Stems twining to the right, prickly at base. Leaves opposite or lower alternate, elliptic-ovate or ovate-lanceolate, 7-10 x 4-6 cm, rounded or cordate at base, subcoriaceous, glabrous or nearly white beneath. Male flowering axes 1-4 together, on up to 70 cm long, leafless branches. Flowers subglobose. Tepals obovate, very thick. Stamens 6, all fertile. Female flowering axes solitary or 2 together. Capsules green, broader than long, retuse at the tip and base, on 3-4 mm long stipe; wings 15-18 x 14-20 mm. Seeds winged around.

Common in mixed and sal forests. Balaghat, Bastar, Raigarh, Raipur, Sidhi, Surguja. *Fl. & Fr.*: Nov. - Jan.

6. Dioscorea hamiltonii Hook. *f.*, Fl. Brit. India 6: 295. 1892; Prain & Burkill in Ann. Roy. Bot. Gard. Calc. 14(2): 299. 1938. *D. hookeri* Prain *ex* Wood in Rec. Bot. Surv. India 2: 143. 1902. *Nagar kanda.*

Climbers. Tubers plough-shaped, with white flesh, long stalked, deeply into the soil. Stems twining to the right, slender, 6-angled, unarmed. Leaves alternate or opposite, ovate or lanceolate, 6-16 x 3-11 cm, acuminate at apex, cordate at base with divergent lobes, 7-costate; petioles 5-10 cm long. Male flowering axes 1-5 together, on axillary leafless branches. Flowers yellowish, fragrant, sessile. Stamens 6, all fertile. Female flowering axes solitary or paired. Capsules coppery brown, reniform, broader than long. Seeds winged around.

Usually at foot hills. Bastar, Raigarh. *Fl. & Fr.*: Nov. March.

Tubers are edible.

7. Dioscorea hispida Dennst., Schlussel Hortus Malab. 15. 1818; Prain & Burkill in Ann. Roy. Bot. Gard. Calc. 14(1): 188. 1936. *D. daemona* Roxb., Fl. Ind. 3: 805. 1832; Hook. *f.*, Fl. Brit. India 6: 289. 1892. *Baichandi.*

Extensive climbers. Tubers subglobose, up to 30 cm across. Stems twining to the left, with short, green, recurved, hard prickles, deciduously golden hairy. Leaves 3-foliolate, glabrous or puberulous; middle leaflet elliptic-oblong or obovate, 10-20 x 8-12 cm, acuminate at apex, acute at base; lateral leaflets smaller, inequilateral, 5-costate. Male flowering axes usually solitary, borne on 30-50 cm long, villous, leafless, axillary branches; bracts brown hairy. Stamens 6, all fertile. Female flowers in solitary spikes, directed downwards. Capsules stramineous, oblong, 3-winged, ascending; wings 40-60 x 10-13 mm. Seeds winged at base.

Common on hill slopes and in mixed forests. Balaghat, Bilaspur, Hoshangabad, Mandla, Raipur, Rajnandgaon, Rewa, Seoni, Surguja. *Fl. & Fr.*: Sept. - May.

Tubers are reported to be poisonous but sometimes eaten after a thorough wash.

8. Dioscorea intermedia Thwaites, Enum. Pl. Zeyl. 326. 1864; Hook. *f.*, Fl. Brit. India 6: 297. 1892; Prain & Burkill in Ann. Roy. Bot. Gard. Calc. 14(2): 389. 1938.

Climbers. Stems twining to the right, terete, neither winged nor angled, unarmed, glabrous. Leaves simple, usually alternate, elliptic or oblong, up to 12 x 6 cm, acuminate or mucronate at apex, narrowed or rounded at base; petioles up to 3 cm long. Male flowering spikes short, fascicled in long panicles. Female flowering spikes simple, solitary, short. Capsules transversely oblong, retuse at apex. Seeds winged around.

Bhopal (Oommachan, 1977). *Fl. & Fr.*: Aug. Sept.

Tubers are edible.

9. Dioscorea oppositifolia L., Sp. Pl. 1033. 1753; Hook. *f.*, Fl. Brit. India 6: 292. 1892, *p.p.*; Prain & Burkill in Ann. Roy. Bot. Gard. Calc. 14(2): 392. 1938. - *Nagar kanda, Targaria kanda.* **Fig. 14.**

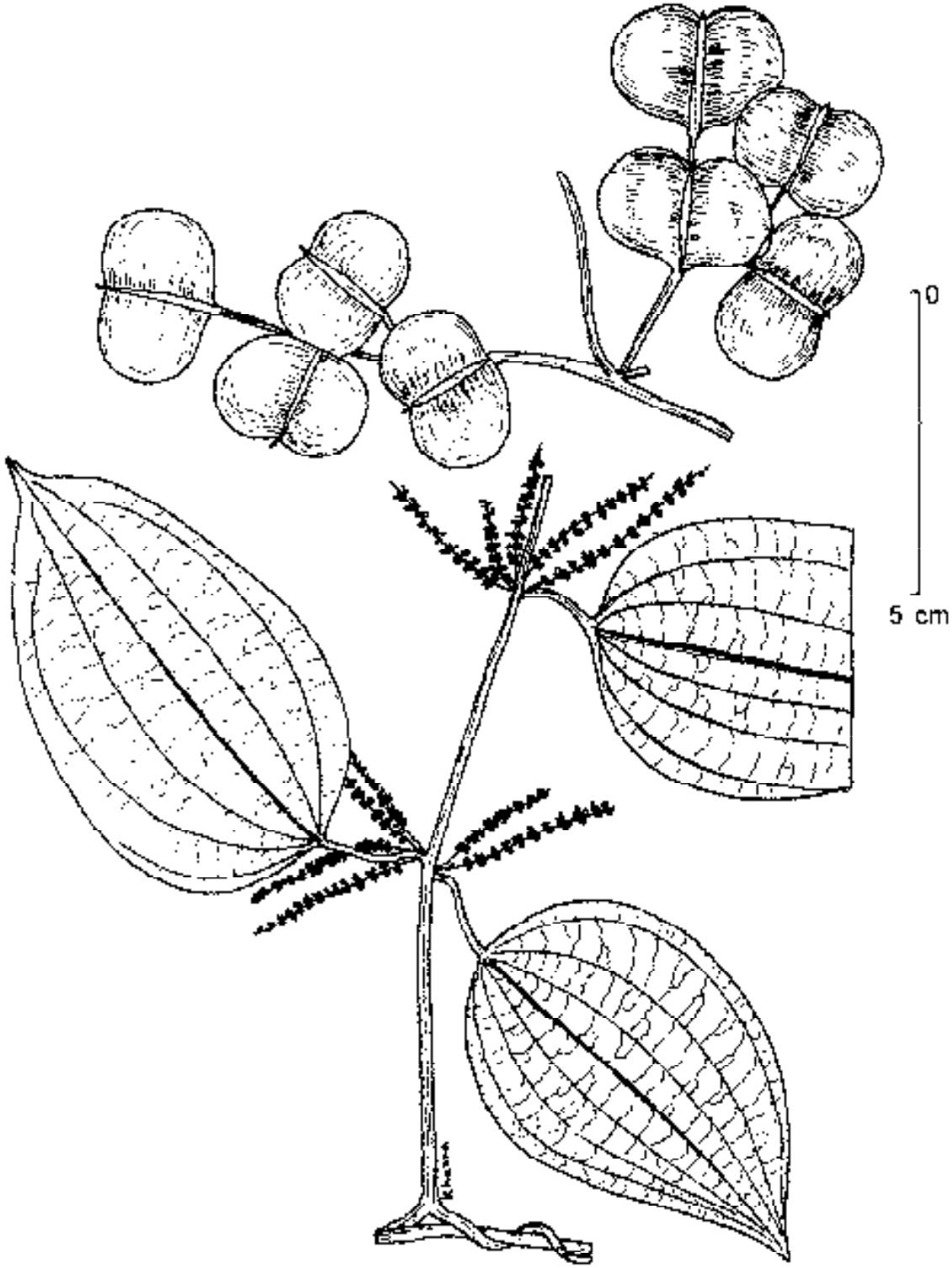

Fig. 14. Dioscorea oppositifolia L.

Climbers. Tubers cylindrical, deeply in the soil. Stems twining to the right, unarmed, usually glabrous, rarely deciduously pubescent. Bulbils small. Leaves simple, opposite or alternate, elliptic-ovate, 6-13 x 4-8 cm, acuminate at apex, obtuse or rounded at base, entire, glabrous, shining. Spikes clustered, axillary; axes glabrous or pubescent. Flowers glabrous, bracteate, bracteolate. Tepals oblong or broadly ovate. Stamens 6, all fertile; filaments short. Capsules 16-24 x 12-17 mm, winged. Seeds brown, winged around.

Common in mixed and sal forests. Balaghat, Bastar, Bilaspur, Hoshangabad, Raigarh, Raipur, Seoni. *Fl. & Fr.*: July – Nov.

Tubers are edible.

10. Dioscorea pentaphylla L., Sp. Pl. 1032. 1753; Hook. *f.*, Fl. Brit. India 6: 289. 1892; Prain & Burkill in Ann. Roy. Bot. Gard. Calc. 14(1): 160. 1936. *D. triphylla* L., Sp. Pl. 1032. 1753. *Barha kanda, Suvar kanda*.

Climbers. Stems twining to the left, prickly at base. Bulbils globose-ellipsoid. Leaves alternate, 3-5-foliolate, glabrous or sparsely to densely pubescent beneath; middle leaflet elliptic-oblanceolate, 6-12 x 2-6 cm, acuminate at apex, oblique at base; lateral leaflets smaller, inequilateral. Male flowers white, in dense, pubescent, pendent, axillary or terminal panicles borne on large leafless branches. Stamens 3, fertile, inserted at the base of the tepal. Female flowers in slender racemes, 2 to 3-nate. Capsules oblong, ascending, pubescent when young; wings up to 20 x 6 mm. Seeds winged at base:

1a. Leaves rusty pubescent beneath ...10.1. var. *communis*

1b. Leaves not rusty pubescent ...10.2. var. *pentaphylla*

10.1. var. **communis** Prain & Burkill in Ann. Roy. Bot. Gard. Calc. 14(1): 168. 1936.

Hoshangabad, Surguja. *Fl. & Fr.*: Nov. – Dec.

10.2. var. **pentaphylla**

Common in forests and along roadsides. Balaghat, Bastar, Bilaspur, Jabalpur, Mandla, Panna, Raigarh, Raipur, Rajnandgaon, Seoni, Surguja. *Fl. & Fr.*: Aug. – Jan.

11. Dioscorea pubera Blume, Enum. Pl. Javae 1: 21. 1827; Prain & Burkill in Ann. Roy. Bot. Gard. Calc. 14(2): 402. 1938. *D. anguina* Roxb., Fl. Ind. 3: 803. 1832 (*excl.* ref. Rumph.); Hook. *f.*, Fl. Brit. India 6: 293. 1892. *D. cornifolia* Kunth, Enum. Pl. 5: 385. 1850. *D. oppositifolia* Backer, Handb. Fl. Java 3: 115. 1924, *p.p.*, *non* L., 1753.

Climbers. Tubers usually 1-2, clavate, with lemon yellow flesh, long stalked, deep into the soil. Stems twining to the right, with deciduously creamy-white pubescence. Bulbils greyish, large, up to 7 cm across. Leaves ovate-cordate, 10-20 x 8-15 cm; pulvinous lilac; petioles pubescent. Male flowering axes 1-2 on leafless branches. Flowers greenish yellow; buds congested. Female flowering axes 1-3, in the axil of leaves or rarely on short axillary branches. Capsules broader than long, puberulous; wings 12-18 x 13-18 mm. Seeds winged around.

In mixed and sal forests and on hill slopes. Balaghat, Bastar, Bilaspur, Hoshangabad, Narsimhapur, Raigarh, Raipur, Satna, Sidhi, Surguja. *Fl. & Fr.*: Sept. Jan.

Tuber is referred as edible.

12. Dioscorea spicata Roth, Nov. Pl. Sp. 371. 1821; Hook. *f.*, Fl. Brit. India 6: 291. 1892; Prain & Burkill in Ann. Roy. Bot. Gard. Calc. 14(2): 238. 1938.

Climbers. Stems twining to the right, terete, neither winged nor angled; branches terete, unarmed. Leaves elliptic, ovate or oblong, 5-7 x 2-5 cm, acuminate or cuspidate at apex, cuneate or rounded at base, coriaceous; petioles 2-4 cm long. Spikes simple, solitary or paired, slender. Flowers solitary, globose, sessile. Tepals erect, elliptic, obtuse. Filaments slender. Capsules subquadrate or rather broader than long, glabrous, shining, retuse at apex and base. Seeds winged around.

In sal forests. Surguja. *Fl. & Fr.*: Dec. Jan.

13. Dioscorea tomentosa Koenig *ex* Spreng., Pl. Min. Cogn. Pug. 2: 92. 1815; Roxb. & B. Heyne in Roth, Nov. Pl. Sp. 371. 1821; Hook. *f.*, Fl. Brit. India 6: 289. 1892; Prain & Burkill in Ann. Roy. Bot. Gard. Calc. 14(1): 156. 1936.

Climbers. Tubers present. Stems twining to the left, grooved, with small recurved prickles, cottony white tomentose. Leaves alternate, usually 3-foliolate, rarely 5-foliolate; middle leaflet obovate, densely tomentose beneath; lateral leaflets elliptic-ovate, up to 12 x 7 cm, abruptly acuminate at apex; petioles tomentose, with prickles. Flowers white, in simple or branched, axillary, pendulous panicles, bracteate; rhachis densely pubescent. Tepals coriaceous, tomentose. Stamens 3, fertile. Staminodes 3. Capsules oblong, 3-winged, white-brown tomentose. Seeds winged at base.

Hoshangabad. *Fl. & Fr.*: July - Aug.

14. Dioscorea wallichii Hook. *f.*, Fl. Brit. India 6: 295. 1892; Prain & Burkill in Ann. Roy. Bot. Gard. Calc. 14(2): 281. 1938.

Climbers. Tubers cylindrical, fascicled, with white flesh. Stems twining to the right, terete, armed at base. Leaves alternate, ovate-orbicular, 10-15 x 8-10 cm, acuminate at apex, cordate at base, 7-9-costate. Male flowering axes on leafless, axillary branches, in simple clusters or panicles. Flowers red-brown. Tepals ovate. Stamens 6, fertile. Female flowering axes 1-2 together. Capsules stramineous with brown flecks, depressed at apex; wings 18-20 x 15-18 mm. Seeds winged around.

Common in mixed and sal forests. Bastar, Raigarh, Raipur, Seoni. *Fl. & Fr.*: Aug. - Nov.

15. Dioscorea wightii Hook. *f.*, Fl. Brit. India 6: 291. 1892; Prain & Burkill in Ann. Roy. Bot. Gard. Calc. 14(2): 236. 1938.

Climbers. Stems twining to the right, slender, pale, glabrous, neither winged nor angled; branches terete, unarmed. Leaves simple, ovate, 5-8 x 2.5-5 cm, acuminate at apex, cordate at base, membranous, reticulate beneath; petioles 2-3 cm long. Male spikes slender, simple, rarely branched. Flowers solitary, sessile, supported by a broad base. Tepals erect. Filaments much longer. Pistillode minute. Capsules whitish green, trigonous. Seeds broadly winged around.

In mixed dry deciduous forests and along roadsides. Bastar, Bilaspur, Hoshangabad, Raigarh. *Fl. & Fr.*: Oct. Feb.

145. LILIACEAE

(R.D. Dixit and J.N. Srivastava)

About 294 genera and 4550 species; cosmopolitan in dry temperate and subtropical regions; 11 genera and 18 species in M.P.

1a. Leaves reduced to spinescent scales; cladodes present ...3. *Asparagus*

1b. Leaves well developed; cladodes absent:

2a. Leaves fleshy, mucilaginous, with spiny margins ...2. *Aloe*

2b. Leaves neither fleshy nor mucilaginous, with smooth margins:

3a. Leaf tip ending in tendrils; perianth-segments strongly undulate ...7. *Gloriosa*

3b. Leaf tip not ending in tendrils; perianth-segments not strongly undulate:

4a. Rootstocks bulbous or cormous:

5a. Leaves cauline ...8. *Iphigenia*

5b. Leaves radical:

6a. Flowers in umbels ...1. *Allium*

6b. Flowers in racemes:

7a. Leaves appearing after the flowers; pedicels 3-7 cm long ...11. *Urginea*

7b. Leaves appearing with the flowers; pedicels 2-5 mm long ...10. *Scilla*

4b. Rootstocks not bulbous:

8a. Leaves tubular, subterete ...4. *Asphodelus*

8b. Leaves flat:

9a. Leaves radical; fruit a capsule ...5. *Chlorophytum*

9b. Leaves cauline; fruit a berry:

10a. Flowers in umbels; berries pisiform ...6. *Disporum*

10b. Flowers solitary or in racemes; berries ovoid or ellipsoid ...9. *Polygonatum*

1. ALLIUM* L.

Herbs, scapigerous, with tunicate bulbs and characteristic pungent odour. Leaves radical, scapose, usually narrow, fistular, flat or grooved; sheath short or long, enveloping the scape below. Flowers in terminal umbels, enclosed by 2-3 membranous bracts, sometimes modified to bulbils; pedicels not articulate. Perianth stellate or campanulate; segments 6, free or connate below. Stamens 6, inserted at or near the base of perianth-segments; filaments free or connate below; anthers oblong. Ovary 3-gonous; ovules 2 or more in each locule; style filiform; stigma minute. Fruit a capsule, small, loculicidal. Seeds black, compressed.

About 700 species; Northern hemisphere; 2 in M.P.

1a. Leaves fistular; scape hollow; flowers greenish white ...1. *A. cepa*

1b. Leaves flat; scape solid; flowers white ...2. *A. sativum*

1. Allium cepa L., Sp. Pl. 300. 1753; Hook. *f.*, Fl. Brit. India 6: 337. 1892. *Piyaz.*

Herbs, annual. Bulbs compound, large. Leaves subdistichous, fistular, shorter than the inflated scape. Umbels often with bulbils; scape 0.6-1 m long, terete, hollow. Flowers greenish white, subtended by 2 or 3 reflexed bracts; pedicels up to 2.5 cm long, shorter than flowers. Perianth-segments linear-oblong. Stamens exserted; 3 inner filaments expanded at base, lobed or toothed.

Cultivated throughout the state. *Fl. & Fr.*: Dec. March.

The young plants are commonly used as vegetable. The bulbs are used as salad or for flavouring the dishes. They are considered as stimulant,

*Sometimes treated under a separate family Alliaceae, *nom. cons.* (App. II B, ICBN, 1994).

diuretic and expectorant, and also used in dysentery. They yield an essential oil.

2. Allium sativum L., Sp. Pl. 296. 1753; Hook. *f.*, Fl. Brit. India 6: 337. 1892. *Lahsun.*

Herbs, annual. Bulbs compound, with several parts or cloves enclosed in a silky white envelope. Leaves flat. Umbels small, dense, with long scarious beaked bracts; scape slender, up to 60 cm long, terete. Flowers white, often replaced by bulbils, usually sterile; pedicels longer than flowers. Perianth-segments lanceolate, acuminate. Stamens exserted; inner filaments 3-toothed at apex.

Cultivated throughout the state. *Fl. & Fr.*: Dec. March.

The bulbs are used as condiment and flavouring agent. They are also of medicinal value.

2. ALOE L.

Herbs. Rootstocks rhizomatous. Stems very short or absent. Leaves usually radical, distichous or in rosettes, thickly fleshy, usually spinose on the margins. Flowers in terminal, simple or branched racemes, actinomorphic, often nodding or pendulous. Perianth tubular or campanulate; segments erect or apically divergent. Stamens 6, subequalling the perianth. Ovary 3-locular; ovules many in each locule; style filiform; stigma capitate. Fruit a capsule, loculicidal.

About 363 species; tropical regions especially S. Africa, Madagascar and Arabia; one in M.P.

Aloe vera (L.) Burm. *f.*, Fl. Ind. 83. 1768 (1st March to 6th April). *A. perfoliata* L. var. *vera* L., Sp. Pl. 320. 1753. *A. barbadensis* Mill., Gard. Dict. ed. 8. n. 2. 1768 (16th April). *Ghee-kunwar.*

Herbs, more or less acaulescent or with subterranean stem, producing rosette of leaves from the ground and reaching up to 60 cm high. Leaves erect, crowded, lanceolate, 30-50 cm long, acuminate, thick, succulent, glaucous-green, spinose on the margins. Flowers in simple, erect racemes, the lower flowers falling off as the raceme elongates. Perianth dull red or reddish yellow, tubular. Filaments slender, shortly exserted.

Cultivated in gardens throughout the state, sometimes wild in drier localities. *Fl. & Fr.*: Nov. March.

The plant is cathartic and refrigerant. Fresh juice of leaves is useful in liver, spleen, eye and skin diseases. Leaves yield fibres.

3. ASPARAGUS* L.

Stragglers or climbers. Rootstocks with fascicled, tuberous roots. Stems woody, smooth, terete, grooved or angled; branches angular. Leaves reduced to spinescent scales bearing tufts of more or less foliaceous, acicular, triquetrous or flattened cladodes in their axils. Flowers solitary or in clusters, umbels or racemes, small, with jointed pedicel. Perianth campanulate, 6-partite. Stamens 6, adnate to the base of perianth-segments; filaments free. Ovary 3-locular; ovules 2 or more in each locule; style columnar; stigmas 3, recurved. Fruit a berry. Seeds black, smooth.

About 100 species; Old World; 4 in M.P.

1a. Plants unarmed; flowers solitary or in clusters:

2a. Cladodes flat; flowers solitary or paired ...1. *A. filicinus*

2b. Cladodes terete; flowers in clusters ...3. *A. gracilis*

1b. Plants armed; flowers in racemes:

3a. Cladodes flat, more than 1 mm broad; spines up to 4 mm long ...2. *A. gonoclados*

3b. Cladodes subterete, less than 0.6 mm broad; spines more than 4 mm long ...4. *A. racemosus*

1. Asparagus filicinus Buch.-Ham. *ex* D. Don, Prodr. Fl. Nepal. 49. 1825; Hook. *f.*, Fl. Brit. India 6: 314. 1892.

Tall herbs or shrubs, erect. Stems hollow, unarmed, much branched; lower branches spreading. Cladodes in clusters of 2-5, flat, curved, acuminate. Flowers solitary or paired, polygamous; pedicels slender, jointed in the middle. Berries subglobose.

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*Often treated under a separate family Asparagaceae, *nom. cons.* (App. II B, ICBN, 1994).

Planted as an ornamental. Indore. *Fl. & Fr.*: June Oct.

2. Asparagus gonoclados Baker in J. Linn. Soc. London (Bot.) 14: 627. 1875; Hook. *f.*, Fl. Brit. India 6: 318. 1892.

Undershrubs, excessively branched; branchlets curved, green, strongly angled; spines short. Cladodes in clusters of 2-6, ensiform, *ca* 1 cm long, flat, stout, falcate, narrowed to acuminate tip. Flowers in lax racemes; bracts short, cymbiform; pedicels jointed below the middle. Perianth segments spreading. Berries globose or didymous.

Planted as an ornamental. Dhar. *Fl. & Fr.*: July Nov.

3. Asparagus gracilis Royle, Illustr. 1: 393. 1839; Hook. *f.*, Fl. Brit. India 6: 315. 1892.

Undershrubs, suberect. Stems smooth. Leaves not spinescent, spurred. Cladodes in clusters of 6-9, small, terete, straight, acute. Flowers in few-flowered, corymbiform clusters; bracts lanceolate, small; pedicels jointed below the middle. Perianth salverform; segments 6, oblong, spreading. Berries red when ripe, 3-lobed.

Bastar (Saxena, 1973; Saxena and Khotele, 1976), Shahdol (Saxena, 1970). *Fl. & Fr.*: Aug. - Oct.

4. Asparagus racemosus Willd., Sp. Pl. 2: 152. 1799; Hook. *f.*, Fl. Brit. India 6: 316. 1892. - *Dashmool, Satawar.*

Undershrubs, scandent, much branched, armed; branches triquetrous, striate. Roots tuberous, fasciculate. Stems woody, terete, grey-white; spines decurved, more than 4 mm long. Cladodes in clusters of 2-6, oblong-linear, 1-3 cm long, triquetrous, falcate. Flowers small, white, in solitary or fascicled, simple or branched racemes; pedicels jointed in the middle; bracts ovate or triangular. Perianth-segments linear-oblong, spreading. Berries scarlet when ripe, globose.

1a. Racemes terminated by cladodes ...4.1. var. *javanicus*

1b. Racemes terminated by flowers ...4.2. var. *racemosus*

4.1. var. **javanicus** (Kunth) Baker in J. Linn. Soc. London (Bot.) 14: 624. 1874; Hook. *f.*, Fl. Brit. India 6: 317. 1892. *Asparagus javanica* Kunth, Enum. Pl. 5: 100. 1850. *A. jacquemontii* Baker in J. Linn. Soc. London (Bot.) 14: 615. 1874; Hook. *f.*, Fl. Brit. India 6: 316. 1892.

Abundant amongst *Phoenix* clamps in plains. Bastar, Bhopal, Bilaspur, Damoh, Dhar, Gwalior, Hoshangabad, Mandla, Panna, Raigarh, Raipur, Rajnandgaon, Seoni, Surguja. *Fl. & Fr.*: July - Jan.

4.2. var. **racemosus**

Throughout the state. *Fl. & Fr.*: Aug. Jan.

Roots are used as tonic, diuretic, galactagogue and in dyspepsia, while oil for nervous and rheumatic complaints.

4. ASPHODELUS L.

Herbs, annual or perennial. Roots slender or stout. Leaves radical, triquetrous or terete, fistular. Flowers in racemes on a simple or branched leafless scape. Perianth marcescent, 6-partite; segments free or connate below. Stamens 6; filaments dilated at the base and embracing the ovary; anthers versatile. Ovary 3-locular; ovules 2 in each locule; style filiform; stigma more or less 3-lobed. Fruit a capsule, loculicidal, 1-seeded. Seeds black, trigonous.

About 12 species; Mediterranean region to Himalaya; one in M.P.

Asphodelus tenuifolius Cav. in Ann. Cienc. Nat. 3: 46. t. 27. f. 2. 1801; Hook. *f.*, Fl. Brit. India 6: 332. 1892. *A. clavatus* Roxb., Fl. Ind. 2: 148. 1832.

Herbs, annual, erect, glaucous. Root fibres stout, numerous. Stems scapose. Leaves tubular, 20–40 cm long, erect, slender, subterete, fistular, sessile. Flowers white, in long branched racemes, pedicellate; pedicels jointed below the middle; bracts cymbiform. Perianth-segments oblong, with a brownish costa. Capsules globose, 2-4 mm across, 3-valved, glabrous. Seeds obovoid, rugose on the back.

Common as weed in cultivated fields and in moist wastelands, also among bushes in the forests. Bhopal, Chhatarpur, Damoh, Hoshangabad, Sidhi. *Fl. & Fr.*: Nov. - Dec.

Seeds are diuretic and yield fatty oil.

5. CHLOROPHYTUM Ker-Gawl.

Herbs, perennial, erect. Roots often tuberous, fleshy, fascicled. Leaves radical, linear-oblong or oblong-lanceolate, sometimes slightly falcate, entire, gradually tapering at apex, sheathing or narrowed into a petiole at base. Flowers in lax racemes on a simple or branched leafless scape; pedicels jointed, usually fascicled in the axil of small or large, membranous bract. Perianth petaloid, marcescent or persistent; segments 6, free, spreading or reflexed, 3-5-nerved. Stamens 6, adnate at the base of perianth, included; filaments subulate; anthers versatile. Ovary 3-locular; ovules 4 or more in each locule; style filiform; stigma minute. Fruit a capsule, trigonous, lateral 3-lobed with flattened lobes, many-seeded. Seeds usually compressed, warty.

About 300 species; tropical regions of Old World especially Africa and India; 3 in M.P.

1a. Leaves petiolate; anthers longer than the filaments; capsules globose ...1. *C. arundinaceum*

1b. Leaves sessile; anthers as long as the filaments or shorter; capsules otherwise:

2a. Perianth greenish white; anthers shorter than filaments; capsules obcordate ...2. *C. laxum*

2b. Perianth white; anthers as long as the filaments; capsules oblong ...3. *C. tuberosum*

1. Chlorophytum arundinaceum Baker in J. Linn. Soc. London (Bot.) 15: 323. 1876; Hook. *f.*, Fl. Brit. India 6: 333. 1892. - *Safed musli.*

Herbs, perennial. Roots tuberous, clustered. Leaves oblanceolate, 15-75 x 2.5-6 cm, obtuse or acute to acuminate at apex, narrowed into a petiole, outer distinctly petiolate, inner sometimes subsessile. Flowers in dense racemes; scape as long as the leaves, often branching at apex; pedicels jointed in the middle; bracts scarious. Perianth white. Anthers about twice as long as the filaments. Capsules globose, *ca* 8 mm across, emarginate at both ends. Seeds black, suborbicular, flat.

Abundant amidst rock boulders, in sal forests and on hill tops. Balaghat, Bastar, Bilaspur, Hoshangabad, Raipur, Sagar, Seoni, Sidhi, Surguja. *Fl. & Fr.*: Aug. Oct.

Roots are used as tonic.

2. Chlorophytum laxum R. Br., Prodr. 277. 1810; Hook. *f.*, Fl. Brit. India 6: 336. 1892.

Herbs. Root fibres ending into ellipsoidal tubers. Leaves subdistichous, strongly recurved, grass-like or conduplicate or flat, linear-lanceolate, falcate, 8-20 x 0.3-0.5 cm, sessile. Flowers in simple or forked racemes; scape slender, 3-6 cm long; pedicels jointed in the middle. Perianth greenish white; segments oblong. Stamens alternately short and long; filaments longer than anthers. Capsules obcordate, 3-winged. Seeds angular.

In open places. Hoshangabad (Joseph, 1963). *Fl. & Fr.*: July Jan.

3. Chlorophytum tuberosum (Roxb.) Baker in J. Linn. Soc. London (Bot.) 15: 332. 1876; Hook. *f.*, Fl. Brit. India 6: 334. 1892. *Anthericum tuberosum* Roxb., Pl. Coromandel 2: 20. 1800. *Safed musli.* **Fig. 15.**

Herbs, perennial. Roots tuberous, cylindrical, fleshy. Leaves radical, crowded at the base, membranous, usually ensiform, falcately recurved, 15-60 x 1.5-4 cm, wavy or crisped on margins, sessile. Flowers in simple or shortly branched racemes; scape 15-90 cm long, with a small sheath; pedicels jointed at or below the middle. Perianth white; segments elliptic, 12-15 mm long. Anthers about as long as the filaments, recurved, finally revolute. Capsules oblong, *ca* 1 cm long, 2-lobed at apex. Seeds irregularly orbicular, flat, opaque.

In sal forests, amidst rock boulders and in open places among grasses. Bilaspur, Hoshangabad, Raipur, Surguja. *Fl. & Fr.*: May - Aug.

Roots are edible and used as tonic while leaves are used as vegetable.

6. DISPORUM Salisb. *ex* D. Don

Herbs, erect. Rootstocks creeping. Stems angular, leafy. Leaves alternate or sometimes opposite, sessile to subsessile, strongly nerved.

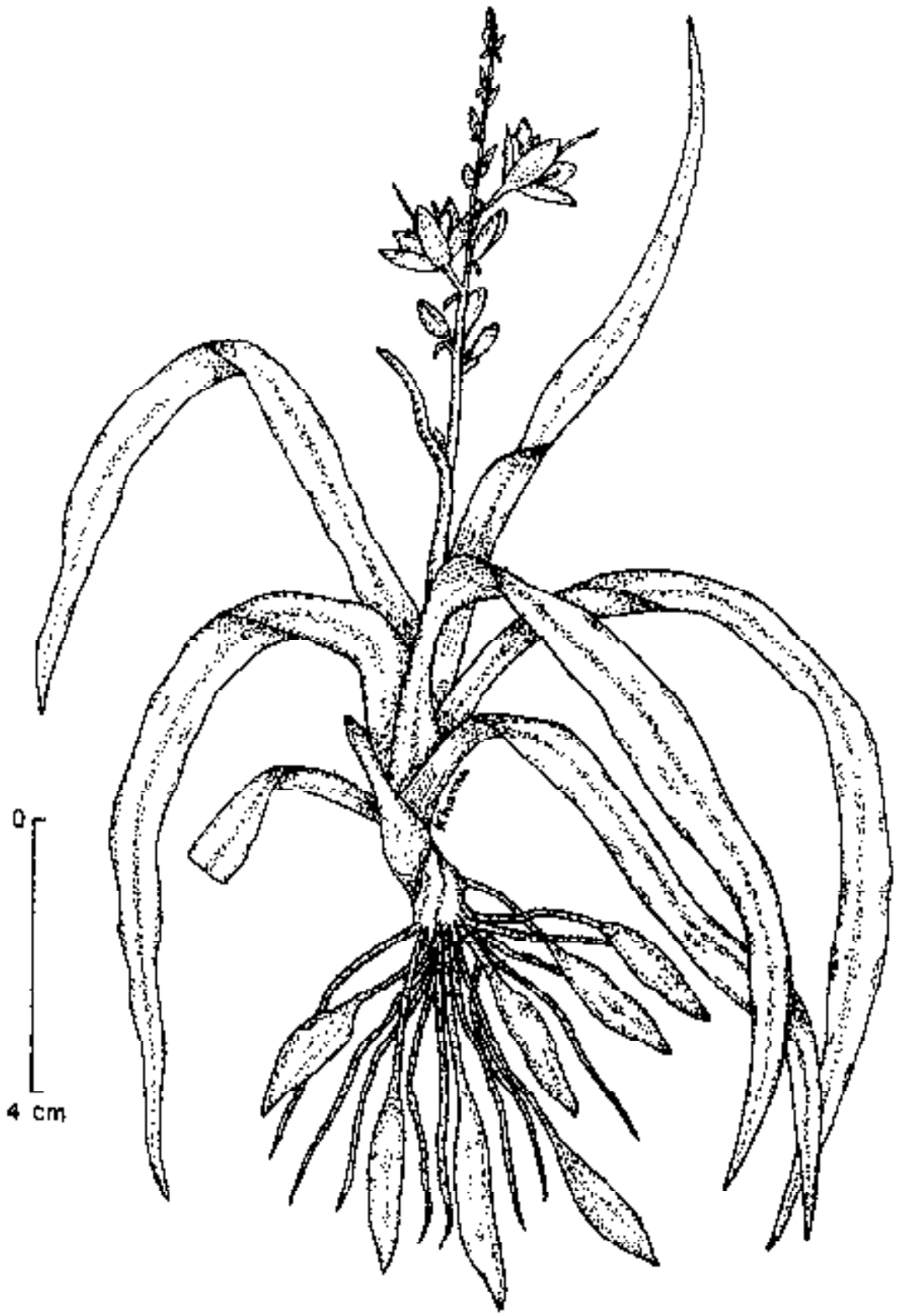

Fig. 15. Chlorophytum tuberosum (Roxb.) Baker

Flowers in terminal or axillary, few-flowered umbels; pedicels decurved. Perianth petaloid, campanulate, deciduous; segments 6, subequal, erect or spreading at tip, saccate or spurred at base. Stamens 6; filaments filiform or flattened; anthers dorsifixed. Ovary 3-locular; ovules 2-6 in each locule; style short or long; stigma short. Fruit a berry, pisiform, fleshy. Seeds subglobose, with appressed testa.

About 30 species; E. Asia, Indo-Malesia and W. N. America; one in M.P.

Disporum calcaratum D. Don in Trans. Linn. Soc. London 18: 516. 1841; Hook. *f.*, Fl. Brit. India 6: 359. 1892.

Herbs, 30-70 cm high. Leaves oblong-lanceolate, 8-15 x 3-5.5 cm, acuminate at apex, rounded at base. Flowers in sessile or shortly peduncled umbels. Perianth white, greenish or purplish; segments lanceolate, acute, spurred at base. Filaments thrice as long as the anthers. Berries purplish black. Seeds brown.

In the forest floor. Bastar. *Fl. & Fr.*: July - Oct.

7. GLORIOSA L.

Herbaceous climbers. Roots tuberous. Leaves simple, cauline, alternate, opposite or 3-nately whorled, with a long, spiral tendril-like apex, subsessile. Flowers large, axillary, solitary or somewhat subcorymbose towards the end of branches. Perianth petaloid, persistent; segments 6, free, subequal, spreading or reflexed. Stamens 6, spreading, equalling perianth-segments; filaments filiform; anthers linear, dorsifixed. Fruit a capsule, loculicidal, many-seeded. Seeds subglobose, warty.

A monotypic genus; tropical regions of Old World.

Gloriosa superba L., Sp. Pl. 305. 1753; Hook. *f.*, Fl. Brit. India 6: 358. 1892. - *Karihari.*

Climbers. Rootstocks 2-7 cm long. Branchlets glabrous. Leaves lanceolate or oblong-lanceolate, 8-15 x 1-3 cm, tendrillar at apex, cordate at base, glabrous, chartaceous, entire, with prominent mid nerve. Flowers showy; pedicels 10-15 cm long. Perianth yellow in lower half, red in upper

half, finally red with age, 5-8 x 1-1.5 cm; segments oblong-lanceolate, undulate on margin. Capsules linear-oblong, up to 5 cm long.

Abundant on bushes in open forests. Balaghat, Bilaspur, Damoh, Dhar, Hoshangabad, Indore, Mandla, Raigarh, Raipur, Rajnandgaon, Satna, Seoni, Sidhi, Tikamgarh. *Fl. & Fr.*: June - Nov.

Tubers are regarded as tonic, stomachic, anthelmintic but poisonous in large doses. They also promote labour pain, and useful in gout and rheumatism.

8. IPHIGENIA Kunth

Herbs, erect. Root a tunicate corm. Stems slender, leafy. Leaves few, cauline, linear, scattered, upper bractiform. Flowers solitary or in corymbs, small, erect, pedicellate, bracteate. Perianth petaloid, 6-partite, stellately spreading, caducous; segments equal, narrow, clawed. Stamens 6; filaments short, flat; anthers versatile. Ovary sessile, 3-locular; ovules many in each locule; styles 3, connate at base. Fruit a capsule, loculicidal. Seeds subglobose; testa thin, appressed.

About 9 species; tropical regions of Old World; 2 in M.P.

1a. Perianth purplish; segments linear-subulate ...1. *I. indica*

1b. Perianth white; segments oblanceolate ...2. *I. pallida*

1. Iphigenia indica (L.) A. Gray in Kunth, Enum. Pl. 4: 213. 1843; Hook. *f.*, Fl. Brit. India 6: 357. 1892. *Melanthium indicum* L., Mant. Pl. 226. 1771. *Santhal-chutia*.

Herbs, perennial, grass like, 5-25 cm high. Corms globose, up to 1 cm across; sheaths brown. Stems flexuous. Leaves few, alternate, 10-20 x 0.3-0.8 cm, upper much smaller. Flowers solitary or in corymbs; pedicels 1-2 cm long; bracts linear, foliaceous. Perianth purplish; segments linear-subulate, 5-7 cm long, spreading and reflexed. Capsules obovoid or oblong, ribbed.

Among grasses in the forest floor and wastelands. Betul, Bhopal, Bilaspur, Hoshangabad, Mandla, Raigarh, Raipur, Rajnandgaon, Rewa, Satna, Seoni, Sidhi, Surguja. *Fl. & Fr.*: June - Oct.

Flowers yield red dye while corms are used in colic pain.

2. Iphigenia pallida Baker in J. Linn. Soc. London (Bot.) 17: 451. 1879; Hook. *f.*, Fl. Brit. India 6: 357. 1892.

Herbs, perennial. Corms globose, *ca* 1 cm across; sheaths pale brown. Stems erect, leafy. Leaves linear-lanceolate, 8-20 x 0.2-0.5 cm, upper smaller. Flowers solitary or in corymbs; pedicels 1-2 cm long; bracts linear, foliaceous. Perianth white; segments oblanceolate, much broader, many-nerved. Capsules oblong.

Among grasses in the forest floor, usually in moist places. Betul, Bilaspur, Seoni. *Fl. & Fr.*: Aug. - Nov.

9. POLYGONATUM Mill.

Herbs, perennial. Rootstocks creeping. Stems leafy above. Leaves alternate, opposite or whorled. Flowers axillary, solitary or in many-flowered racemes, drooping, white, green or purplish; pedicels jointed at the top. Perianth tubular; mouth 6-cleft; outer lobes subvalvate. Stamens 6; filaments adnate to the middle of perianth-tube; anthers introrse. Ovary 3-locular; ovules 4-6 in each locule. Fruit a berry, few or many-seeded. Seeds subglobose; testa thin.

About 55 species; N. temperate regions especially S. W. China; one in M.P.

Polygonatum oppositifolium (Wallich) Royle, Ill. Bot. Himal. Mts. 1: 380. 1839; Hook. *f.*, Fl. Brit. India 6: 320. 1892. *Convallaria oppositifolia* Wallich in Asiat. Res. 13: 380. f. 1. 1820.

Herbs. Rhizomes green, tuberous. Stems 0.5-1.5 m tall, furrowed, glabrous. Leaves many, opposite, oblong or oblong-lanceolate, 7-15 cm long, spreading, coriaceous, acuminate at apex, bright green above, pale beneath with reddish nerves, 7-9-nerved, shortly petiolate. Peduncles many-flowered. Perianth white; lobes greenish, deltoid. Berries scarlet, ovoid or ellipsoid, 6-7 mm long. Seeds many, globose.

Along the edge of forests. Bastar, Surguja. *Fl. & Fr.*: July - Oct.

The plants are used as vegetable curry.

10. SCILLA L.

Herbs. Bulbs tunicate. Leaves radical, linear, lorate, oblong or lanceolate. Flowers in racemes on a simple, leafless scape; bracts small. Perianth petaloid, persistent, campanulate or stellately spreading; segments 6, subequal, recurved. Stamens 6, adnate at or near the base of perianth-segments; filaments filiform, glabrous; anthers ovate or oblong. Ovary 3-locular, shortly stipitate; ovules 2-few in each locule; style filiform; stigma capitate. Fruit a capsule, 3-lobed, loculicidal, 1-2-seeded in each cell. Seeds black, obovoid or subglobose.

About 40 species; Eurasia and temperate Africa; one in M.P.

Scilla hyacinthina (Roth) Macbr. in Contrib. Gray Herb. n.s. 56: 14. 1918. *Ledebouria hyacinthina* Roth, Nov. Pl. Sp. 195. 1821. *Scilla indica* Baker in Saund. Refug. Bot. 3: App. 12. 1870; Hook. *f.*, Fl. Brit. India 6: 348. 1892, *non* Roxb., 1832.

Bulbs globose or ovoid, 2-5 cm across. Leaves variable, oblong-lanceolate, 6-10 x 2-3 cm, often recurved, subacute or mucronate at apex, sometimes tips rooting and bulbiferous after reaching the ground, attenuate and sheathing at base, glabrous, often with black blotches, sessile or petiolate. Racemes cylindrical, many-flowered; scape 5-15 cm long; pedicels 2-5 mm long. Flowers greenish purple. Perianth-segments oblong. Filaments purple. Capsules globose, membranous.

In grassy fields. Bhopal, Hoshangabad, Shivpuri. *Fl. & Fr.*: June - Oct.

Bulbs are used as expectorant, cardiac stimulant and diuretic. They are also used as substitute for true squill.

11. URGINEA Steinh.

Herbs, scapigerous. Bulbs tunicate. Leaves radical, simple, linear or lorate, entire. Flowers in racemes on a long, leafless scape; pedicels short or long; bracts small. Perianth petaloid, campanulate or stellately spreading; segments 6, subequal. Stamens 6, adnate at the base of the perianth-segment, included; filaments filiform or thickened at base; anthers linear. Ovary 3-locular, sessile; ovules many in each locule; style filiform; stigma capitate. Fruit a capsule, triquetrous, loculicidal, many-seeded. Seeds flat; testa black, membranous.

About 120 species; S. Europe, Africa and Asia; one in M.P.

Urginea indica (Roxb.) Kunth, Enum. Pl. 4: 333. 1843; Hook. *f.*, Fl. Brit. India 6: 347. 1892. *Scilla indica* Roxb., Fl. Ind. 2: 147. 1832. *Drimia indica* (Roxb.) J.P. Jessop. in J. S. Afr. Bot. 43: 272. 1977.

Herbs. Bulbs pale, ovoid, 3-5 cm across, thick, with a long neck. Leaves linear, ensiform, flat, 15-40 cm long, acute, appearing after the flowers. Racemes erect, 15-30 cm long; scape erect, 30-40 cm long, brittle. Flowers distant, dingy brown; pedicels 3-7 cm long, spreading or decurved; bracts evanescent. Perianth greenish white; segments linear-oblong. Filaments flattened at base. Capsules ellipsoid, 6-9-seeded in each cell.

In open dry situations, sometimes amongst stones and gravels in open places or shades. Bastar, Bilaspur, Rewa, Satna, Surguja. *Fl. & Fr.*: March - May.

Bulbs are used as cardio tonic, stimulant, expectorant, diuretic, deobstruent and for rheumatism but in large doses they are emetic and may cause depression. The alcoholic extract of bulbs are referred to possess some anticancerous properties. Leaves are eaten during the time of scarcity.

145a. RUSCACEAE*

(K.K. Khanna)

Three genera and about 9 species; W. & C. Europe and Mediterranean region; one species cultivated in M.P.

RUSCUS L.

Undershrubs or shrubs, erect, dioecious. Stems partially woody; branches modified into foliaceous phylloclades; phylloclades alternate, coriaceous, sessile, persistent. Leaves minute, reduced to membranous

* Possibly due to ornamental nature of the plant, the family has escaped the attention and has not been included under Key to families given in Flora of Madhya Pradesh Vol. I. However, for the purpose, it should be placed after lead 225b on page 119 and can be differentiated from Smilacaceae and Liliaceae by phylloclades (modification of branches) and minute scale like leaves.

scales. Flowers small, fascicled in the middle of the upper, rarely lower surface of the phylloclade, actinomorphic. Tepals 6, in 2 series, free or connate at base, unequal, sometimes with fleshy corona. Stamens 3 or 6; filaments connate into a short column or tube; anthers sessile. Ovary 3-locular; ovules 2 in each locule. Fruit a berry.

About 6 species; Macaronesia & W. Europe and Mediterranean region to Iran; one in M.P.

Ruscus aculeatus L., Sp. Pl. 1041. 1753.

Undershrubs, 50-100 cm high. Phylloclades ovate, 2-4 cm long, acuminate and ending in a spiny point at apex. Flowers 1-2, shortly pedicellate. Berries red, globose.

Cultivated. Bhopal (Oommachan, 1977), Ujjain (Singh and Khare, 1996).

146. SMILACACEAE

(R.D. Dixit and J.N. Srivastava)

About 10 genera and 225 species; tropical and subtropical regions especially Southern; one genus and 2 species in M.P.

SMILAX L.

Shrubs, usually climbing. Stems often armed. Leaves alternate, rarely opposite, persistent, 3-7-costate, with reticulate venation; petioles with 2 tendrils at base. Flowers small, in umbels. Perianth-segments 6, free, subequal, incurved or recurved. Male flowers with 6 stamens; filaments free, short or long; anthers didymous, oblong. Female flowers with 3-6 staminodes. Ovary 3-locular; ovules solitary or 2 in each locule; style short or absent; stigmas 3, recurved. Fruit a berry. Seeds 1-3.

About 200 species; tropical and subtropical regions; 2 in M.P.

1a. Petiolar sheath auricled, wings 5-10 mm broad on one side; umbels 10-20 ...1. *S. perfoliata*

1b. Petiolar sheath not auricled, wings less than 5 mm broad on one side; umbels 1-3 ...2. *S. zeylanica*

1. **Smilax perfoliata** Lour., Fl. Cochinch. 2: 622. 1790; Koyama in Quart. J. Taiw. Mus. 13: 38. 1960 & in Hara *et al.*, Enum. Fl. Pl. Nepal 1: 79. 1978. *S. prolifera* Roxb., Fl. Ind. 3: 795. 1832; Hook. *f.*, Fl. Brit. India 6: 312. 1892.

Climbers. Stems stout, strongly armed with recurved prickles; branchlets 4-angled. Leaves alternate, elliptic, ovate or broadly oblong, 10-25 x 5-15 cm, acuminate-cuspidate at apex, rounded or subcordate at base, usually 3-costate, rarely 7-costate; petioles 2-5 cm long, sheathing portion usually forming 2, large, basal, amplexicaul, erect or reflexed auricles; tendrils 5-10 cm long. Umbels 10-20; peduncles 2-4 cm long, 30-40-flowered. Flowers white, very small; bracteoles minute. Perianth-segments oblong-lanceolate. Staminodes 3 in female flowers. Berries red when ripe, oblong or globose. Seeds biconvex.

On bushes near stream embankments. Bastar, Surguja. *Fl. & Fr.*: Sept. - April.

2. **Smilax zeylanica** L., Sp. Pl. 1029. 1753; Hook. *f.*, Fl. Brit. India 6: 309. 1892. *S. macrophylla* Roxb., Fl. Ind. 3: 793. 1832, *non* Willd., 1806; Hook. *f.*, Fl. Brit. India 6: 310. 1892.

Climbers. Stems slender to stout, more or less 4-angled to terete; branches unarmed or with a few small prickles; branchlets often zig-zag. Leaves elliptic, broadly oblong, ovate-oblong or orbicular, 10-30 x 5-15 cm, cuspidate at apex, rounded or subcordate at base, usually 5-costate from above the base, rarely 3-costate; petioles 1.5-2.5 cm long, jointed in the middle, narrowly sheathing at base but not auricled. Umbels 1-3 on a common peduncle, 20-30-flowered; male peduncle *ca* 1 cm long, female ones *ca* 1.5 cm long. Perianth-segments oblong. Stamens as long as perianth-segments. Staminodes 3 in female flowers. Berries red, globose. Seeds biconvex.

In damp valleys. Bastar, Bilaspur, Hoshangabad, Jabalpur, Mandla, Narsimhapur, Raigarh, Raipur, Rajnandgaon, Sagar, Shahdol, Sidhi. *Fl. & Fr.*: Sept. - April.

Roots are prescribed for veneral and skin diseases, while decoction is given for sores, swellings and abscesses. Fresh leaves are consumed as a vegetable.

147. PONTEDERIACEAE

(O.P. Misra and B.K. Shukla)

About 7 genera and 29 species; tropical and subtropical to N. temperate regions; 2 genera and 3 species in M.P.

1a. Flowers zygomorphic, sessile; tepals connate below ...1. *Eichhornia*

1b. Flowers actinomorphic, distinctly pedicellate; tepals more or less free ...2. *Monochoria*

1. EICHHORNIA Kunth

Herbs, aquatic, floating or creeping, stoloniferous, rooting at nodes. Leaves rosulate or alternate, broadly ovate-rhomboid or linear-lanceolate, often long petiolate. Inflorescence terminal, spiciform, many-flowered, pedunculate, erect during anthesis, deflexed afterwards. Flowers zygomorphic. Perianth lilac blue, often with yellow blotch, 6-fid, marcescent after anthesis. Stamens inserted in the throat of the perianth or deeper, decurved, unequal, often 3 longer, 3 shorter. Ovary sessile, 3-locular; ovules many in each locule; style filiform; stigma slightly swollen or shortly 3-6-lobed. Fruit a capsule, ovoid-oblong or linear. Seeds ovoid, many ribbed.

About 7 species; tropical America; one in M.P.

Eichhornia crassipes (Mart.) Solms in A. DC., Monogr. Phan. 4: 527. 1883. *Pontederia crassipes* Mart., Nov. Gen. Sp. Pl. 1: 9. t. 4. 1823.

Herbs, perennial, aquatic. Leaves rosette-forming, broadly ovate-rhomboid, 5-15 cm long, obtuse at apex, rounded-subcordate at base, fleshy, shining green; petioles 15-28 cm long, spongy. Flowers in dense, up to 15 cm long spikes. Perianth 1.5-1.8 cm long, slightly curved; limb 2-lipped, light blue; lobes 6, posterior with a yellow median blotch. Capsules ovoid-oblong, *ca* 1.5 cm long. Seeds many, ovoid, *ca* 1 mm long.

Abundant in ponds and stagnant water near habitations. Bastar, Chhatarpur, Damoh, Durg, Panna, Raigarh, Raipur. *Fl. & Fr.*: April - Nov.

2. MONOCHORIA K. Presl

Herbs, perennial, aquatic, erect. Rootstocks suberect or creeping, covered with leaf-sheaths. Leaves radical and solitary at the top of the emerging stem or branches; petioles of basal leaves longer. Flowers in terminal racemes, bisexual, actinomorphic. Tepals 6, more or less free, petaloid, subequal. Stamens 6, adnate at the base of tepals, one usually largest with its filament dentate on one side. Ovary superior, 3-locular; ovules many in each locule; style filiform; stigma subentire or minutely 3-lobed. Fruit a capsule, loculicidal. Seeds many, ovoid, ribbed.

Three species; N. E. Africa to China and Australia; 2 in M.P.

1a. Rootstocks elongated, creeping; leaves triangular ovate, sagittate, hastate or rarely cordate at base; flowers long pedicellate ...1. *M. hastata*

1b. Rootstocks short, suberect; leaves broadly ovate or ovate-oblong, rounded or subcordate-truncate at base; flowers shortly pedicellate ...2. *M. vaginalis*

1. Monochoria hastata (L.) Solms in A. DC., Monogr. Phan. 4: 523. 1883; Subram., Aquatic Angiosp. 69. f. 46. 1962; *Pontederia hastata* L., Sp. Pl. 288. 1753. *Monochoria hastaefolia* K. Presl, Reliq. Haenk. 1: 128. 1827; Hook. *f.*, Fl. Brit. India 6: 362. 1892.

Herbs, perennial, marshy, rhizomatous, up to 1 m tall. Leaves triangular ovate, 7-20 x 4-20 cm, obtuse, acute or acuminate at apex, sagittate, hastate or rarely cordate at base, smooth and glossy, many-nerved; petioles of basal leaves up to 60 cm long, of upper ones shorter. Racemes erect, dense, shortly peduncled, deflexed finally; pedicels 2-3 cm long, erecto-patent. Perianth 1.5-1.8 cm long, twisting in cork screw-fashion round the fruit when withering. Stamens 6; anthers linear-oblong, the large anther blue. Ovary ellipsoid or ovoid; stigma obscurely 3-lobed. Capsules subglobose or oblong, 5-6 mm across.

Common along the margins of tanks, canal and in paddy fields. Bilaspur, Damoh, Sidhi. *Fl. & Fr.*: June - Sept.

2. Monochoria vaginalis (Burm. *f.*) K. Presl, Reliq. Haenk. 1: 128. 1827; Hook. *f.*, Fl. Brit. India 6: 363. 1892; Subram., Aquatic Angiosp. 69. f. 47. 1962. *Pontederia vaginalis* Burm. *f.*, Fl. Ind. 80. 1768.

Fig. 16.

Herbs, annual-perennial, amphibious, erect, up to 50 cm tall. Leaves broadly ovate or ovate-oblong, 5-15 x 3-11 cm, acute or acuminate at apex, rounded or subcordate-truncate at base. Racemes erect, subtended by leaf-sheath when young, finally deflexed. Tepals 6, blue-violet; outer oblong, 8-10 mm long; inner obovate, 10-12 mm long. Ovary ellipsoid, glandular; stigma 3-lobed. Capsules pale with brown ribs, ovoid, 8-10 mm long. Seeds many, ovoid, with many brown ribs.

Common in rice fields and along the margins of ponds, tanks and marshy places. Balaghat, Bastar, Bilaspur, Chhatarpur, Mandla, Panna, Raipur, Rajnandgaon, Satna. *Fl. & Fr.*: Aug. - April.

148. XYRIDACEAE

(Ram Saran)

About 5 genera and 260 species; tropical and subtropical regions, while few in temperate regions; one genus with 2 species in M.P.

XYRIS L.

Herbs, mostly perennial, slender to robust, grass-like. Rootstocks bulbous. Leaves basal, linear, ensiform or filiform, sometimes twisted; sheaths with membranous margin, with or without short ligule. Inflorescence a terminal, few to many-flowered, globose head, bracteate; peduncles scape like, compressed or terete, obscurely winged or ribbed; bracts imbricate, fimbriate or lacerate, entire, ciliate. Flowers bisexual, sessile. Sepals 3; median sepal spathose or cup-shaped, enveloping petals, membranous; lateral sepals oblong, navicular, with entire, dentate or ciliate keel. Petals 3, yellow, clawed, free or cohering mutually or by the staminodes. Stamens 3, fertile, inserted at the base of petals; filaments short, flattened; anthers sagittate. Staminodes 3, alternating with petals, filiform, penicillate, with 2-fid tips. Ovary superior, 1-3-locular; ovules numerous; style filiform, 3-fid; stigma capitate. Fruit a capsule. Seeds ellipsoid, ribbed.

Fig. 16. Monochoria vaginalis (Burm. *f.*) K. Presl

About 240 species; tropical and subtropical regions; 2 in M.P.

1a. Leaves with short transverse ribs connecting longitudinal nerves, sheaths 8-25 cm long; bracts dark brown; stamens *ca* 4 mm long ...1. *X. indica*

1b. Leaves without transverse ribs, sheaths up to 7 cm long; bracts yellowish brown; stamens 1-1.5 mm long ...2. *X. pauciflora*

1. Xyris indica L., Sp. Pl. 42. 1753; Hook. *f.*, Fl. Brit. India 6: 364. 1892. *X. robusta* Mart. in Wallich, Pl. Asiat. Rar. 3: 30. 1832; Hook. *f.*, Fl. Brit. India 6: 364. 1892. *X. calocephala* Miq., Fl. Ind. Bat. 3: 527. 1857. *X. capito* Hance in J. Bot. 14: 262. 1876. *X. paludosa* R. Br., Prodr. 256. 1810. **Fig. 17.**

Herbs, perennial, robust, apparently several-stemmed. Leaves linear-ensiform, falcate and curved in the upper part, 5-50 x 0.3-1 cm, acute-obtuse at apex, with prominent transverse ribs connecting the nerves; sheaths 8-25 cm long. Heads globose or ellipsoid, up to 1 cm long; peduncles 20-60 cm long, with prominent longitudinal ribs; bracts dark brown, papyraceous. Sepals 3; median sepal cup-shaped; lateral sepals obtuse, with dentate-serrate keel. Petals yellow, clawed, serrulate; limb obovate. Stamens *ca* 4 mm long. Ovary 1-locular, 3-angled. Capsules *ca* 3 mm long. Seeds brownish yellow.

Rare. In damp places. Raigarh (Lal and Kumar, 1983). *Fl.* & Fr.: Oct. Nov.

2. Xyris pauciflora Willd., Phytographia 2. t. 1. f. 1. 1794; Hook. *f.*, Fl. Brit. India 6: 365. 1892. *X. pauciflora* Willd. var. *oryzetorum* Miq., Fl. Ind. Bat. 3: 529. 1857.

Herbs. Stems angular. Leaves narrowly linear, up to 20 x 0.15 cm, acute to acuminate at apex, minutely papillose; sheaths 2-7 cm long. Heads globose-ovoid, 3-8 mm long; peduncles slightly compressed, sometimes winged, up to 15 cm long; bracts yellowish brown, dorsally keeled at apex, basal bracts orbicular, papillate, spinulose, with membranous margin, median one elliptic, mucronate. Sepals 3, oblanceolate; median sepal broad; lateral sepals curved, coarsely serrate on wing. Petals yellow; limb obovate,

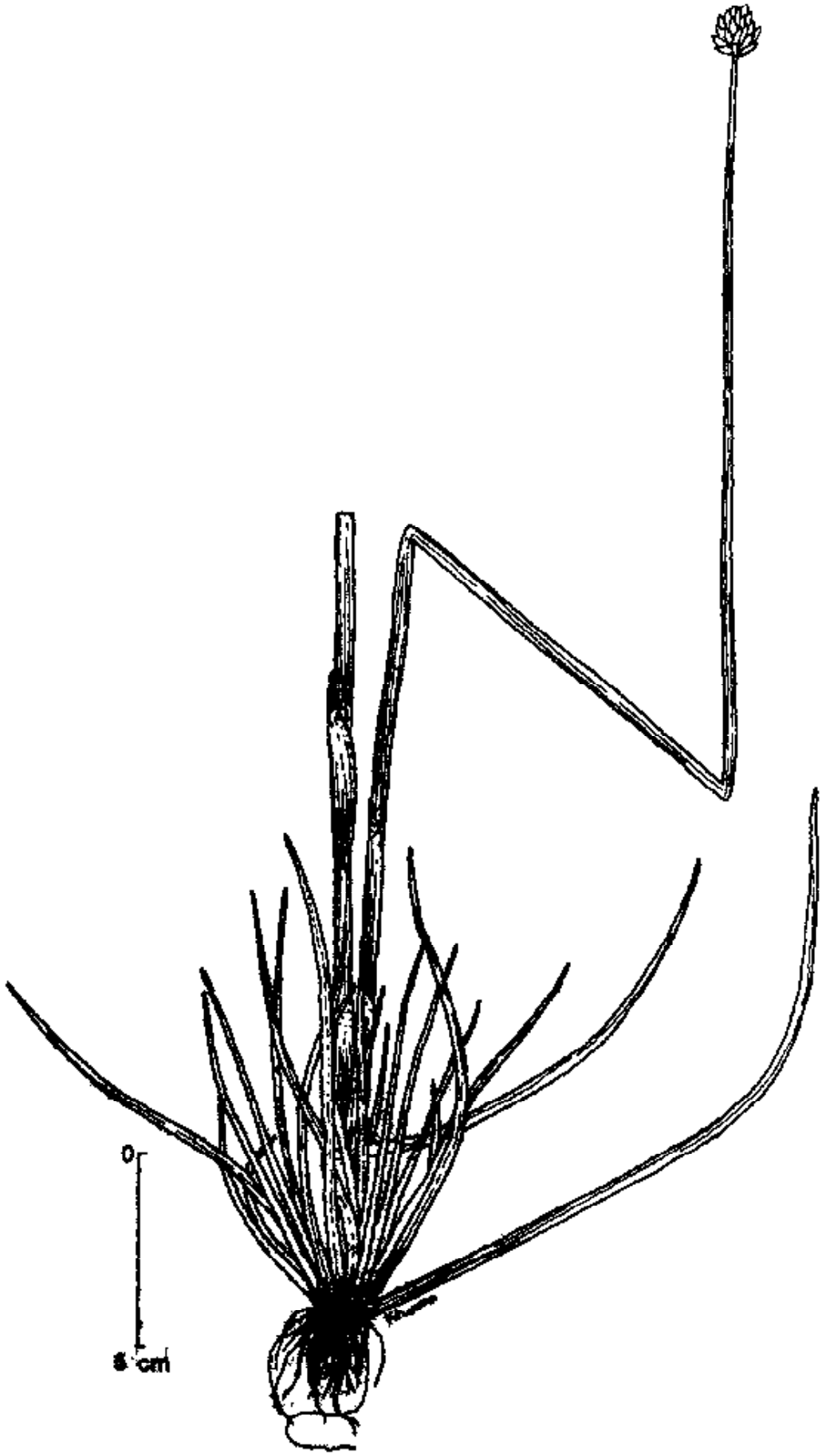

Fig. 17. Xyris indica L.

emarginate. Stamens 1-1.5 mm long. Ovary 1-locular, 3-angled. Seeds *ca* 0.5 mm long.

In paddy fields and near drains. Bastar, Bilaspur, Raigarh, Surguja (Subramanyam and Henry, 1966; Lal and Kumar, 1983). *Fl.* & Fr.: Oct. April.

149. COMMELINACEAE

(K.K. Khanna and Ram Saran)

About 38 genera and 500 species; tropical and subtropical regions; 7 genera and 30 species in M.P.

1a. Fertile stamens 2-3; staminodes 3-4:

2a. Cymes solitary, included in a spathe; flowers zygomorphic ...1. *Commelina*

2b. Cymes panicled, not included in a spathe; flowers actinomorphic ...4. *Murdannia*

1b. Fertile stamens 6, rarely 5; staminodes absent:

3a. Petals free or nearly so; ovule solitary in each locule:

4a. Flowers in cymes or thyrsoid panicles; bracts minute or absent; ovary 2-locular ...3. *Floscopa*

4b. Flowers in dense umbels; bracts well developed; ovary 3-locular ...5. *Rhoeo*

3b. Petals connate at base; ovules 2 in each locule:

5a. Flowers sessile, enclosed in inflated leaf sheaths ...6. *Tonningia*

5b. Flowers pedicellate, not enclosed in inflated leaf sheaths but within bracts or bracteoles:

6a. Flowers in cymes or cincinni; sepals free or connate at base ...2. *Cyanotis*

6b. Flowers in clusters; sepals connate forming a tube ...7. *Zebrina*

1. COMMELINA L.

Herbs, usually creeping below. Leaves sheathing at base, subsessile. Spathes infundibuliform or ovate-lanceolate, complicate, cucullate. Flowers in terminal and/or axillary, 2-fid cymes, zygomorphic, ephemerous, of upper cymes small, caducous, of lower ones fertile. Sepals 3; outer one cucullate; inner two often connate at base. Petals 3, ovate, unequal, clawed, 2 larger, third one smaller, sepaloid. Stamens 3, fertile; filaments glabrous; anthers oblong, one usually larger; staminodes 2 or 3, 6-lobed, yellow. Ovary 3-locular, glabrous; ovules 1 or 2 in anterior locule, solitary or absent in posterior locule. Fruit a capsule, loculicidal, posterior cells dehiscent or indehiscent, sometimes absent, anterior one connate and indehiscent. Seeds ellipsoid or angular, smooth, rugose, reticulate, pitted or grooved.

About 230 species; tropical and subtropical regions; 11 in M.P.

1a. Spathes infundibuliform or cucullate, margin connate almost to the tip:

2a. Leaves almost as broad as long ...2. *C. benghalensis*

2b. Leaves longer than broad:

3a. Cleistogamous flowers present; anterior pair of locules of ovary 2-ovuled ...6. *C. forsskalaei*

3b. Cleistogamous flowers absent; locule of ovary 1-ovuled:

4a. Ovary 2-locular; capsules 2-celled ...11. *C. suffruticosa*

4b. Ovary 3-locular; capsules 3-celled:

5a. Inflorescence subtended by 2 smaller leaves; petals violet-purple ...5. *C. erecta*

5b. Inflorescence not subtended by 2 smaller leaves; petals blue or white ...10. *C. paludosa*

1b. Spathes ovate-lanceolate, free or connate only at the base:

6a. Leaves linear-lanceolate, 10-15 times longer than broad; seeds appendiculate:

7a. Leaves up to 7 cm long; capsules 2-celled; seeds appendiculate at both ends ...1. *C. attenuata*

7b. Leaves 8-15 cm long; capsules 3-celled; seeds appendiculate at one end only ...9. *C. longifolia*

6b. Leaves lanceolate or ovate-lanceolate, 3-4 times longer than broad; seeds not appendiculate:

8a. Seeds smooth or obscurely rugose:

9a. Capsules 3-celled ...7. *C. hasskarlii*

9b. Capsules 2-celled ...8. *C. imberbis*

8b. Seeds rugose or reticulate:

10a. Capsules 3-celled ...4. *C. diffusa*

10b. Capsules 2-celled:

11a. Spathes *ca* 7.5 cm long; locule of ovary 2-ovuled; seeds brownish black ...3. *C. clavata*

11b. Spathes up to 1.5 cm long; locule of ovary one-ovuled; seeds pale yellow ...11. *C. suffruticosa*

1. Commelina attenuata J. Koenig *ex* Vahl, Enum. Pl. 2: 168. 1805; Hook. *f.*, Fl. Brit. India 6: 372. 1892.

Herbs, ascending, slender, much branched, glabrous or sparsely hairy. Leaves linear or linear-lanceolate, 3.5-7 x 0.3-0.7 cm, usually conduplicate, acute or acuminate at apex, entire; sheaths ciliate, usually not differentiated from leaf-blade. Spathes caudate-acuminate at apex, cordate at base, minutely hairy inside. Flowers small. Petals blue. Stamens included. Capsules oblong, 2-celled, trigonous; each cell 1-2-seeded. Seeds subterete, smooth, appendiculate at both ends.

Common in forest clearings, leaf litters, under the shade of trees and amidst boulders. Bilaspur, Raigarh, Raipur, Rajnandgaon, Sidhi, Surguja. *Fl. & Fr.*: Aug. - Sept.

2. Commelina benghalensis L., Sp. Pl. 41. 1753; Hook. *f.*, Fl. Brit. India 6: 370. 1892.

Herbs, annual, slender, decumbent-ascending, diffusely branched. Stems up to 1 m long. Leaves ovate, elliptic or suborbicular, 1-8 x 1-4 cm, subsessile or narrowed into 0.5-1 cm long petiole; sheaths 1.2-1.8 cm long, pubescent outside, bearded at the mouth. Spathes 2-3 at the end of branches, terminal or leaf-opposed, subsessile, recurved, auricled on one side at the base, hairy outside. Petals blue or lilac. Capsules oblong, trigonous, unequally 3-celled. Seeds 5, pitted, wrinkled. Sometimes cleistogamous flowers present on subterranean leafless branches, bisexual, solitary, in pear-shaped spathes.

Abundant in moist places mostly in alluvial soil, often in wastelands alongwith *Triumfetta* sp., *Sida* sp. and *Xanthium indicum*. Balaghat, Bastar, Durg, Hoshangabad, Indore, Mandla, Panna, Raigarh, Raipur, Rewa, Sidhi, Tikamgarh, West Nimar. *Fl. & Fr.*: Aug. - Jan.

3. Commelina clavata C.B. Clarke, Commelyn. Cyrtandr. Bengal. 15. t. 5. 1874; Hook. *f.*, Fl. Brit. India 6: 371. 1892.

Herbs, up to 1 m high. Roots tuberous. Leaves variable in shape, ovate, lanceolate or linear-lanceolate, 1.5-7.5 x 1.3-1.7 cm, acute-acuminate at apex, tapering at base, entire, glabrescent; sheaths apically hirsute, up to 2.5 cm long. Spathes ovate-lanceolate, *ca* 7.5 x 5 cm (opened out), attenuate at apex, cordate at base. Petals bright blue. Capsules constricted in the middle, 2-celled, with 2 seeds in each cell. Seeds brownish black, oblong, reticulate.

Bastar (Tiwari and Maheshwari, 1965). *Fl. & Fr.*: June - Aug.

Sometimes used as food by the poor people.

4. Commelina diffusa Burm. *f.*, Fl. Ind. 18. t. 7. f. 2. 1768. *C. nudiflora auct. pl. non* L., 1753: Hook. *f.*, Fl. Brit. India 6: 369. 1892.

Herbs, annual, straggling, glabrous. Stems with red-brown streaks, up to 1 m long. Leaves lanceolate or ovate-lanceolate, 3.5-8 x 1-2 cm, abruptly acuminate at apex, narrowed at base, sessile; sheaths *ca* 1 cm long, often ciliate, mottled with red markings. Spathes solitary in almost all axils, ovate-

cordate, 1.7-4 cm long. Cymes branched, 1-3-flowered, usually all male; outer cymes with 3-4 bisexual flowers. Petals white or blue. Capsules broadly oblong, *ca* 5 mm long, apiculate, 3-celled. Seeds oblong-cylindrical, of 2-seeded cell *ca* 1.5 mm long, of 1-seeded cell *ca* 2.5 mm long, tuberculate and reticulate.

Common in marshy places, as weed in cultivated fields and in mixed forest alongwith *Corchorus* sp. and *Urena* sp. Balaghat, Bastar, Bilaspur, Damoh, Dhar, Hoshangabad, Katni, Mandla, Panna, Raipur, Rajnandgaon, Surguja. *Fl. & Fr.*: Aug. - Nov.

5. Commelina erecta L., Sp. Pl. 41. 1753; Rolla Rao *et al.* in Bull. Bot. Surv. India 12: 250. 1970. *C. undulata* R. Br., Prodr. 270. 1810; Hook. *f.*, Fl. Brit. India 6: 373. 1892 *C. kurzii* C.B. Clarke in J. Linn. Soc. London (Bot.) 11: 444. 1871; Hook. *f.*, Fl. Brit. India 6: 373. 1892.

Herbs, annual, erect or straggling, profusely branched, up to 75 cm high, often rooting at lower nodes. Leaves variable, lanceolate or oblong-lanceolate, 6-18 x 2-4 cm, acuminate at apex, oblique at base, chartaceous, glabrous or sparsely pilose; sheaths sparsely villous, ciliate at mouth. Spathes 2-5 together, infundibuliform, alongwith 2-4 smaller leaves in addition to 2 mature leaves. Flowers in 2-fid cymes; outer cymes 3-6-flowered; inner one represented by a stump. Petals violet or violet-purple. Capsules oblong, 3-celled. Seeds black, ovoid, pitted.

Common in muddy soil, marshes and between rocks. Balaghat, Bastar, Hoshangabad, Raigarh, Tikamgarh. *Fl. & Fr.*: Aug. - Dec.

6. Commelina forsskalaei Vahl, Enum. Pl. 2: 172. 1805; Hook. *f.*, Fl. Brit. India 6: 371. 1892.

Herbs, annual, straggling or creeping, diffusely branched, rooting at nodes, with aerial chasmogamous and underground cleistogamous flowers. Leaves linear or narrowly oblong-elliptic, 6.5-7.5 x 1-1.3 cm, pinkish violet, entire, often undulate; sheaths pubescent, ciliate along the margin of mouth. Spathes sparsely hairy with long hairs. Flowers in axillary branched cymes; cymes 3-5-flowered; inner branch with a single male flower, outer ones with 2-3 flowers. Petals sky blue. Capsules orange-brown, oblong, laterally compressed, 3-seeded. Seeds brown. Cleistogamous flowers usually solitary in a spathe, bisexual, terminating into 1-seeded capsule.

Common on the embankment of ditches and near streams. Bilaspur, Indore, Sidhi, Surguja, West Nimar. *Fl. & Fr.*: Aug. - Nov.

7. Commelina hasskarlii C.B. Clarke, Commelyn. Cyrtandr. Bengal. 13. t. 5. 1874 & in A. DC., Monogr. Phan. 3: 157. 1881; Hook. *f.*, Fl. Brit. India 6: 370. 1892.

Herbs, diffuse, slender, much branched, often rooting at nodes. Leaves lanceolate or ovate-lanceolate, 3-8 x 1-2 cm, acute at apex, glabrous; sheaths ciliate, oblique at mouth. Spathes solitary, leaf-opposed, ovate-lanceolate, 1-2.5 cm long, cordate at base. Flowers blue, in axillary 2-fid, unequal cymes; inner 1-2-flowered; outer 2-4-flowered. Stamens included; filaments glabrous. Capsules quadrate, *ca* 5 mm long, apiculate, membranous. Seeds cylindrical, conical, 3-4 mm long, smooth, without an appendage.

Common in moist places mostly in semidried drains, along river banks and roadsides in association with *Polygonum plebeium*. Balaghat, Bilaspur, Damoh, Gwalior, Hoshangabad, Indore, Mandla, Panna, Raigarh, Raipur, Rajnandgaon, Sagar, Sidhi, Surguja, West Nimar. *Fl. & Fr.*: Nov. - Jan.

8. Commelina imberbis Ehrenb. *ex* Hassk. in Schweinf., Beitr. Fl. Aethiop. 206. 1867; Rolla Rao in Blumea 14: 352. 1966. *C. persicariaefolia* Wight *ex* C.B. Clarke in A. DC., Monogr. Phan. 3: 171. 1881, *non* DC., 1816; Hook. *f.*, Fl. Brit. India 6: 372. 1892.

Herbs, diffuse, rooting at lower nodes. Stems glabrous. Leaves ovate-lanceolate or lanceolate, 5-15 x 2-5 cm, acuminate at apex, rounded or subcordate at base, shortly petiolate; sheaths *ca* 2 cm long, minutely pubescent at mouth. Spathes ovate, 2-2.5 cm long, truncately rounded at base, not auricled. Flowers in axillary cymes. Petals blue. Capsules oblong, *ca* 6 mm long, glabrous, 2-celled. Seeds obscurely rugose.

Jhabua (Samvatsar, 1996). *Fl. & Fr.*: Oct. - Dec.

9. Commelina longifolia Lam., Encycl. 1: 129. 1783; Rolla Rao in Taxon 10: 254. 1961 & in Notes Roy. Bot. Gard. Edinburgh 25: 179. 1964. *C. salicifolia* Roxb., Fl. Ind. (Carey & Wallich ed.) 1: 176. 1820; Hook. *f.*, Fl. Brit. India 6: 370. 1892.

Herbs, erect or decumbent, slender, up to 30 cm high, sometimes rooting at nodes. Leaves linear or linear-lanceolate, 8-15 x 0.4-1.3 cm, acute-acuminate at apex, obtuse at base, entire, chartaceous, glabrous or puberulous beneath; sheaths ciliate on margin. Spathes solitary, axillary, leaf-opposed, ovate-lanceolate, subcordate at base. Flowers blue, polygamous, in 2-fid cincinni; branch usually 1-2-flowered. Lateral petals clawed. Capsules oblong, quadrate, membranous, 3-celled. Seeds black, covered with white powder, ovoid-subglobose, appendiculate at one end.

Common in marshy places and as undergrowth of mixed deciduous forests and sal forests alongwith *Desmodium* sp. and *Chlorophytum* sp. Balaghat, Bilaspur, Durg, Raigarh. *Fl. & Fr.*: Aug. - Nov.

10. Commelina paludosa Blume, Enum. Pl. Javae 1: 2. 1827. *C. obliqua* Buch.-Ham. *ex* D. Don, Prodr. Fl. Nepal. 45. 1825, *non* Vahl, 1805; Hook. *f.*, Fl. Brit. India 6: 372. 1892.

Herbs, erect or procumbent, diffuse, robust, rooting at nodes. Leaves obliquely lanceolate or ovate-elliptic, 5-20 x 1.5-5.5 cm, acuminate at apex, acute or obtuse at base; sheaths usually undifferentiated from leaf blade, ciliate. Spathes 3-8 clustered together, narrowly ovate-lanceolate, 15-30 mm long, glabrous, usually with red-brown margin. Flowers small. Petals blue-violet or white. Stamens included. Capsules ovoid, *ca* 6 mm across, 3-celled, 1-3-seeded. Seeds smooth.

Common in shady places, rock crevices, embankment of drains and as undergrowth in mixed forests. Balaghat, Bilaspur, Dhar, Hoshangabad, Indore, Raigarh, Raipur, Rajnandgaon, Rewa, Sagar, Seoni, Shivpuri, Surguja, West Nimar. *Fl. & Fr.*: Oct. - Jan.

11. Commelina suffruticosa Blume, Enum. Pl. Javae 1: 3. 1827; Hook. *f.*, Fl. Brit. India 6: 374. 1892.

Herbs, perennial, erect, tufted, stout, branched. Leaves lanceolate or ovate-lanceolate, 7-15 x 2-5 cm, entire, glabrous or scabridly pubescent beneath, sessile; sheaths *ca* 1.5 cm long, pubescent, ciliate at mouth. Spathes solitary or several clustered together, broadly ovate, 1-1.5 cm long, acute, shortly pedunculate. Flowers in unbranched cincinni. Petals white or blue. Capsules 6-8 per spathe, 2-celled. Seeds pale yellow, ellipsoid, *ca* 3.5 mm long, rugose.

In moist shady places of hill slopes, rock crevices and sal forests. Balaghat, Bastar, Bilaspur, Hoshangabad, Mandla, Panna, Raipur, Rajnandgaon, Rewa, Satna, Sidhi, Shivpuri, Surguja. *Fl. & Fr.*: Aug. - Sept.

2. CYANOTIS D. Don, *nom. cons.*

Herbs, erect, creeping or ascending. Roots sometimes tuberous. Leaves with amplexicaul sheaths. Flowers in axillary and/or terminal cymes or cincinni, rarely solitary, actinomorphic; bracts prominent, either equal to or exceeding cymes; bracteoles foliaceous, 2-seriate, secund. Sepals 3, free or basally connate. Petals 3, unequal, connate at base. Stamens 6, all fertile, inserted on the torus; filaments hairy above the middle, thickened at the apex; staminodes absent. Ovary sessile, apically villous, 3-locular; ovules 2 in each locule; style filiform; stigma terminal. Fruit a capsule, 3-celled, loculicidally 3-valved. Seeds 1-2 per cell, terete or pyramidal, rugose or pitted.

About 50 species; palaeotropical regions; 5 in M.P.

1a. Plants cottony or cobwebby:

2a. Plants purplish; basal leaves dissimilar from upper ones; cymes densely aggregate on flowering shoots ...1. *C. arachnoidea*

2b. Plants not purplish; leaves similar; cymes lax, terminal and axillary on stem ...4. *C. fasciculata*

1b. Plants otherwise:

3a. Bracts up to 1 cm long ...2. *C. arcotensis*

3b. Bracts 1.5-3 cm long:

4a. Roots tuberous; stems pubescent; cymes corymbose ...5. *C. tuberosa*

4b. Roots fibrous; stems glabrous; cymes solitary ...3. *C. cristata*

1. Cyanotis arachnoidea C.B. Clarke in A. DC., Monogr. Phan. 3: 250. 1881; Hook. *f.*, Fl. Brit. India 6: 386. 1892.

Herbs, perennial, cottony or cobwebby, covered with long woolly hairs. Leaves variable in shape, lanceolate or linear-oblong, 4-8 x 1-2 cm, rounded

at apex, obtuse at base, entire; upper ones chartaceous, cobwebby; sheaths *ca* 2 cm long. Flowers in axillary and terminal, subsessile cymes; bracts ovate-lanceolate, exceeding cymes; bracteoles falcately lanceolate. Petals pink or purple. Filaments and style hairy. Capsules oblong, *ca* 3 mm long. Seeds conical, terete, obscurely pitted.

Extremely rare. Occurring among rock boulders and on alluvial soil under shade. Bastar. *Fl. & Fr.*: Aug. Sept.

2. Cyanotis arcotensis Rolla Rao in Blumea 14: 345. 1966.

Herbs, annual. Branches pubescent. Leaves linear-lanceolate, 2-5 x 0.2-0.5 cm, acute-obtuse at apex, cordate at base, glabrous above, pubescent beneath; sheaths short, pubescent. Flowers in terminal cymes; peduncles 3-5 cm long; bracts ovate-lanceolate, up to 1 cm long, falcately recurved; bracteoles ovate, ciliate, cross-nerved. Petals purple. Filaments hairy. Capsules *ca* 2.5 mm long. Seeds pitted.

In moist places as forest undergrowth. Jhabua (Samvatsar, 1996). *Fl. & Fr.*: Aug. Dec.

3. Cyanotis cristata (L.) D. Don, Prodr. Fl. Nepal. 46. 1825; Hook. *f.*, Fl. Brit. India 6: 385. 1892. *Commelina cristata* L., Sp. Pl. 42. 1753.

Herbs, perennial, trailing, slender. Roots fibrous. Stems up to 60 cm long; branches rooting below. Leaves ovate-oblong or oblong-oblanceolate, 5-10 x 1-2 cm, acute at apex, cordate or rounded at base, glabrous or sparsely hairy, ciliolate on margins, sessile; sheaths short, hairy. Flowers in sessile or long pedunculate cincinni; cincinni often longer than the bracteoles; bracteoles linear-ovate, falcate. Petals blue-violet. Capsules oblong, trigonous, nearly glabrous. Seeds black, conical, pitted.

In moist shady places of sal forests and mixed forests usually alongwith *Desmodium* sp., *Biophytum* sp. and *Cyperus* sp. Balaghat, Bastar, Bilaspur, Damoh, Dhar, Durg, Hoshangabad, Mandla, Panna, Raigarh, Raipur, Rajnandgaon, Rewa, Satna, Seoni, Sidhi, Surguja, Tikamgarh. *Fl. & Fr.*: Aug. - Sept.

4. Cyanotis fasciculata (Heyne *ex* Roth) Schult. & J.H. Schult. in Roem. & Schult., Syst. Veg. 7: 1152. 1830; Hook. *f.*, Fl. Brit. India 6:

387. 1892. *Tradescantia fasciculata* Heyne *ex* Roth, Nov. Pl. Sp. 189. 1821.

Herbs, erect or decumbent, branched. Stems terete, striate, floccosely silky or cobwebby woolly. Leaves linear-lanceolate or narrowed from base to the apex, 2-8 x 0.5-1.2 cm, acute or acuminate at apex, woolly on both the surfaces, sessile. Flowers in compact, axillary and terminal, 5-15 mm long cincinni, enclosed in linear-ovate, falcate, cottony woolly bracteoles; peduncles *ca* 2 cm long, one or more together; bracts *ca* 1.5 cm long. Petals blue, purple or pink. Capsules oblong, trigonous, *ca* 4 mm long, almost glabrous, pilose at apex. Seeds 2, oblong, rugulose.

In mixed forests, wastelands and amidst boulders usually in association with *Spermacoce* sp. and grasses. Balaghat, Bastar, Dhar, Durg, Gwalior, Indore, Raipur, Rajnandgaon, Rewa, Tikamgarh, West Nimar. *Fl. & Fr.*: Aug. Sept.

5. Cyanotis tuberosa (Roxb.) Schult. & J.H. Schult. in Roem. & Schult., Syst. Veg. 7: 1153. 1830; Hook. *f.*, Fl. Brit. India 6: 386. 1892. *Tradescantia tuberosa* Roxb., Pl. Coromandel 2: 5. t. 108. 1799 & Fl. Ind. 2: 119. 1832.

Herbs, erect or creeping. Roots tuberous. Stems densely pubescent, up to 1 m long, rooting at nodes. Leaves radical and cauline, oblong-lanceolate, 15-25 x 2-4 cm, acute at apex, often purple beneath, softly pilose, sessile; sheaths up to 2.5 cm long. Flowers in axillary and terminal, densely hairy, scorpioid cymes, enclosed in foliaceous, falcately decurved bracts. Petals bluish purple. Filaments hairy. Capsules *ca* 3 mm long, hairy. Seeds brown.

Bastar (Tiwari and Maheshwari, 1965). *Fl. & Fr.*: Throughout the year.

Roots are said to be useful in fever.

3. FLOSCOPA Lour.

Herbs, perennial, erect or subscandent. Leaves alternate. Flowers in axillary or terminal, dense, many-flowered cymes or thyrsoid panicles, bisexual, rather small, actinomorphic or zygomorphic, secund, shortly pediceliate; bracts minute or absent. Sepals 3, free, persistent. Petals 3,

free, white, pink or violet, slightly exceeding the calyx. Stamens 6, all fertile; filaments glabrous. Ovary compressed, stipitate, 2-locular; ovule solitary in each locule. Fruit a capsule, loculicidally 2-valved.

About 20 species; tropical and subtropical regions; one in M.P

Floscopa scandens Lour., Fl. Cochinch. 1: 193. 1790; Hook. *f.*, Fl. Brit. India 6: 390. 1892. *F. paniculata* Hassk. in Miq., Pl. Jungh. 151. 1852.

Large herbs, subscandent or prostrate. Branches suberect, rooting below. Leaves lanceolate, 5-15 x 1.5-3.5 cm, acuminate at apex, narrowed at base, subsessile; sheaths short, hairy at mouth. Flowers in terminal, dense panicles; lower bracteate; upper ebracteate. Sepals oblong, villous. Petals white or rosy, obovate. Filaments purple. Capsules subglobose, compressed, *ca* 4 mm across. Seeds hemispherical, wrinkled.

Common in muddy soil, near drains and in sandy river beds. Bilaspur, Hoshangabad, Raigarh, Shahdol, Sidhi, Surguja. *Fl. & Fr.*: Oct. - Dec.

4. MURDANNIA Royle, *nom. cons.*

Herbs, prostrate or decumbent. Roots fibrous or tuberous. Leaves alternate, often radical. Flowers in axillary and/or terminal, dense or lax panicles or clusters, actinomorphic. Sepals 3, free, membranous. Petals 3, free, subequal, obovate. Fertile stamens 2-3, alternating with 2-4 staminodes; filaments glabrous or hairy; staminodes hastate or 3-lobed at apex. Ovary 3-locular, rarely 2-locular. Fruit a capsule, subequally 3-valved, 3 or more-seeded. Seeds 1-5 in each locule, 1 or 2-seriate, rugose or pitted.

About 50 species; tropical regions; 9 in M.P.

1a. Roots tuberous:

2a. Flowers borne on a separate leafless scape ...2. *M. edulis*

2b. Flowers not borne on a separate leafless scape:

3a. Leaves pubescent; flowers clustered in upper leaf sheaths; seeds 2-seriate in each cell ...4. *M. lanuginosa*

3b. Leaves usually glabrous; flowers in terminal panicles; seeds 1-seriate in each cell ...7. *M. simplex*

1b. Roots not tuberous:

4a. Locule of ovary 1 to 2-ovuled and of capsule 1 to 2-seeded:

5a. Flowers in panicles; cell of capsule 2-seeded ...5. *M. nudiflora*

5b. Flowers in clusters; cell of capsule 1-seeded ...9. *M. vaginata*

4b. Locule of ovary 3 to many-ovuled and of capsule 3 to many-seeded:

6a. Flowers clustered on short axillary peduncle ...1. *M. blumei*

6b. Flowers in cymose panicles:

7a. Leaves 2-3 mm broad; filaments glabrous; seeds 2-seriate ...6. *M. semiteres*

7b. Leaves more than 4 mm broad; filaments bearded; seeds 1-seriate:

8a. Slender herbs; leaves up to 4 cm long; seeds tuberculate ...8. *M. spirata*

8b. Stout herbs; leaves more than 8 cm long; seeds smooth ...3. *M. japonica*

1. Murdannia blumei (Hassk.) Brenan in Hook., Icon. Pl. t. 3578. 1962; Rolla Rao in Notes Roy. Bot. Gard. Edinburgh 25: 183. 1964. *Dichoespermum blumei* Hassk., Commelin. Ind. 41. 1870. *Aneilema blumei* (Hassk.) Bakh. *f.* in Blumea 6: 398. 1950. *A. hamiltonianum* Wallich *ex* C.B. Clarke in A. DC., Monogr. Phan. 3: 213. 1881; Hook. *f.*, Fl. Brit. India 6: 380. 1892. *Murdannia hamiltoniana* (Wallich *ex* C.B. Clarke) Brückner in Engl. & Prantl, Nat. Pflanzenfam. ed. 2, 15a: 173. 1930. *Tradescantia terminalis* Blume, Enum. Pl. Javae 1: 6. 1827. *Aneilema terminale* (Blume) Haines, Bot. Bihar Orissa 6: 1080. 1924. *Murdannia terminalis* (Blume) Raiz. in Indian For. 84: 499. 1958.

Herbs, diffuse. Stems creeping and rooting. Leaves linear-lanceolate, 2.5-8 x 1-2.5 cm, nearly glabrous, amplexicaul, often complicate. Flowers

1-4 clustered on short axillary peduncles, more or less concealed in the leaf-bases; pedicels jointed. Petals white or pinkish white. Capsules oblong, shining, many-seeded. Seeds *ca* 16 or more in each locule, scabrid or flocculent.

In moist places. Hoshangabad (Tiwari and Maheshwari, 1965). *Fl. & Fr.*: July - Oct.

2. Murdannia edulis (Stokes) Faden in Taxon 29: 77. 1980. *Commelina edulis* Stokes, Bot. Mat. Med. 1: 184. 1812. *C. tuberosa* Lour., Fl. Cochinch. 1: 40. 1790, *non* L., 1753. *C. scapiflora* Roxb., Fl. Ind. (Carey & Wallich ed.) 1: 178. 1820. *Aneilema scapiflorum* (Roxb.) Kostel., Allg. Med.-Pharm. Fl. 1: 127. 1831; Hook. *f.*, Fl. Brit. India 6: 375. 1892. *Murdannia scapiflora* (Roxb.) Royle, Ill. Bot. Himal. Mts. 403. t. 95. 1839.

Herbs, perennial. Roots fibrous, with fusiform tubers. Leaves in a basal rosette, linear-lanceolate, narrowly ensiform, 10-15 x 0.3-1.5 cm, finely acuminate at apex, wavy on margin, subglabrous to puberulous on both the surfaces. Flowering shoots 1-5, scapiform, separate from the leaves, 20-40 cm long, with a few, 2-5 cm long apiculate sheaths. Flowers in 5-15 cm long panicles. Sepals elliptic-oblong. Petals blue-mauve, obovate, 8-12 mm long. Fertile stamens 3; anthers purple; staminodes 3, subequal. Capsules oblong-elliptic, trigonous. Seeds straw-coloured, 1-seriate, reticulate.

As undergrowth in sal forests. Bastar, Bilaspur, Raipur. *Fl. & Fr.*: March June.

3. Murdannia japonica (Thunb.) Faden in Taxon 26: 142. 1977. *Commelina japonica* Thunb. in Trans. Linn. Soc. London 2: 332. 1794. *Aneilema japonicum* (Thunb.) Kunth, Enum. Pl. 4: 70. 1843. *Commelina lineolata* Blume, Enum. Pl. Javae 1: 3. 1827. *Aneilema lineolatum* (Blume) Kunth, Enum. Pl. 4: 69. 1843; Hook. *f.*, Fl. Brit. India 6: 376. 1892. *Commelina elata* Vahl, Enum. Pl. 2: 178. 1805. *Murdannia elata* (Vahl) Brückner in Engl. & Prantl, Nat. Pflanzenfam. ed. 2, 15a: 173. 1930.

Herbs, perennial, stout. Roots fleshy. Branches pendent, up to 60 cm long. Leaves lanceolate or oblong, *ca* 15 x 4 cm, acute at apex, amplexicaul at base. Flowers in large, axillary and terminal, dichotomously branched

panicles. Sepals oblong. Petals violet, exceeding the sepals. Stamens 2-3; filaments bearded; staminodes 2-3. Capsules subglobose, trigonous. Seeds smooth.

In moist shady places. Bastar (Tiwari and Maheshwari, 1965). *Fl.* & *Fr.*: Aug. Sept.

4. Murdannia lanuginosa (Wallich *ex* C.B. Clarke) Brückner in Engl. & Prantl, Nat. Pflanzenfam. ed. 2, 15a: 173. 1930. *Aneilema lanuginosum* Wallich *ex* C.B. Clarke in A. DC., Monogr. Phan. 3: 214. 1881; Hook. *f.*, Fl. Brit. India 6: 380. 1892. *A. siennea* Blatt. in J. Bombay Nat. Hist. Soc. 33: 75. 1928. *Murdannia siennea* (Blatt.) Raiz. in Indian For. 84: 499. 1958.

Herbs, procumbent, slender, 15-40 cm high. Roots tuberous. Leaves linear-oblong or lanceolate, 4-6 x 0.4-0.5 cm, acute or acuminate at apex, undulate, pubescent; sheaths *ca* 1 cm long. Flowers 1-5, clustered in upper leaf sheaths; pedicels jointed at the middle with 2 minute bracteoles at the joint. Petals blue. Filaments bearded in the lower half. Capsules oblong, trigonous, *ca* 1 cm across, many-seeded. Seeds angular.

On sandy soil near ditches. Hoshangabad (Tiwari and Maheshwari, 1965). *Fl.* & *Fr.*: Aug. - Oct.

5. Murdannia nudiflora (L.) Brenan in Kew Bull. 1952: 189. 1952. *Commelina nudiflora* L., Sp. Pl. 41. 1753, *p.p. Aneilema nudiflorum* Wallich *ex* Hook. *f.*, Fl. Brit. India 6: 378. 1892. *Murdannia malabarica* (L.) Brückner in Engl. & Prantl, Nat. Pflanzenfam. ed. 2, 15a: 173. 1930. *Aneilema malabaricum* (L.) Merr. in Philipp. J. Sci. Bot. 7: 232. 1912. *Tradescantia malabarica* L., Sp. Pl. ed. 2, 412. 1762. **Fig. 18.**

Herbs, subcreet or diffuse, ascending. Stems glabrous, 5-50 cm long, rooting at nodes. Leaves linear-lanceolate, rarely ovate-lanceolate, 3-10 cm long, subacute at apex, rounded or subcordate at base, glabrous, sessile; sheaths sparsely hairy, ciliate at mouth. Flowers in terminal and axillary, lax, cymose panicles, bracteate. Sepals ovate. Petals purple, blue or whitish, orbicular. Fertile stamens 2, included; filaments hairy. Capsules with purple streaks, subglobose, mucronate, 6-seeded. Seeds trigonous, tuberculate.

Fig. 18. Murdannia nudiflora (L.) Brenan

Along roadsides, bund of paddy fields and in sal forests. Bastar, Bilaspur, Damoh, Durg, Indore, Jabalpur, Mandla, Panna, Raipur, Rajnandgaon, Rewa, Sagar, Satna, Surguja. *Fl. & Fr.*: Aug. - Nov.

6. Murdannia semiteres (Dalzell) Santapau in Poona Agric. Coll. Mag. 41: 284. 1951; Brenan in Kew Bull. 1952: 184. 1952. *Aneilema semiteres* Dalzell in Hook., J. Bot. Kew Gard. Misc. 3: 138. 1851. *A. paniculatum* Wallich *ex* C.B. Clarke in A. DC., Monogr. Phan. 3: 215. 1881, *non* Wight, 1853; Hook. *f.*, Fl. Brit. India 6: 381. 1892. *Commelina nimmoniana* J. Graham, Cat. Pl. Bombay 224. 1839; Hook. *f.*, Fl. Brit. India 6: 374. 1892.

Herbs, erect, tufted, pinkish, 1-1.5 m high. Roots fibrous. Leaves narrowly linear, filiform, 5-10 x 0.2-0.3 cm, gramineous, acute or acuminate at apex, glabrous. Flowers in terminal, few-flowered panicles; branches slender; bracts minute, ochreate, apiculate, persistent. Petals blue. Filaments glabrous, connate at base. Capsules subglobose, angular. Seeds 6-8 in each locule, pale yellow, compressed, smooth.

In open places near stagnant water pools. Hoshangabad (Tiwari and Maheshwari, 1965). *Fl. & Fr.*: Sept. - Oct.

7. Murdannia simplex (Vahl) Brenan in Kew Bull. 1952: 186. 1952. *Commelina simplex* Vahl, Enum. Pl. 2: 176. 1805. *Aneilema sinicum* Ker-Gawl. in Bot. Reg. 8: t. 659. 1822; Hook. *f.*, Fl. Brit. India 6: 379. 1892. *A. secundum* Wight, Icon. Pl. Ind. Orient. t. 2075. 1853.

Herbs, subscandent. Roots slender, tuberous; tubers ellipsoid. Stems 30-50 cm high. Leaves mostly radical, few cauline, linear-lanceolate, *ca* 5 x 0.5 cm, acute or acuminate at apex, glabrous or nearly so; sheaths ciliate. Flowers in 1-3-flowered cymes on terminal loose panicles. Petals purple. Fertile stamens 2, rudimentary stamen 1; staminodes 3; filaments bearded. Capsules oblong. Seeds rugose.

Rare. Sagar. *Fl. & Fr.*: July - Oct.

8. Murdannia spirata (L.) Brückner in Engl. & Prantl, Nat. Pflanzenfam. ed. 2, 15a: 173. 1930. *Commelina spirata* L., Mant. Pl. 176. 1771. *Aneilema spiratum* (L.) R. Br., Prodr. 271. 1810; Hook. *f.*, Fl. Brit. India 6: 377. 1892. **Fig. 19.**

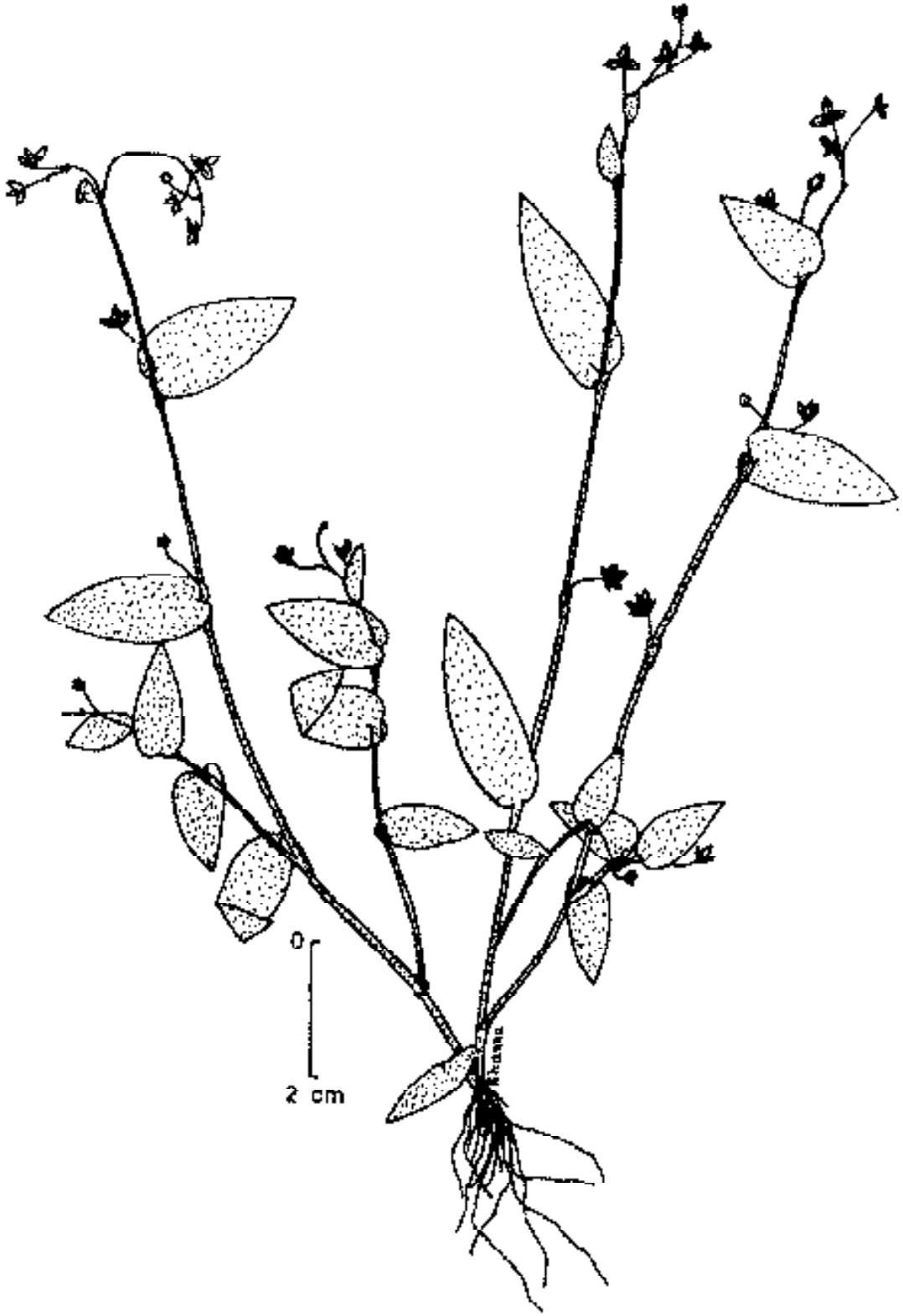

Fig. 19. Murdannia spirata (L.) Brückner

Herbs, annual, erect or ascending, usually diffuse. Stems simple or branched, 5-30 cm high. Leaves ovate or oblong-lanceolate, 1-4 x 0.4-1 cm, subacute or acute at apex, amplexicaul at base, usually wavy on margins, glabrous, sessile; sheaths ciliate at mouth and on margins. Flowers in terminal, cymose panicles. Petals blue, pink or purple, sometimes white. Capsules acutely triangular. Seeds trigonous, tuberculate.

In moist sandy soil and sal forests. Balaghat, Bastar, Bilaspur, Durg, Hoshangabad, Raigarh, Raipur, Rajnandgaon, Seoni, Shivpuri, Sidhi, Surguja. *Fl. & Fr.*: Aug. - May.

9. Murdannia vaginata (L.) Brückner in Engl. & Prantl, Nat. Pflanzenfam. ed. 2, 15a: 173. 1930. *Commelina vaginata* L., Mant. Pl. 177. 1771. *Aneilema vaginatum* (L.) R. Br., Prodr. 271. 1810; Hook *f.*, Fl. Brit. India 6: 381. 1892. *A. pauciflorum* Dalzell in Hook., J. Bot. Kew Gard. Misc. 3:136. 1851, *non* Wight, 1853.

Herbs, erect or ascending, stout. Stems profusely branched, almost fleshy, rooting at lower nodes. Leaves linear-lanceolate, 4-20 x 0.4-1 cm, acuminate at apex, glabrous or sparsely hairy beneath, sessile; sheaths short, ciliate. Flowers 1-3 together, fascicled in the axils of distant bracts along the filiform, slender terminations of the branches; bracts linear-lanceolate, 8-15 mm long. Petals blue-violet. Stamens 2; staminodes 4. Capsules globose, cuspidate. Seeds black, trigonously conical, rugose.

In moist places and as undergrowth in sal forests along with *Lindernia* sp., *Biophytum* sp., *Cyperus* sp., *Fimbristylis* sp. and *Eriocaulon* sp. Mandla, Raigarh, Surguja. *Fl. & Fr.* : Aug. - Oct.

5. RHOEO Hance *ex* Walp.

Herbs. Leaves narrowly lanceolate, densely imbricate, vaginate at base. Flowers in dense, many-flowered umbels; umbels enclosed by 2 cymbiform bracts; peduncles axillary. Sepals 3, ovate-lanceolate, withering. Petals 3, ovate, withering. Stamens 6, fertile; filaments hairy. Ovary sessile, 3-locular; ovule solitary in each locule.

A monotypic genus; Mexico, Central America and West Indies.

Rhoeo spathacea (Sw.) W.T. Stearn in Baileya 5: 198. 1957. *Tradescantia spathacea* Sw., Prodr. 57. 1788. *Rhoeo discolor* Hance

in Walp., Ann. Bot. Syst. 3: 660. 1852. *Tradescantia discolor* L'Hérit., Sert. Angl. 8. t. 12. 1790.

Herbs. Stems short. Leaves narrowly lanceolate, 15-30 x 5-8 cm, densely imbricate, purple beneath. Flowers several in a dense umbel, enclosed by 2 cymbiform bracts; peduncles axillary, sometimes divided. Sepals ovate-lanceolate. Petals white, ovate, soon withering. Stamens 6; filaments hairy.

Cultivated throughout the state (Tiwari and Maheshwari, 1965). *Fl.*: Throughout the year.

6. TONNINGIA Neck. *ex* Adr. Juss.

Herbs, annual, subscandent, succulent, branched, glabrous. Roots fibrous. Leaves linear or oblong-lanceolate. Flowers in much condensed cymes or axillary fascicles, enclosed in inflated leaf-sheaths, sessile, exserted when mature, bracteolate; bracteoles linear, conspicuous, transparent. Sepals spathulate-acuminate. Petals connate at base; tube long, narrow. Stamens 6; filaments hairy. Fruit a capsule, embedded in leaf-sheath axils; tip pointed with beak like projection or depressed in centre with 3 horn like projections.

Two species; tropical regions; both in M.P.

1a. Capsules simply beaked, without any depression; seeds pitted ...1. *T. axillaris*

1b. Capsules 3-horned at apex, with central depression; seeds smooth or obscurely pitted ...2. *T. cucullata*

1. Tonningia axillaris (L.) Kuntze, Revis. Gen. Pl. 2: 721. 1891. *Commelina axillaris* L., Sp. Pl. 42. 1753. *Tradescantia axillaris* (L.) L., Mant. Pl. 321. 1771. *Cyanotis axillaris* (L.) D. Don, Prodr. Fl. Nepal. 46. 1825; Hook. *f.*, Fl. Brit. India 6: 388. 1892. *Zygomenes axillaris* (L.) Salisb. in Trans. Hort. Soc. 1: 271. 1812. *Amischophacelus axillaris* (L.) Rolla Rao & Kammathy in J. Linn. Soc. London (Bot.) 59: 306. 1966.

Herbs, perennial, suberect or prostrate, slender, somewhat fleshy, rooting at nodes. Ascending branches 10-75 cm long. Leaves linear-lanceolate or ensiform, 4-15 x 0.3-1.2 cm, acute to acuminate at apex,

often falcate, glabrous, sessile; sheaths scarious, 5-10 mm long, ciliate on margins. Flowers in axillary fascicles. Corolla pink or blue; lobes ovate, *ca* 5 mm long; tube *ca* 1 cm long. Capsules oblong, glabrous. Seeds conical, pitted, truncate at base.

Common in moist shady places. Balaghat, Bilaspur, Damoh, Dhar, Durg, Mandla, Morena, Panna, Raigarh, Raipur, Rajnandgaon, Rewa, Satna, Sidhi, Surguja, Tikamgarh, West Nimar. *Fl. & Fr.*: Aug. - Jan.

2. Tonningia cucullata (Roth) Kuntze, Revis. Gen. Pl. 2: 722. 1891. *Tradescantia cucullata* Roth, Nov. Pl. Sp. 189. 1821. *Cyanotis cucullata* (Roth) Kunth, Enum. Pl. 4: 107. 1843; Hook. *f.*, Fl. Brit. India 6: 389. 1892. *Zygomenes cucullata* (Roth) Rolla Rao & Kammathy in Notes Roy. Bot. Gard. Edinburgh 25: 187. 1964. *Amischophacelus cucullata* (Roth) Rolla Rao & Kammathy in J. Linn. Soc. London (Bot.) 59: 306. 1966.

Herbs, annual, suberect or decumbent. Branches glabrous, stout, rooting at nodes. Leaves distichous, linear-lanceolate, 2.5-7 x 0.5-1 cm, reflexed or spreading, sessile; sheaths globosely inflated. Flowers in axillary fascicles. Corolla pinkish purple. Capsules ellipsoid-oblong, trigonous, *ca* 6 mm long, 3-horned at apex, glabrous. Seeds brown, subquadrate, smooth or obscurely pitted.

In moist places, often in abandoned field edge usually amidst *Andropogon* sp. and *Sorghum* sp. Bilaspur, Dhar, Gwalior, Hoshangabad, Indore, Mandla, Surguja. *Fl. & Fr.:* Aug. - Nov.

7. ZEBRINA Schnizl.

Herbs. Stems creeping, descending or pendulous. Leaves ovate or oblong, vaginate at base. Flowers clustered at the top of the stem within an involucre of 2 conduplicate, channelled bracts, almost sessile. Sepals connate. Petals highly connate; segments ovate or oblong; tube long, narrow. Stamens 6, equal, all fertile, inserted at the throat of tubular corolla. Ovary sessile, 3-locular; ovules 2 in each locule; style filiform; stigma capitate, 3-lobed. Fruit a capsule, dehiscing loculicidally.

About 5 species; South United States to Central America; one species cultivated in M.P.

Zebrina pendula Schnizl. in Bot. Zeit. 7: 870. 1849. *Tradescantia zebrina* Hort. *ex* Loud., Encycl. Pl. Suppl. 2. 1340. 1855. *Commelina zebrina* Hort. *ex* C.B. Clarke in A. DC., Monogr. Phan. 3: 318. 1881.

Herbs, decumbent or pendulous. Branches sparingly hairy. Leaves oblong or ovate, 2.5-7.5 cm, acute or acuminate at apex, vaginate at base, striped green and white above, purple below, pubescent beneath; sheaths hairy. Flowers clustered between two sessile, conduplicate bracts. Calyx-tube white. Corolla-segments red-purple; tube white.

Cultivated (Tiwari and Maheshwari, 1965). *Fl. & Fr.*: March - April.

149a. FLAGELLARIACEAE*

(K.K. Khanna and Anand Kumar)

One genus with about 4 species; tropical regions of Old World; one species in M.P.

FLAGELLARIA L.

Woody climbers. Leaves bifarious, ovate to lanceolate, tendrillar at apex, longitudinally parallel nerved, sessile or subsessile. Inflorescence paniculate. Flowers small, fascicled or spicate on the branches of panicle, bisexual, bracteate. Tepals 6, 2-seriate, membranous. Stamens 6; filaments filiform; anthers linear-oblong. Ovary 3-locular; ovule solitary in each locule; style divided into 3, subentire or 2-partite stigmatic arms. Fruit a drupe, globose, subglobose or ovoid, with succulent exocarp and bony endocarp, 1-2-seeded. Seeds globose or ovoid.

Flagellaria indica L., Sp. Pl. 333. 1753; Hook. *f.*, Fl. Brit. India 6: 391. 1892.

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*Possibly because of rare occurrence and restricted distribution in M.P., the family has somehow escaped the attention and has not been included under Key to families given in Flora of M.P. Vol. I. However, for the purpose, it should be placed after lead 226b on page 119 and can be differentiated from Liliaceae by large woody climbing habit of plants, internodes covered with leaf-sheaths and fruit being a drupe.

Woody climbers, perennial. Branches covered with truncate sheaths. Leaves bifarious, lanceolate, 10-20 x 1-5.5 cm, with a slender spiral tendril at apex, rounded at base, sessile, shortly narrowed into sheath; sheaths cylindrical, striate, 2-auricled at the apex. Panicles terminal, 12-25 cm long. Tepals white, erect; outer tepals broadly ovate or suborbicular, *ca* 3 mm long, obtuse; inner tepals similar to outer ones, more or less unequal. Stamens and stigmas exserted. Drupes pink or red, subglobose, 4-6 mm across, smooth.

Rare. In dense moist deciduous forests. Bastar (Subramanyam and Henry, 1967). *Fl.* & Fr.: March - Nov.

150. JUNCACEAE

(R.D. Dixit and R. Prasad)

About 10 genera and 325 species; temperate, arctic and tropical mountains; one genus with 2 species in M.P.

JUNCUS L.

Herbs, annual or perennial. Rootstocks sympodial, producing one leafy shoot each year. Stems tufted. Leaves variable, all radical or both radical and cauline, flat or terete, with large sheathing bases, with or without transverse septa. Inflorescence terminal, apparently continuous with the stem, with foliaceous basal bract. Flowers small, solitary or clustered, arranged in cymes of various types, commonly monochasial, usually with 1-2 bracteoles. Tepals 6, glumaceous, equal or the 3 inner ones smaller. Stamens 3-6, free or attached to the base of tepals; filaments linear; anthers erect, oblong or linear. Ovary sessile, 3-locular; style short, linear, with 3 brush like stigmas. Fruit a capsule, loculicidal, 3-valved. Seeds ovoid or oblong, minute, shallowly ribbed.

About 225 species; cosmopolitan; 2 in M.P.

1a. Annuals; flowers solitary; capsules shorter than the perianth ...1. *J. bufonius*

1b. Perennials; flowers crowded into 6-10-flowered heads; capsules longer than the perianth ...2. *J. leschenaultii*

1. Juncus bufonius L., Sp. Pl. 328. 1753; Hook. *f.*, Fl. Brit. India 6: 392. 1892.

Herbs, annual, pale-coloured, 10-25 cm high. Stems erect or decumbent, slender, terete, soft, often branched. Leaves linear, the lowermost larger and upper ones shorter; sheaths rather long, not auricled. Inflorescence terminal, branched. Flowers usually solitary, pale-coloured, variable, 3-7 mm long, nearly sessile, each flower at the base with a bract and 2 bracteoles; bracts and bracteoles ovate, acute, thinly membranous. Tepals narrowly ovate or lanceolate, the 3 inner often much smaller than outer. Stamens 6, in the topmost flowers often 3. Capsules oblong, trigonous, usually shorter than the perianth, 3-5 mm long. Seeds numerous, brown.

In moist shady places. Damoh, Rewa, Satna. *Fl. & Fr.*: Feb. April.

2. Juncus leschenaultii Gay in Laharpe, Monogr. Jonc. 137. 1827; Hara *et al.*, Enum. Fl. Pl. Nepal 1: 84. 1978. *J. prismatocarpus* var. *leschenaultii* (Gay) Buchenau in Engl., Bot. Jahrb. 6: 205. 1885. *J. prismatocarpus auct. non* R. Br., 1810: Hook. *f.*, Fl. Brit. India 6: 395. 1892, *p.p.* **Fig. 20.**

Herbs, perennial, glabrous. Stems erect, sometimes decumbent and rooting at nodes, terete or compressed, not septate. Leaves few, filiform or broader, soft, flat or terete, *ca* 10 x 0.2 cm, always shorter than the stem. Inflorescence terminal, very lax; cymes erect; branches erect or spreading; heads densely 6-10-flowered, hemispherical; lower bracts leafy, erect, shorter than the cyme. Flowers green or brown, sessile. Tepals up to 4 mm long. Stamens 6, included. Capsules usually much exceeding the perianth. Seeds very minute, apiculate.

Common in water-logged fields. Balaghat, Bilaspur, Mandla, Raigarh, Surguja. *Fl.* & Fr.: Nov. - May.

151. ARECACEAE

(R.D. Dixit)

About 207 genera and 2675 species; tropical and subtropical regions; 7 genera and 10 species in M.P.

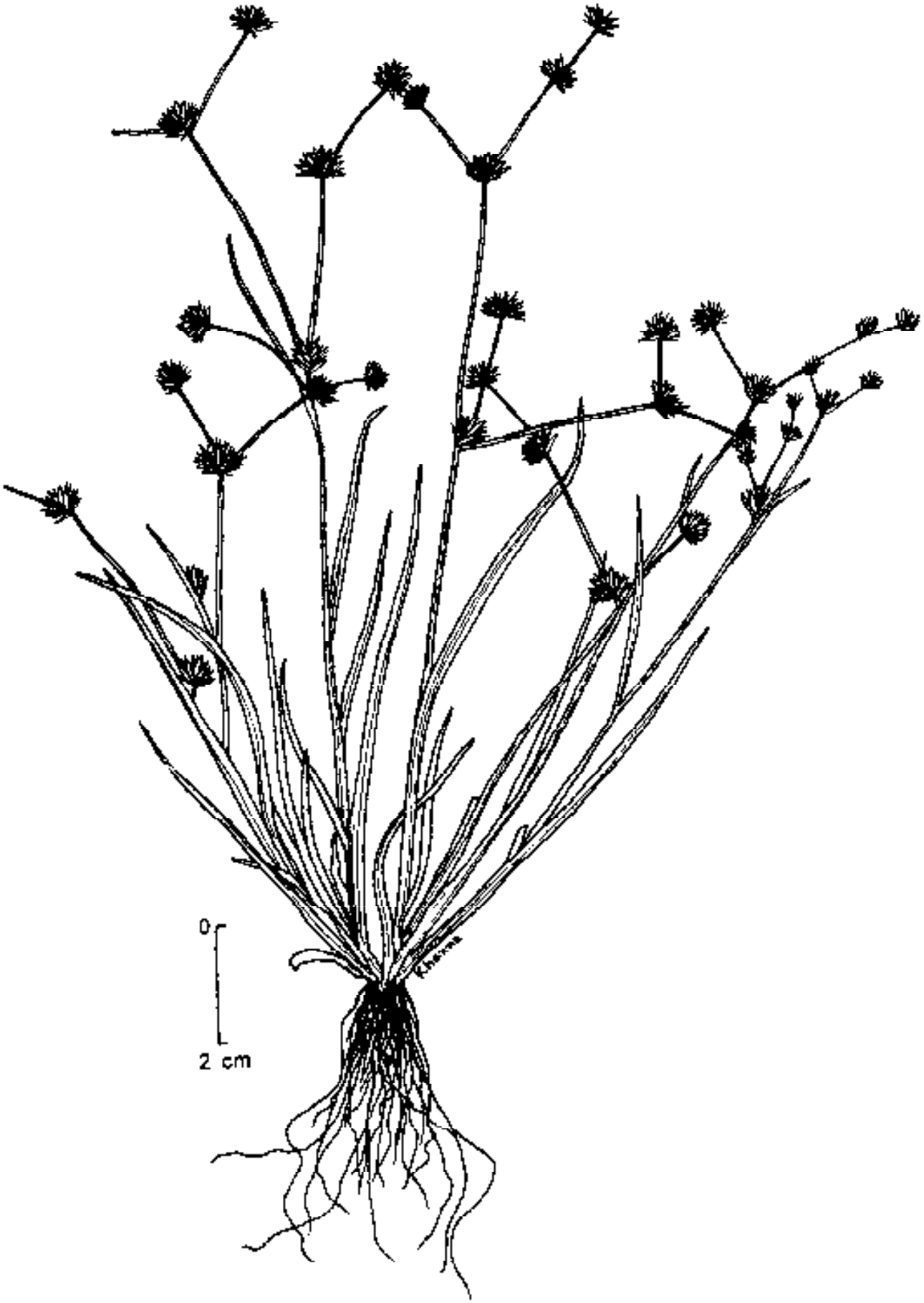

Fig. 20. Juncus leschenaultii Gay

1a. Leaves palmately lobed or flabelliform:

2a. Flowers unisexual; fruits 15-20 cm across ...2. *Borassus*

2b. Flowers bisexual; fruits 1.5-2 cm long ...5. *Livistona*

1b. Leaves pinnately compound:

3a. Leaves bipinnate; leaflets strongly ribbed, like fish-tail ...3. *Caryota*

3b. Leaves unipinnate; leaflets neither strongly ribbed nor like fish-tail:

4a. Lower pinnae spinescent ...6. *Phoenix*

4b. Lower pinnae never spinescent:

5a. Leaflets praemorse at apex; spadix infrafoliar (inserted below the leaves):

6a. Ovary 1-locular; fruits orange or scarlet, 3-5 cm long ...1. *Areca*

6b. Ovary 3-locular; fruits brown to dark purple, *ca* 1 cm across ...7. *Roystonea*

5b. Leaflets not praemorse at apex; spadix interfoliar (inserted among the leaves) ...4. *Cocos*

1. **ARECA** L.

Slender palms. Stems erect, annulate. Leaves pinnatisect. Flowers on branched, infrafoliar spadices. Spathes 3 or more, caducous. Male flowers many, minute, solitary or 2-nate, towards the end of branches. Stamens 3 or 6. Female flowers much larger than males, usually at the base of branches. Perianth accrescent. Ovary 1-locular; stigmas 3. Fruits ovoid or oblong. Seeds with truncate base.

About 50 species; Indo-Malesia to tropical Australia and Solomon Islands; one in M.P.

Areca catechu L., Sp. Pl. 1189. 1753, '*cathecu*'; Beccari & Hook. *f.* in Hook. *f.*, Fl. Brit. India 6: 405. 1892. - *Betel-nut palm, Supari.*

Tall palms, unarmed. Leaves 1-2.8 m long; leaflets numerous, 30-60 cm long, glabrous, with one to several main nerves, upper leaflets confluent. Spadices much branched; rhachis stout, compressed. Lowest spathe pale straw-coloured, large, monoecious, parallel veined. Male flowers minute, nearly distichous. Sepals small. Petals obliquely lanceolate. Stamens 6. Female flowers towards the base. Perianth persistent; segments orbicular. Fruits orange or scarlet on maturity, ovoid, 3-5 cm long, fleshy fibrous.

Cultivated. Bhopal (Oommachan, 1977). *Fl. & Fr.*: Throughout the year.

Fruits are chewed alongwith betel leaf, while fresh ones are intoxicating.

2. BORASSUS L.

Tall palms, dioecious. Leaves flabelliform, with broad split base; leaflets induplicate; petioles armed with irregular spines. Spadices very long, sheathed with bracts; bracts tubular at base. Male flowers very small, seated on the inner side of the cavities. Sepals 3, imbricate. Petals 3, smaller than sepals. Stamens 6; filaments connate with petals. Pistillode of 3 bristles. Female flowers much larger, solitary, globose. Sepals 3, imbricate. Petals 3, convolute. Staminodes 6-9. Ovary 3-4-locular. Fruit a drupe.

About 7 species; tropical regions of Old World; one in M.P.

Borassus flabellifer L., Sp. Pl. 1187. 1753; Beccari & Hook. *f.* in Hook. *f.*, Fl. Brit. India 6: 482. 1892.

Tall palms, 20-30 m high. Leaves flabelliform, 60-120 cm across; leaflets 60-80, linear-lanceolate, folded along the middle; petioles 60-100 cm long. Spadices branched; branches of male spadix large, clustered. Spathe open. Drupes subglobose, 15-20 cm across, with 1-3 fibrous pyrenes.

Cultivated. Dhar (Samvatsar, 1996), Jabalpur (Hole, 1904).

3. CARYOTA L.

Tall palms. Stems naked or sheathed. Leaves bipinnate, large; leaflets obliquely, dimidiately flabelliform, obtuse at apex; petioles swollen at base.

Spadices interfoliar, pedunculate, branched; branches slender, pendulous. Spathes 3-5, tubular. Male flowers symmetrical. Sepals rounded, imbricate. Petals linear-oblong. Stamens many. Female flowers subglobose. Sepals rounded, imbricate. Petals rounded, valvate. Fruits globose, 1-2-seeded. Seeds erect.

About 12 species; Indo-Malesia to tropical Australia; one in M.P.

Caryota urens L., Sp. Pl. 1189. 1753; Beccari & Hook. *f.* in Hook. *f.*, Fl. Brit. India 6: 422. 1892. - *Mari.*

Tall palms, 15-20 m high. Stems annulate. Leaves 6-7 x 3-4 m, bipinnate; leaflets 1.5-2 m long, curved and drooping; pinnules 10-20 cm long, broadly cuneate, upper narrower, outer margin caudate; petioles short, stout. Spadices 3-4 m long. Spathes 30-50 cm long. A female flower between two males. Fruits reddish.

Planted. Bhopal, Indore. *Fl. & Fr.*: Oct. March.

Fibre is obtained from the leaf-sheath which is used for making ropes, baskets, broom, brushes. Young unfolded leaves are used as vegetable.

4. COCOS L.

Tall palms, monoecious, unarmed. Leaves pinnatisect; leaflets narrow. Spadices erect at first, drooping with age, simply panicled; branches bearing female flowers near the base, male ones above. Spathes 2 or more. Male flowers asymmetrical. Perianth-segments coriaceous, 2-seriate; outer 3 segments small; inner 3 segments oblong. Stamens 6; filaments subulate. Pistillode minute or absent. Female flowers much larger than males. Perianth accrescent; outer 3 segments imbricate; inner 3 shorter, convolute. Ovary 3-locular; ovule usually solitary; style short; stigma recurved. Fruit a drupe, large, ovoid, 1-seeded; pericarp thick, fibrous; endocarp stony. Seed cohering with endocarp.

A monotypic genus; E. Malesia, now widely cultivated and naturalised in pantropical regions.

Cocos nucifera L., Sp. Pl. 1188. 1753; Beccari & Hook. *f.* in Hook. *f.*, Fl. Brit. India 6: 482. 1893 *Coconut, Nariyal.*

Tall palms. Stems thickened at the base with mass of rootlets. Leaves 1.5-4.5 m long; leaflets linear-lanceolate, up to 1 m long, coriaceous; petioles long, stout. Spadices interfoliar, androgynous, panicled; branches bearing scattered female flowers near the base and male flowers above. Lower spathes short, hard, splitting lengthwise; upper fusiform or clavate. Drupes green or yellowish, subglobose, 1-celled; pericarp fibrous; endocarp stony.

Planted. Bhopal (Oommachan, 1977). Indore (Khanna *et al.*, 1991). *Fl. & Fr.*: Throughout the year.

Coconut tree is of great commercial value. Leaves are used for making mats and baskets. The endosperm and oil are edible and copera obtained from the fruit is used in confectionaries.

5. LIVISTONA R. Br.

Tall trees. Trunk annulate. Leaves orbicular, flabellately plicate, split to the middle into 2-fid narrow lobes; petioles long, spinous on margins. Spadices interfoliar, fruiting ones pendulous. Spathes many, tubular, sheathing. Flowers minute, bisexual, loosely panicled on spadix. Sepals 3, rounded, imbricate. Petals 3, valvate, coriaceous. Stamens 6; filaments connate at base into a cup. Ovary 3-locular. Fruit a drupe, globose, ovoid, oblong or ellipsoid. Seeds erect.

About 29 species; N. E. Africa, Arabia, Ryukyus and Indo-Malesia to Australia; one in M.P.

Livistona chinensis R. Br., Prodr. 268. 1810; Beccari & Hook. *f.* in Hook. *f.*, Fl. Brit. India 6: 434. 1892. - *Chinese fan palm.*

Stout palms. Trunk with bases of petioles. Leaves flabelliform, reniform, 1-1.5 m across, much plicated; segments linear-lanceolate, smooth, pendulous; petioles up to 1 m long, bearing recurved spines. Spadices paniculate, surrounded at the base by spathes. Flowers white, small, in panicles, with an unpleasant odour. Drupes olive green, ovoid or oblong-ellipsoid, 1.5-2 cm long.

Planted. Bhopal, Indore. *Fl. & Fr.*: Feb. - June.

Leaves are used for making fans while fibres from the leaf stalk for ropes.

6. PHOENIX L.

Tall or dwarf palms, dioecious. Trunk stout, erect, uniformly thickened. covered with bases of fallen leaves. Leaves pinnate; pinnae numerous, lanceolate or ensiform, fascicled, coriaceous, unequal, lowest pinnae often spinescent. Spadices interfoliar, erect or drooping. Flowers unisexual, sessile. Male flowers: Calyx cupular, 3-toothed. Petals 3, longer than calyx. Stamens 6; filaments subulate, connate at base. Female flowers globose. Calyx cupular, 3-toothed, accrescent. Petals 3, rounded, imbricate. Staminodes 6, free or connate. Carpels 3, free. Fruit a one-seeded berry, ovoid or oblong, with a fleshy pericarp.

About 17 species; tropical and subtropical Africa and Asia; 4 in M.P.

1a. Foot of stem surrounded by the root suckers ...2. *P. dactylifera*

1b. Foot of stem not surrounded by the root suckers:

2a. Tall plants, *ca* 15 m high ...4. *P. sylvestris*

2b. Dwarf plants, up to 6 m high:

3a. Stems underground or very short above; leaflets very rigid, swollen and decurrent at base ...1. *P. acaulis*

3b. Stems not underground; leaflets not very rigid, neither swollen nor decurrent at base ...3. *P. loureirii*

1. Phoenix acaulis Buch.-Ham. *ex* Roxb. in Trans. Linn. Soc. London 15: 87. 1826; Beccari & Hook. *f.* in Hook. *f.*, Fl. Brit. India 6: 426. 1892. *Junglee Chhina, Thakal.*

Dwarf palms. Stems ovoid, almost underground, *ca* 20 cm thick, covered with petiole bases. Leaves pinnate, almost erect from the ground, up to 75 cm long; leaflets almost opposite, fascicled, very rigid, 20-30 cm long; petioles *ca* 30 cm long, bearing compressed spines. Spadices erect, either equal or longer than spathe. Drupes orange-red to blue-black when fully matured, oblong-ellipsoid, 15-20 mm long.

In sal forests. Bhopal, Raipur. *Fl. & Fr.*: Dec. June.

Leaves are used as fodder and for thatching, making mats, brooms and ropes etc. Young buds are consumed as vegetables while fruits are edible.

2. Phoenix dactylifera L., Sp. Pl. 1188. 1753. *Date palm, Khajur.*

Robust palms, in clusters. Trunk covered with persistent bases of petioles; foot of the stem often surrounded by root suckers. Leaves pinnate, upper leaves ascending, lower leaves curving; leaflets distichous, rigid, sharp pointed; petioles laterally compressed. Male panicles compact on a short peduncle. Flowers white, sweet fragrant. Fruits reddish brown or yellowish brown when ripe, oblong, with edible flesh. Seeds stony, cylindrical.

Planted. Bhopal (Oommachan, 1977). *Fl. & Fr.*: March Oct.

Leaves are used for making mats, fans, baskets and also for thatching. Gum is used in diarrhoea. Dates are eaten as fresh and dried, also used in bakery and confectionary. They are demulcent, expectorant and laxative; useful in respiratory diseases and fever.

3. Phoenix loureirii Kunth, Enum. Pl. 3: 257. 1841. *P. humilis* Royle *ex* Beccari & Hook. *f.* in Hook. *f.*, Fl. Brit. India 6: 426. 1894.

Dwarf palms. Stems solitary or clustered, usually covered with persistent leaf bases. Leaves usually ascending, *ca* 1.5 m long; leaflets interruptedly fascicled along the rhachis, pale green above, bluish green below, sharply pointed at tip; rhachis rigid; petioles armed with straight spines. Spadices up to 30 cm long. Fruits orange, ovoid-oblong.

Hoshangabad (Rao and Narayanaswamy, 1960; Joseph, 1963; Mukherjee, 1984). *Fl. & Fr.*: Feb. - May.

4. Phoenix sylvestris (L.) Roxb., Fl. Ind. 3: 787. 1832; Beccari & Hook. *f.* in Hook. *f.*, Fl. Brit. India 6: 425. 1892. *Elate sylvestris* L., Sp. Pl. 1189. 1753. - *Khajur, Khajuri.*

Robust palms, without root suckers. Trunk 20-40 cm across, rough, covered with petiole bases. Leaves 2-4 m long, lower leaves arching;

leaflets in several fascicles, greyish green, 15-45 x 2-3 cm, rigid, ensiform, canaliculate, spinous-pointed; petioles compressed towards the apex and bearing a few short spines at the base. Male flowers white, fragrant. Female inflorescence drooping. Drupes orange to reddish brown, oblong, up to 15 mm long. Seeds pale brown, grooved on one face.

Along road sides and in villages. Bhopal, Raipur. *Fl. & Fr.*: Dec. June.

Leaves are used for thatching and making mats. Stems are tapped for toddy while fruits are edible.

7. **ROYSTONEA** O.F. Cook

Tall palms, monoecious, unarmed. Trunk ventricose near the middle. Leaves at the stem apex, paripinnate, usually one leaf drooping below the leaf-crown, shortly petiolate; sheath long, tightly enveloping the stem apex, tubular. Spadices infrafoliar, at the base of tubular leaf-sheath. Spathes 2. Flowers 3-merous, often in triads, one female between two males. Male flowers: Sepals suborbicular. Petals nearly free. Stamens 6-9; filaments free; pistillode present or absent. Female flowers: Sepals suborbicular. Corolla 3-lobed. Ovary 3-locular. Fruit a drupe.

About 6 species; Caribbean region and N. E. regions of South America; one in M.P.

Roystonea regia (Humb., Bonpl. & Kunth) O.F. Cook in Bull. Torrey Bot. Club 531. 1901. *Oreodoxa regia* Humb., Bonpl. & Kunth, Nov. Gen. Sp. 1: 305. 1816. - *Bottle palm, Royal palm.*

Tall palms. Trunk smooth, dull grey, faintly annulate, *ca* 70 cm across at base. Leaves pinnate, 2-3 m long, terminal very large, lower leaves drooping; leaflets papyraceous, ensiform, many-nerved lengthwise, shortly 2-fid at apex; leaf-sheath elongate. Spadices *ca* 1 m long. Male flowers *ca* 5 mm long. Stamens 6. Female flowers smaller than males. Drupes brown to dark purple, globose, *ca* 1 cm across.

Commonly planted in the gardens as avenue tree. Bhopal, Indore, Jabalpur. *Fl. & Fr.*: Throughout the year.

Tender top portion is edible. The leaves are used for thatching.

152. PANDANACEAE

(M.I. Hanfi)

Three genera and about 675 species; tropical regions of Old World to New Zealand; one species in M.P.

PANDANUS S. Parkinson

Small shrubs, often scandent with aerial roots, dioecious. Leaves usually trifarious, narrow, acuminate, coriaceous; margins and keel usually spinously dentate. Spadices axillary or terminal, simple or branched, unisexual, covered with leafy spathes. Flowers small, crowded on a catkin-like spadix or its branches; bracts and bracteoles absent. Male flowers: Stamens many; filaments free or connate; anthers erect, basifixed. Pistillode small or absent. Female flowers: Staminodes small or absent. Carpels many, free or connate in phalanges of two or more; ovules solitary or many; stigma subsessile, papillose. Fruit a drupe, woody or fleshy, globose or oblong, angular, free or connate, 1 to numerous-celled.

About 600 species; tropical regions of Old World; one in M.P.

Pandanus odoratissimus L. *f.*, Suppl. Pl. 64. 1782; St. John in Taxon 12: 201. 1963; Stone in Matthew, Fl. Tamiln. Carn. 2: 1680. 1983. *P. fascicularis* Lam., Encycl. 1: 372. 1785; Hook. *f.*, Fl. Brit. India 6: 485. 1893.

Shrubs, erect, branched, up to 5 m high. Stems cylindrical, grey, marked with scars of fallen leaves. Leaves spiral, ensiform, *ca* 150 x 4.5 cm, caudate-acuminate at apex, coriaceous, with recurved spines on margins and at midrib. Inflorescence a spadix, with numerous branches; spathes yellow, caudate-acuminate, prickly. Stamens numerous; staminal column long cuspidate. Carpels many; ovule solitary; stigma short, reniform. Fruit a large syncarp of drupes, red or yellowish red, spinescent; spines recurved.

Common along streams and paddy fields. Bastar, Raipur (Unni, 1967). *Fl.* & Fr.: Feb. Sept.

153. TYPHACEAE

(O.P. Misra and S.K. Srivastava)

One genus with about 12 species; cosmopolitan; one species in M.P.

TYPHA L.

Herbs, aquatic or marshy. Rhizomes creeping, covered with distichous scales. Leaves distichous, erect, spongy. Flowers minute, crowded in dense superposed, cylindrical spikes, often intermixed with slender, clavate bracteoles or simple or branched hairs. Perianth reduced to capillary hairs or in the male flowers obsolete. Stamens 1 or more; connective thickened at the tip. Ovary often reduced to a clavate-tipped hair, long stalked, narrowed into a capillary; style with a filiform stigma. Fruits very minute, indehiscent or follicular; pericarp membranous. Seeds with striate testa.

Typha angustifolia L., Sp. Pl. 971. 1753. *T. domingensis* Pers., Syn. Pl. 2: 532. 1807. *T. angustata* Bory & Chaub., Exp. Sci. Morée, Bot. 2, 1: 338. 1833; Hook. *f.*, Fl. Brit. India 6: 489. 1893; Subram., Aquatic Angiosp. 74. 1962.

Herbs, perennial, aquatic or marshy, robust, 1-3 m tall. Leaves *ca* 1 m long, exceeding the flowering stem. Inflorescence an interrupted spike; spikes reddish brown, cylindrical, *ca* 35 cm long; male and female spikes separated by a considerable interval (sometimes male and female flowers on different plants). Male flowers paler and more slender, mixed with clavate tipped pistillodes. Female spikes pale brown. Stigma linear. Nutlets brown, ellipsoid, minute.

Common and gregarious in marshy and water logged places along roadsides and in ditches. Damoh, Durg, Gwalior, Indore, Rewa, Seoni, Shivpuri. *Fl.* & Fr.: Throughout the year.

154. ARACEAE

(U.S. Vaish)

About 106 genera and 2950 species; tropical and subtropical regions while few in temperate regions; 12 genera and 17 species in M.P.

(*Caladium bicolor* (Aiton) Vent., *Dieffenbachia seguine* Schott., *Monstera deliciosa* Liebm. and *Pothos aureus* Lindl. are cultivated in gardens).

1a. Free floating aquatic herbs; leaves many in a congested rosette, sessile, obovate-oblong ...7. *Pistia*

1b. Attached submerged aquatic or terrestrial herbs; leaves variable, otherwise:

2a. Plants prickly on the leaves and peduncles ...6. *Lasia*

2b. Plants smooth throughout:

3a. Leaves and spadices present during the same period:

4a. Leaves compound, pedatisect or 3-5-lobed:

5a. Monoecious, the male and female floriferous zones separated by neuters ...12. *Typhonium*

5b. Dioecious, or if monoecious then the male and female floriferous zones contiguous ...3. *Arisaema*

4b. Leaves simple:

6a. Leaves linear, lanceolate or elliptic:

7a. Peduncles 25-30 cm long; spathe foliaceous ...1. *Acorus*

7b. Peduncles up to 8 cm long; spathe not foliaceous:

8a. Spadices inconspicuous; lower spathe margins united enclosing the spadix ...5. *Cryptocoryne*

8b. Spadices conspicuous; lower spathe margins merely overlapping and spadix exserted ...11. *Theriophonum*

6b. Leaves peltate or broadly ovate ...4. *Colocasia*

3b. Leaves and spadices appearing separately during different periods:

9a. Spadices appendaged:

10a. Lower spathe margins connate into a tube ...10. *Sauromatum*

10b. Lower spathe margins convolute ...2. *Amorphophallus*

9b. Spadices not appendaged:

11a. Bulbiferous shoots present; placentation parietal ...9. *Remusatia*

11b. Bulbiferous shoots absent; placentation axile ...8. *Plesmonium*

1. ACORUS L.

Herbs, marshy, aromatic. Rhizomes creeping. Leaves distichous, ensiform or linear, equitant at base, with striate venation. Inflorescence on a leaf-like peduncle. Spathes erect, foliaceous. Spadix cylindrical, straight or slightly bent, densely flowered, sessile. Flowers bisexual, typically 3-merous. Tepals 6 in 2 whorls, free. Stamens 6; filaments linear, flat. Ovary conical, 2-3-locular; ovules many, pendulous. Berries ellipsoid. Seeds few, endospermous.

Two species; Old World and N. America; one in M.P.

Acorus calamus L., Sp. Pl. 324. 1753; Hook. *f.*, Fl. Brit. India 6: 555. 1893. **Fig. 21.**

Herbs, perennial. Rhizomes aromatic, compressed, up to 2 cm thick. Stems erect, glabrous. Leaves linear or ensiform, 60-80 x 1-2 cm. Peduncles 25-30 x 1 cm. Spathes foliaceous, 30-40 cm long. Spadix 5-10 cm long, *ca* 1 cm across. Flowers densely arranged. Tepals oblong-obovate. Seeds obconical, *ca* 2 mm long.

Rare. In marshy places. Surguja. *Fl. & Fr.*: July-Sept.

Rhizomes are used in indigenous medicines.

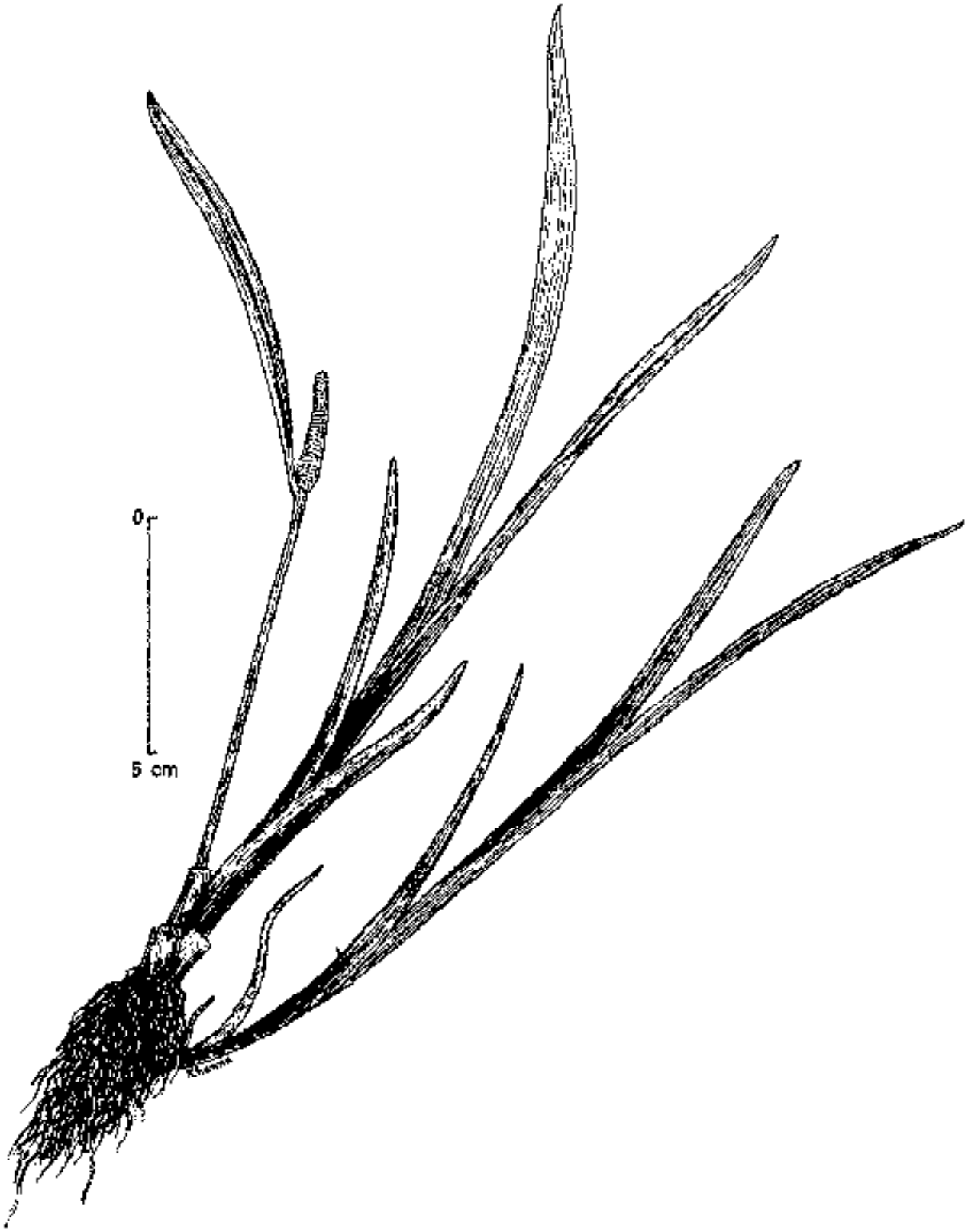

Fig. 21. Acorus calamus L.

2. AMORPHOPHALLUS Blume *ex* Decne., *nom. cons.*

Herbs, with large corms. Leaves usually appearing after flowering, solitary, trichotomously forked, thereafter decompound; leaflets usually with decurrent bases; petioles cylindrical, smooth or rough, often mottled. Inflorescence with short or long peduncle. Spathe with a basal convolute tubular portion and an upper expanded, erect or spreading limb portion, ultimately completely withering. Spadix with female flowers at base and male flowers above but sometimes separated by few neuter flowers and rest produced into a naked appendage (appendix). Perianth absent. Male flowers: Anthers 2-4, subsessile, truncate, dehiscing by apical pores. Female flowers: Ovary 1-4-locular; ovule solitary in each locule; style present or absent; stigma entire or lobed. Berries 1-3-seeded. Seeds without endosperm.

About 90 species; tropical regions of Old World; 3 in M.P.

1a. Leaves with bulbils at the fork of the lamina ...1. *A. bulbifer*

1b. Leaves without bulbils:

2a. Appendage globose ...2. *A. paeoniifolius*

2b. Appendage cylindrical ...3. *A. sylvaticus*

1. Amorphophallus bulbifer (Roxb.) Blume, Rumphia 1: 148. 1837; Hook. *f.*, Fl. Brit. India 6: 515. 1893. *Arum bulbiferum* Roxb., Fl. Ind. 3: 510. 1832.

Herbs, deciduous. Leaves with large bulbils at the fork of the lamina; leaflets obovate or lanceolate, usually purple on margins; petioles smooth, spotted. Peduncles up to 50 cm long, mottled. Spathes up to 15 cm long, tubular, rose-pink inside the tube, faintly greenish pink mottled outside. Spadix sessile; appendage elongate, pale. Style absent.

In shady places inside the forests and around habitations. Bastar, Bilaspur, Hoshangabad. *Fl. & Fr.*: June - Aug.

2. Amorphophallus paeoniifolius (Dennst.) Nicolson in Taxon 26: 338. 1977. *Dracontium paeoniifolius* Dennst., Schlüssel Hortus Malab. 13, 21, 38. 1818. *Amorphophallus campanulatus* (Roxb.) Blume *ex* Decne. in Ann. Mus. Hist. Nat. Paris 3: 366. 1834; Hook. *f.*, Fl. Brit. India 6: 513. 1893.

Herbs, perennial, up to 1 m tall. Tubers depressed globose, dark brown. Leaves large, radical, twice 2-fid; leaflets obovate or oblong, acute, many veined; petioles dark green, warty. Spathes campanulate, light red to pink. Spadix as long as spathe, stout; appendage globose, amorphous. Male inflorescence turbinate. Anthers pale yellow. Female inflorescence sessile on the ground. Ovaries crowded, dark red.

In shady places. Indore, Raipur. *Fl. & Fr.*: July - Oct.

Cultivated for its tuberous roots which are boiled and consumed as vegetables.

3. **Amorphophallus sylvaticus** (Roxb.) Kunth, Enum. Pl. 3: 34. 1841. *Arum sylvaticum* Roxb., Fl. Ind. 3: 511. 1832. *Synantherias sylvatica* (Roxb.) Schott, Gen. Aroid. t. 28. 1858; Hook. *f.*, Fl. Brit. India 6: 518. 1893.

Tubers up to 8 cm across. Leaves solitary, up to 30 cm across; leaflets lanceolate, 10-20 cm long. Peduncles up to 40 cm long. Spathes 12-15 cm long, convolute except at the top, green outside, with a purple blotch inside. Spadix stipitate. Male part brown, *ca* 5 cm long. Female part up to 3 cm long; stigma yellow. Neuter part up to 2 cm long, flesh-coloured; appendage brown, cylindrical, up to 12 cm long.

Scarce. As an undergrowth in mixed forests. Bastar, Raipur. *Fl. & Fr.*: April - June.

3. ARISAEMA Mart.

Herbs, monoecious or dioecious. Tubers present. Leaves 1-2, compound, radiately or pedately divided; leaflets usually sessile, penninerved with a submarginal collective vein. Peduncles present. Spathe with a convolute basal tube and an upper expanded limb. Spadix in dioecious plants either with male or female flowers at base, sometimes followed by subulate neuters and ending in a barren appendage of various shapes, in monoecious plants with contiguous female and male floriferous zones and terminating in an appendage; appendage cylindrical, subulate or caudate, erect or bent. Male flowers several. Female flowers with 1-locular ovary. Neuters above contiguous. Berries ovoid, few-seeded. Seeds endospermous.

About 150 species; E. Africa, tropical and E. Asia and W. N. America; 3 in M.P.

1a. Leaflets 3 ...2. *A. griffithii*

1b. Leaflets 5-19:

2a. Leaflets 7-19; peduncles longer than petioles ...3. *A. tortuosum*

2b. Leaflets 5-7; peduncles much shorter than petioles ...1. *A. decipiens*

1. Arisaema decipiens Schott in Oester. Bot. Zeitsch. 373. 1857; Hook.*f.*, Fl. Brit. India 6: 503. 1893.

Rhizomes horizontal, somewhat compressed, jointed, 8-10 cm long, 2-4 cm thick, creamy with bluish violet on the joints. Leaves 2, pedately compound; leaflets 5-7, elliptic-lanceolate, median 20-30 x 5-8 cm, laterals slightly shorter, caudate-acuminate, sessile; petioles 30-40 cm long. Peduncles much shorter than petioles. Spathes dull purple; tube 5-6 cm long; limb ovate-lanceolate, incurved, tapering into a long tail. Male spadix: Floriferous part *ca* 3 cm long; appendage stipitate, obtuse; anthers 3, stipitate. Female spadix: Floriferous part *ca* 3 cm long; appendage as in the male. Ovary subglobose.

Rare. In valleys. Bastar. *Fl. & Fr.*: Aug. April.

2. Arisaema griffithii Schott, Syn. Aroid. 26. 1856; Hook.*f.*, Fl. Brit. India 6: 499. 1893.

Bulbs depressed globose. Leaves 1 or 2, trifoliolate; leaflets deep green, rhomboid-ovate or depressed roundish rhomboid, 10-40 x 10-40 cm, undulate; petioles 15-60 cm long, smooth. Spathes very large, dark purple; tube cylindrical, 5-10 cm long. Spadix unisexual; appendage long flagellate, dark purple, 20-50 cm long, suddenly expanded into a fleshy disk and stipitate at the base. Anthers 3-4, yellow. Ovary green, ovoid; stigma dark purple.

Scarce. In shady places. Bastar. *Fl. & Fr.*: Aug. Oct.

3. Arisaema tortuosum (Wallich) Schott in Schott & Endl., Melet. Bot. 17. 1832; Hook.*f.*, Fl. Brit. India 6: 502. 1893. *Arum tortuosum* Wallich, Pl. Asiat. Rar. 2: 10. t. 114. 1830. - *Bagh jandhra*.

Corms up to 5 cm across. Leaflets 7-19, pedatisect, *ca* 12 x 4 cm; petioles greenish with purplish spots, up to 40 cm long, sheathing to about basal 3/4th length. Peduncles usually longer than the petioles, up to 45 cm long. Spathes up to 12 cm long, basal portion convolute, tubular, upper portion expanded, horizontally bent, ovate, acuminate, greenish, sometimes with purplish tinge. Spadix usually monoecious, rarely dioecious; appendage sigmoid at the base, purple, tapering up to 25 cm long tail. Fertile portion 2.5-6.5 cm long, lowest 1-2 cm pistillate and upper 2-5 cm staminate.

In shady places of the forests, sometimes in forest clearings. Bilaspur, Hoshangabad, Indore, Raipur. *Fl. & Fr.*: June - Nov.

4. COLOCASIA Schott, *nom. cons.*

Tall herbs, perennial, deciduous, with tuberous stems and stolons. Leaves peltate; lamina broadly ovate, sagittate usually with tip pointing downwards and basal lobes pointing upwards; petioles long vaginate at base. Inflorescence 1 or more, axillary, pedunculate. Spathe with a basal convolute, persistent tubular portion and an upper lanceolate limb portion. Spadix sessile, shorter than the spathe, differentiated into 4 distinct portions: basal female followed by neuteriferous, male and apical naked sterile appendage; appendage slightly wrinkled, subcylindrical, with pointed tip. Berries oblong, many-seeded.

About 6 species; tropical Asia; one in M.P.

Colocasia esculenta (L.) Schott in Schott & Endl., Melet. Bot. 18. 1832. *Arum esculentum* L., Sp. Pl. 965. 1753. *Colocasia antiquorum* Schott in Schott & Endl., Melet. Bot. 18. 1832.

Herbs. Rhizomes hard, tuberous, often stoloniferous. Leaves radical, peltate or broadly ovate, 10-30 cm long, pale or glaucous beneath, long petiolate. Spathe-tube green, 3-5 cm long; limb yellow, lanceolate, convolute, 12-15 cm long, deciduous. Spadix up to 10 cm long including 1.5 cm long appendage, female and male parts separated by a zone of neuters.

In moist shady places of the forests. Balaghat, Bastar, Bilaspur, Mandla, Rajnandgaon, West Nimar. *Fl. & Fr.*: Aug. - Sept.

Usually cultivated for its edible tubers.

5. CRYPTOCORYNE Fisch. *ex* Wydl.

Herbs, aquatic, deciduous, rhizomatous. Leaves simple, linear, with striate, undifferentiated venation. Spathe an elongate tube with a twisted blade. Spadix short, differentiated into a basal portion of single whorl of pistillate flowers, followed by a naked slender barren interstice ending in a densely packed staminate portion and ultimately terminating in a small barren subconical appendage attached to the auricular flap (septum). Ovules many; style decurved. Fruits drying and becoming multiple.

About 50 species; Indo-Malesia; one in M.P.

Cryptocoryne retrospiralis (Roxb.) Wydl. in Linnaea 5: 428. 1830; Kunth, Enum. Pl. 3: 12. 1841; Hook. *f.*, Fl. Brit. India 6: 493. 1893. *Ambrosinia retrospirale* Roxb., Fl. Ind. 3: 492. 1832.

Small herbs, aquatic, purplish green, rhizomatous. Leaves linear or lanceolate, crisped, 5-40 x 0.3-1.8 cm. Spathes greyish green, streaked with purple, shortly peduncled, subequalling the leaves; limb linear, twisted. Spadix tip adhering to the septum of the tube. Fruits subglobose-ovoid.

On rocky substratum near streams. Bastar, Panna, Raigarh, Raipur, Surguja. *Fl. & Fr.*: Oct. Feb.

6. LASIA Lour.

Herbs, marshy, suberect, armed. Rhizomes branched, spinous. Leaves hastate-sagittate, entire or pedately pinnatifid, spinous beneath, long petiolate; petioles spinous. Peduncles long, spinous. Spathes fleshy, very long, narrow, twisted, convolute at base, deciduous. Spadix short, cylindrical, densely flowered downwards. Tepals 4-6, obovate. Stamens 4-6; filaments short, flat. Ovary 1-locular; ovules pendulous; style stout; stigma depressed. Berries pyramidal, 6-sided. Seeds compressed, rugose.

Three species; Indo-Malesia; one in M.P.

Lasia spinosa (L.) Thwaites, Enum. Pl. Zeyl. 336. 1864. *Dracontium spinosum* L., Sp. Pl. 967. 1753. *Lasia heterophylla* Schott in Schott & Endl., Melet. Bot. 21. 1832; Hook.*f.*, Fl. Brit. India 6: 550. 1893.

Herbs, perennial, stout. Stems up to 50 cm long, 0.2-6 cm thick, covered with up to 1 cm long, broad-based spines. Leaves very variable, 10-70 x 7-80 cm, coriaceous, young entire, hastate or sagittate, older ones variously pedately lobed, frequently broader than long, cordate; lobes acuminate; nerves yellowish, raised and prickly beneath; petioles 40-50 cm long, 1-3 cm thick, with a well developed pulvinous. Peduncles solitary, axillary, 30-100 cm long, spiny. Spathe-tube greenish, ovoid, 6-10 cm long; limb linear-lanceolate, twisted, 10-30 x 2-4 cm. Spadix reddish, 2-6 x 0.8-1 cm, sessile; appendage absent. Flowers bisexual. Tepals with incurved tips. Anthers *ca* 0.5 mm long. Ovary ovoid, 1.5-2.5 mm long; ovules solitary; style stout, 0.5-1 mm long; stigma depressed globose, *ca* 1 mm broad. Berries obovoid, muricate on top. Seeds exalbuminous.

In marshy and shady places of drains of hill slopes. Bilaspur, Raigarh, Sidhi. *Fl. & Fr.*: Jan. - Nov.

7. PISTIA L.

Herbs, aquatic, free floating, monoecious, stoloniferous. Roots long, slender with fine root hairs. Leaves tufted, densely pubescent, sessile; venation flabellately reticulate. Peduncles short. Spathes small, with a slightly convolute basal portion and an expanded ovate-acute limb with a slight constriction between. Spadix with pistillate portion adnate to the spathe; male and female flowers separated by a disk-like structure. Male flowers of 4-6 sessile anthers adnate in a whorl forming a synandrium. Female flowers represented by a solitary pistil. Ovary 1-locular; ovules many on parietal placenta. Fruits with membranous wall. Seeds few, ovoid, endospermous.

A monotypic genus; tropical regions.

Pistia stratiotes L., Sp. Pl. 963. 1753; Hook. *f.*, Fl. Brit. India 6: 497. 1893.

Herbs, free floating, acaulescent. Leaves in a rosette, obovate-obdeltoid, 2-12 cm across, rounded or retuse at apex, cuneate at base, brown papillose in the upper part and white woolly in the lower part, with 3-12 main veins. Spathes inconspicuous, yellowish green, obliquely campanulate, 10-15 mm long. Spadix as long as leaves, adnate to the spathe-tube at the base.

Common. In ponds and slow running streams along with *Nymphoides* sp., *Lemna* sp. and *Azolla* sp. Bastar, Damoh, Mandla, Raigarh, Rajnandgaon, Rewa, Sagar, Shahdol, Tikamgarh. *Fl. & Fr.*: Aug. - Oct.

8. PLESMONIUM Schott

Herbs, tuberous. Leaves solitary, 3-partite, appearing long after the flowers, long petiolate. Spathe with an open infundibuliform limb. Spadix included, cylindrical, rather lax-flowered; male and female flowers distant, with large obovoid pearl like or turbinate neuters interposed; appendage absent. Male flowers: Stamens 2-4; anthers sessile. Female flowers: Ovary globose, 1-3-locular; style short; stigma 2-3-lobed. Berries red in clusters. Seeds exalbuminous.

Two species; N. India; one in M.P.

Plesmonium margaritiferum (Roxb.) Schott, Syn. Aroid. 34. 1856; Hook. *f.*, Fl. Brit. India 6: 518. 1893. *Arum margaritifer* Roxb., Fl. Ind. 3: 512. 1832.

Herbs, perennial. Tubers white, bulbiferous. Leaves 3-partite; segments pinnatisect; petioles 30-50 cm long. Peduncles up to 50 cm long. Spathes erect, pale yellowish green, suffused with pink on the inner surface, 10-15 cm long, obtuse, convolute below the middle. Spadix stout, as long as spathe, stipitate, with female flowers below, neutral middle and male above. Berries ovoid, *ca* 7 mm long.

Common. In shady places of forests. Hoshangabad, Raipur, Rajnandgaon, Sidhi, Surguja. *Fl. & Fr.*: July - Nov.

9. REMUSATIA Schott

Herbs, tuberous, producing long, stolon-like, leafless bulbiferous shoots with peculiar small bulbils. Leaves solitary, peltate, appearing after the flowers, with reticulate venation. Spathes coriaceous; tube convolute, persistent, accrescent over the fruit; limb erect or spreading, deciduous. Spadix much shorter than spathe, sessile, divided into 3 parts: lower pistillate, middle sterile and upper staminate; appendage absent. Perianth absent. Male flowers of 2-4 sessile anthers united into a 4 to 6-angled synandrium. Female flowers of solitary pistil. Ovary 1-locular; ovules many; stigma disciform, sessile. Fruit a berry. Seeds ovoid.

About 4 species; tropical Africa and Himalaya to Taiwan; one in M.P.

Remusatia vivipara (Roxb.) Schott in Schott & Endl., Melet. Bot. 18. 1832; Hook. *f.*, Fl. Brit. India 6: 521. 1893. *Arum viviparum* Roxb., Fl. Ind. 3: 496. 1832, '*viviparium*'

Herbs, perennial. Tubers depressed, 2-3 cm broad, in clusters; bulbiferous shoots flexuous, 15-25 cm long, 1-many, suberect; bulbils ovoid-globose, scaly, in clusters. Leaves peltate, ovate-triangular, 10-32 x 8-20 cm, abruptly acute at apex, cordate at base, membranous; petioles 15-30 cm long. Peduncles up to 20 cm long. Spathes 8-20 cm long; tube ovoid-oblong, green; limb golden yellow, ovate-cordate. Spadix 2-3 cm long. Berries in clusters.

In moist shady places of hill slopes. Hoshangabad. *Fl. & Fr.*: July Dec.

10. SAUROMATUM Schott

Herbs, deciduous. Tubers present. Leaves solitary appearing after flowering; venation reticulate. Spathes shortly pedunculate, entirely withering; tube cylindrical, with margins connate below; limb long, narrow, open, reflexed. Spadix elongate, divided into 4 parts: pistillate, sterile area with clavate pistillodes, naked staminate portion and elongate naked appendage. Stamens free; anthers large, sessile. Ovary 1-locular; ovules 1-2, erect, basal; style very short or absent. Fruit a berry. Seeds globose.

Two species; tropical regions of Old World; one in M.P.

Sauromatum venosum (Aiton) Schott, Prodr. Syst. Aroid. 71. 1860. *Arum venosum* Aiton, Hort. Kew. 3: 315. 1789. *A. guttatum* Wallich, Pl. Asiat. Rar. 2: 10. t. 115. 1830. *Sauromatum guttatum* (Wallich) Schott in Schott & Endl., Melet. Bot. 17. 1832; Hook. *f.*, Fl. Brit. India 6: 508. 1893.

Herbs, perennial. Tubers depressed globose. Leaves palmately deeply 7-9-lobed; segments elliptic-ovate or oblong, acute at apex, narrowed at base; petioles 50-100 cm long. Peduncles 10-15 cm long. Spathes lanceolate-oblong, purple outside, dark purple and blotched inside. Spadix as long as spathe, with a terminal appendage. Berries black, ovoid.

Rare. In moist shady places of hill slopes. Hoshangabad. *Fl. & Fr.*: April - Aug.

11. THERIOPHONUM Blume

Herbs, deciduous, tuberous. Stem absent. Leaves usually cordate-hastate, sagittate or linear-lanceolate, entire, appearing simultaneously with the flowers, long petiolate. Spathe with a basal convolute tube and an open spreading limb, completely withering. Spadix with female flowers at base, male flowers above, both portions separated by partially naked intermediate area with few neuters, either close to the female portion or near the male flowers; appendage present, sessile or stipitate. Male flowers with 2-lobed anthers. Female flowers usually in a whorl, rarely in more than a whorl. Ovary 1-locular; ovules 3-6, basal or apical. Fruits borne on deflexed peduncles, few-seeded.

About 5 species; India and Sri Lanka; 2 in M.P.

1a. Neuters near the female flowers; anthers not beaked; spadix appendage shortly stipitate ...1. *T. dalzellii*

1b. Neuters close to the male flowers; anthers beaked; spadix appendage sessile ...2. *T. minutum*

1. Theriophonum dalzellii Schott, Aroid. 15. 1855; Hook. *f.*, Fl. Brit. India 6: 513. 1893; Sivadasan & Nicolson in Kew Bull. 37: 278. 1983. *T. indicum* Engl., Pflanzenr. IV. 23. (heft 73): 107. 1920. *T. uniseriatum* Blatter & McCann in J. Bombay Nat. Hist. Soc. 35: 25. 1932.

Tubers globose, *ca* 2 cm across. Leaves variable, usually hastate-sagittate, 3-lobed; lobes ovate-lanceolate, acuminate at apex; petioles 6-12 cm long. Peduncles 7-8 cm long. Spathes 11-13 cm long, basal convolute portion ovoid; tube short, cylindrical or oblong; limb flat, oblong-lanceolate. Spadix 9-12 cm long, shorter than spathe; appendage creamy to purplish, slender, subulate, 7-9 cm long, shortly stipitate. Staminate flowers in a cylindrical mass. Neuters near the female flowers. Berries ovoid.

In moist shady places of sal forests. Hoshangabad, Mandla. *Fl.* & *Fr.*: July - Aug.

2. Theriophonum minutum (Willd.) Baill., Hist. Pl. 13: 457. 1895. *Arum minutum* Willd., Sp. Pl. 4: 484. 1805, *excl.* Rheede, Illustr. cited. *A. crenatum* Wight in Hook., J. Bot. Misc. 2: 100 (suppl.) t. 3. 1831.

Theriophonum crenatum (Wight) Blume, Rumphia 1: 128. 1837; Hook. *f.*, Fl. Brit. India 6: 512. 1893.

Tubers globose, up to 2 cm across. Leaves hastate, lateral lobes ovate-lanceolate, *ca* 4 x 1.5 cm, middle lobe ovate-oblong, *ca* 8 x 4 cm; petioles slender, up to 20 cm long. Peduncles 6-8 cm long. Spathes pale green, convolute, 8-13 cm long, crenulate on margins. Spadix 5-7 cm long; appendage purplish black, *ca* 3 cm long. Stamens red. Neuters on both side of the male zone, red, subulate, lower *ca* 4 mm long, upper *ca* 2 mm long. Berries ovoid.

In moist shady places of mixed forests. Balaghat, Mandla, Raipur. *Fl & Fr.*: Aug. Sept.

12. TYPHONIUM Schott

Herbs. Tubers present. Leaves sagittate-hastate, pedately divided or 3-5-lobed, appearing simultaneously with the flowers. Peduncles short. Spathe with a short, convolute, persistent tube below and an expanded deciduous, ovate, oblong, lanceolate or linear limb. Spadix exserted; male and female inflorescence distant with the neuters above the female and sometimes below the male; appendage elongate, muricate or smooth, sessile or stipitate. Male flowers of 1-2, sessile anthers. Female flowers: Ovary 1-locular; ovules 1-2; stigma sessile. Berries ovoid. Seeds 1-2, globose, albuminous.

About 30 species; S. E. Asia especially Indo-Malesia; one in M.P.

Typhonium trilobatum (L.) Schott in Wien. Zeitschr. 3: 72. 1829; Hook. *f.*, Fl. Brit. India 6: 509. 1893; Nicolson & Sivadasan in Blumea 27: 488. 1981. *Arum trilobatum* L., Sp. Pl. 965. 1753.

Herbs. Tubers 1-4 cm broad. Leaves 1 or 2, deeply 3-lobed, hastate or 3-partite; petioles 10-50 cm long. Peduncles slender, 2-10 cm long. Spathe-tube 2-3 x 1-1.5 cm; limb pale green outside, red-brown inside, oblong or ovate-lanceolate, 10-20 x 4-10 cm, acuminate. Spadix with *ca* 1.5 cm long male and *ca* 0.8 cm long female zones; neuters numerous, filiform, curved, *ca* 1 cm long; appendage red-purple, elongate-ovoid, 4-10 cm long, stipitate.

In shady places. Balaghat, Bilaspur, Hoshangabad. *Fl.* & *Fr.*: May June.

155. LEMNACEAE

(Anand Kumar)

About 6 genera and 30 species; cosmopolitan; 3 genera and 7 species in M.P.

1a. Roots present; inflorescence with a spathe:

2a. Root solitary on each frond ...1. *Lemna*

2b. Roots numerous on each frond ...2. *Spirodela*

1b. Roots absent; inflorescence without a spathe ...3. *Wolffia*

1. LEMNA L.

Herbs, floating, sometimes submerged. Root solitary, sheathed near the point of insertion; root cap acute or obtuse at apex. Fronds (thallus) oblong, ovate, obovate, rounded, rounded-elliptic, elliptic or obovate-oblong, thin or spongy; individual frond more or less cohering; daughter frond budding from lateral pocket. Floral pocket lateral or ventral with spathe enclosing 1 pistillate and 2 staminate flowers. Perianth absent. Fruits 1-(-6) seeded. Seeds usually longitudinally ribbed.

About 9 species; cosmopolitan, especially in arctic regions; 3 in M.P.

1a. Root sheath winged; fruits asymmetrical ...3. *L. perpusilla*

1b. Root sheath not winged; fruits symmetrical:

2a. Cells on ventral side of the frond large, visible to the naked eye; fruits winged ...1. *L. gibba*

2b. Cells on ventral side of the frond small, not visible to the naked eye; fruits not winged ...2. *L. minor*

1. Lemna gibba L., Sp. Pl. 970. 1753; Hook. *f.*, Fl. Brit. India 6: 556. 1893.

Herbs, floating. Fronds solitary or in groups of 2-4, usually asymmetrical, ovate, obovate or orbicular, up to 5 x 3.5 mm, obtuse or rounded at apex, entire; ventral side flat or inflated; nerves 3-5 (sometimes indistinct). Floral pocket ventral to the margin of frond. Ovary with 1-4 ovules. Fruits ellipsoid, laterally winged. Seeds 1-4, longitudinally ribbed.

In stagnant water. Throughout India (Karthikeyan *et al.*, 1989). *Fl. & Fr.*: April - Oct.

2. Lemna minor L., Sp. Pl. 970. 1753; Hook. *f.*, Fl. Brit. India 6: 556. 1893, *p.p.*

Small herbs, floating. Fronds solitary or in groups of 2 to many, usually symmetrical, rounded-elliptic, elliptic or ovate, up to 4.5 x 3 mm, ventral side flat to slightly convex; nerves 3. Floral pocket coinciding with the margin of frond. Ovary with solitary ovule. Fruits ellipsoid. Seeds 1, smooth.

In ponds. Raipur (Unni, 1967). *Fl. & Fr.*: June - Nov.

3. Lemna perpusilla Torr., Fl. New York 2: 245. 1843. *L. minor auct. non* L., 1753: Hook. *f.*, Fl. Brit. India 6: 556. 1893, *p.p. L. paucicostata* Engelm. in Gray, Manual ed. 5, 681. 1867; Hook. *f.*, Fl. Brit. India 6: 556. 1893; Subram., Aquatic Angiosp. 78. 1962.

Herbs, free floating. Root sheath with two lateral wings. Fronds 1-5, asymmetrical, ovate to obovate or obovate-oblong, up to 5 x 3 mm, thin, obtuse or slightly acute at apex, entire; ventral side flat to convex; nerves 3 (sometimes indistinct). Floral pocket coinciding with the margin of frond. Ovary with solitary ovule. Fruits ellipsoid. Seed 1, black, longitudinally ribbed.

In slow flowing or stagnant water. Bhopal, Mandla, Raipur. *Fl. & Fr.*: May - Nov.

2. SPIRODELA Schleid.

Herbs, floating. Roots 2-numerous from swollen portion beneath the fronds; root cap acute. Fronds discoid to oblong, 3-10 x 1-8 mm; daughter fronds budding from lateral slit. Flowers rarely produced, unisexual; spathe

enclosing 2-3 staminate and 1 pistillate flower in lateral slit-pouch. Perianth absent. Staminate flowers with 1 stamen. Anthers 2-thecous. Pistillate flowers with 1-4 ovules.

About 4 species; cosmopolitan; one in M.P.

Spirodela polyrhiza (L.) Schleid. in Linnaea 13: 392. 1839; Subram., Aquatic Angiosp. 77. 1962. *Lemna polyrhiza* L., Sp. Pl. 970. 1753; Hook. *f.*, Fl. Brit. India 6: 557. 1893. - *Bhos.*

Herbs, free floating. Fronds green above, purple beneath, orbicular-ovate, 1-3.5 x 1-2.5 mm; nerves 5-11; daughter fronds budding from near the point of root insertion in a slit in the parent thallus. Flowers surrounded by a small, open spathe in a lateral slit-pouch. Staminate flowers 2-3. Stamen 1. Pistillate flowers with 2 ovules. Fruits slightly winged on margin.

In ponds, lakes and tanks. Bhopal, Chhatarpur, Mandla, Raipur, Sagar. *Fl. & Fr.*: Feb. - April.

3. WOLFFIA Horkel *ex* Schleid., *nom. cons.*

Minute herbs, free floating. Roots absent. Fronds almost ellipsoid, *ca* 1 mm across, flattened on the upper surface at water level; daughter fronds produced in a circular lateral pit, soon separating from the parent. Flowers in a pit on the upper surface on the median line, 1 staminate and 1 pistillate; spathe and perianth absent.

About 7 species; tropical, subtropical and temperate regions; 3 in M.P.

1a. Dorsal outline of the fronds angled ...3. *W. microscopica*

1b. Dorsal outline of the fronds not angled:

2a. Dorsal outline of the fronds rounded to ovate ...1. *W. arrhiza*

2b. Dorsal outline of the fronds elliptic ...2. *W. globosa*

1. Wolffia arrhiza (L.) Horkel *ex* Wimm., Fl. Schles. ed. 3. 140. 1857; Hook. *f.*, Fl. Brit. India 6: 557. 1893, *p.p.*; Subram., Aquatic Angiosp. 79. 1962. *Lemna arrhiza* L., Mant. Pl. 294. 1771.

Minute herbs, floating. Fronds almost as long as wide, up to 1 x 1 mm; dorsal side flat to slightly convex; ventral side inflated, globose. Floral pocket median, infundibuliform, with circular opening. Inflorescence dorsal, of 1 staminate and 1 pistillate flower. Anther 1-thecous. Ovary with solitary ovule. Fruits globose. Seeds smooth.

In stagnant water. 'Chattisgarh region' (Shukla and Jain, 1984 85). *Fl. & Fr.*: July - Nov.

2. Wolffia globosa (Roxb.) Hartog & Plas in Blumea 18: 367. 1970. *Lemna globosa* Roxb., Fl. Ind. 3: 565. 1832. *Wolffia arrhiza auct. non* (L.) Horkel *ex* Wimm., 1857: Hook. *f.*, Fl. Brit. India 6: 557. 1893, *p.p.*

Minute herbs, floating. Fronds up to 0.7 x 0.3 mm; dorsal side dark green, flat near the apex and convex near the base; ventral side pale, inflated, globose. Floral pocket often with a distinct collar of elongated cells. Inflorescence dorsal, of 1 staminate and 1 pistillate flower. Anther 1-thecous. Ovary with solitary ovule.

In still water. Morena (Sikarwar and Kaushik, 1995), Raipur (Unni, 1967). *Fl. & Fr.*: Oct. Feb.

3. Wolffia microscopica (Griff. *ex* Voigt) Kurz in J. Linn. Soc. London (Bot.) 9: 265. 1866; Hook. *f.*, Fl. Brit. India 6: 558. 1893. *Grantia microscopica* Griff. *ex* Voigt, Hort. Suburb. Calcutt. 692. 1845.

Minute herbs, floating. Fronds 5-6-angled in dorsal outline, up to 0.5 x 0.5 mm; dorsal side flat; ventral side elongated into a conical, up to 2 mm long protuberance. Inflorescence dorsal, of 1 staminate and 1 pistillate flower. Anther 1-thecous. Ovary globose, with solitary ovule. Fruits globose. Seeds almost globose.

In pools, puddles, ponds and lakes. Bhopal (Oommachan, 1977). *Fl. & Fr.*: Oct. - Jan.

156. ALISMATACEAE

(S.K. Srivastava and O.P. Misra)

About 11 genera and 96 species; cosmopolitan especially N. temperate regions; 3 genera and 5 species in M.P.

1a. Pistils inserted on a small inconspicuous receptacle; achenes turgid:

2a. Leaves cordate; flowers all bisexual; achenes without air chambers ...1. *Caldesia*

2b. Leaves sagittate; flowers male and bisexual; achenes with two lateral air chambers ...2. *Limnophyton*

1b. Pistils inserted on a large globose or oblong receptacle; achenes compressed or winged ...3. *Sagittaria*

1. CALDESIA Parl.

Herbs, aquatic or marshy, perennial. Leaves ovate or suborbicular, floating or emerged in dry season, long petiolate; petioles somewhat septate. Panicles 1-3, large, pyramidal, their branches and flowers in whorls of three, each subtended by oblong-lanceolate bracts. Flowers bisexual, long pedicellate. Sepals greenish, elliptic-oblong, spreading or reflexed. Petals white, elliptic, deciduous. Stamens 6-9. Carpels few to many on a small flat receptacle; ovule solitary, basal. Fruit of coriaceous or hard achenes. Seeds erect; testa membranous; embryo horse-shoe shaped.

About 4 species; tropical regions of Old World; 2 in M.P.

1a. Leaves membranous, with acute lobes; style very short, caducous ...1. *C. oligococca*

1b. Leaves coriaceous, with rounded lobes; style long, persistent ...2. *C. parnassifolia*

1. Caldesia oligococca (F. v. Muell.) Buchenau in Engl., Bot. Jahrb. 2: 479. 1882; Subram., Aquatic Angiosp. 84. 1962. *Alisma oligococcum* F. v. Muell., Fragm. 1: 23. 1858; Hook.*f*., Fl. Brit. India 6: 560. 1893.

Herbs, scapigerous, sometimes submerged. Leaves ovate, 8-12 x 5-8 cm, very flaccid, cordate at base, with acute lobes and narrow sinus; nerves 11-17, nervules 2-3 mm apart, perpendicular to the principal nerves; petioles 40-60 cm long. Panicles 25-35 cm long; peduncles as long as the petioles; lower bract 6-8 cm long; pedicels 1-1.5 cm long. Sepals *ca* 2 x 1 mm. Petals 3 x 0.8 mm. Stamens 6; filaments *ca* 1.5 mm long; anthers *ca* 1 mm long. Carpels 3-7; style ventral, *ca* 1 mm long. Achenes somewhat reniform, 2-3 mm long, spinulous warty.

Along bank of ponds in muddy places and in shallow water. Balaghat, Mandla, Rajnandgaon. *Fl. & Fr.*: Dec. May.

2. Caldesia parnassifolia (Bassi *ex* L.) Parl., Fl. Ital. 3: 599. 1858; Subram., Aquatic Angiosp. 84. 1962. *Alisma parnassifolia* Bassi *ex* L., Syst. Nat. ed. 12, 3: 230. 1768. *A. reniforme auct. non* D. Don, 1825: Hook.*f.*, Fl. Brit. India 6: 560. 1893, *p.p.*

Herbs, aquatic. Leaves broadly elliptic-ovate or suborbicular, 3-8 cm long, floating, deeply cordate with rounded basal lobes, 13-17 costate; petioles 15-40 cm long. Panicles pyramidal, *ca* 30 cm long with branches and flowers in whorls of 2-4, long pedunculate. Flowers white. Petals *ca* 5 mm long. Carpels 5-8; style persistent. Achenes *ca* 3 mm long, ribbed.

In ponds. Rajnandgaon. *Fl. & Fr.*: Nov. - May.

2. LIMNOPHYTON Miq.

Herbs, perennial, scapigerous, acaulescent; sap milky. Leaves sagittate, erect. Flowers polygamous (male and bisexual), in paniculate whorls; scapes stout; receptacles flat. Sepals 3, herbaceous, persistent. Petals 3, membranous, deciduous. Stamens 6 in 2 series, largest in the male flowers; filaments compressed. Carpels 15-20, obsolete in the male flowers; ovule solitary, anatropous, basal; stigma small on a ventral style. Fruit of several turgid hard achenes. Seeds erect, basal; testa membranous.

A monotypic genus; tropical regions of Old World.

Limnophyton obtusifolium (L.) Miq., Fl. Ind. Bat. 3: 242. 1856; Hook.*f.*, Fl. Brit. India 6: 560. 1893; Subram., Aquatic Angiosp. 86. 1962. *Sagittaria obtusifolia* L., Sp. Pl. 993. 1753. **Fig. 22.**

Herbs, aquatic, scapigerous. Rootstocks stout, with numerous long root fibres. Leaves radical, broadly sagittate, 10-15 x 7-9.5 cm, floating, pellucid-punctate, with ovate-triangular acute basal lobes; apical lobe 7-12 cm long. Panicles pyramidal; peduncles ribbed, hairy. Flowers pale bluish white, whorled on 15-25 cm long scape. Sepals elliptic-obtuse, 4-6 mm long. Petals suborbicular. Achenes obovoid, *ca* 5 mm long, turgid, wrinkled, cuneate at base.

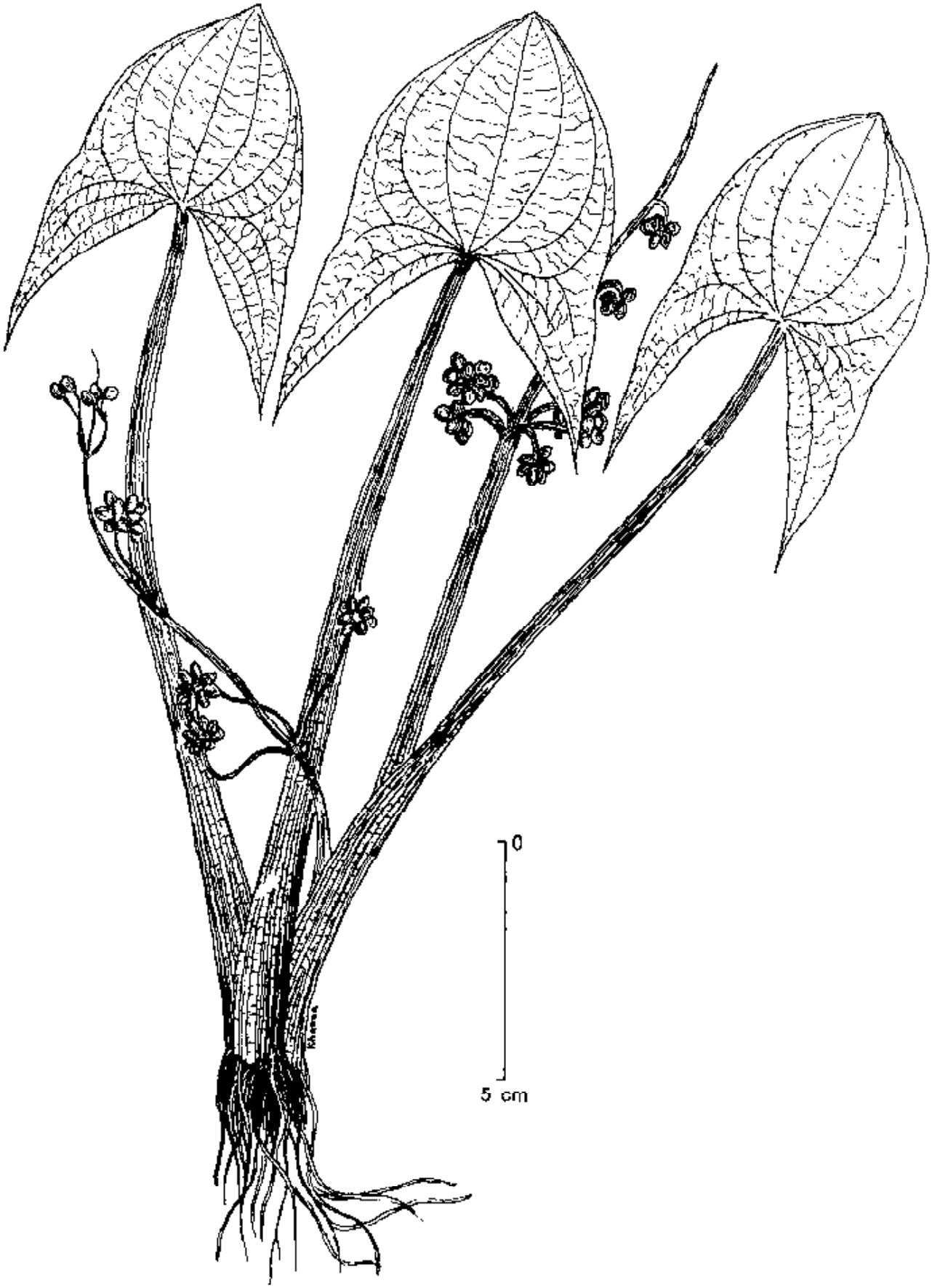

Fig. 22. Limnophyton obtusifolium (L.) Miq.

In shallow water along banks of lakes and ponds. Bilaspur, Raipur, Rajnandgaon, Sagar. *Fl. & Fr.*: Oct. Jan.

3. SAGITTARIA L.

Herbs, aquatic, erect. Emerged leaves lanceolate or sagittate; floating ones mostly cordate; submerged phyllodes linear. Flowers rather large, unisexual or polygamous, in panicled or spicate whorls. Sepals 3, herbaceous. Petals 3, deciduous. Stamens 6 or more; filaments filiform, compressed. Carpels many, laterally flattened, crowded on a large globose or oblong receptacle; ovule solitary, basal; style ventral or apical; stigma papillose. Fruit a globose or oblong head of flattened crested or winged achenes. Embryo horse-shoe shaped.

About 20 species; cosmopolitan, especially America; 2 in M.P.

1a. Leaves broadly ovate, rounded or obtuse at apex; lower whorls of flowers bisexual in racemes ...1. *S. guayanensis* subsp. *lappula*

1b. Leaves hastate or sagittate, acute or acuminate at apex; lower whorls of flowers female in racemes ...2. *S. trifolia*

1. Sagittaria guayanensis Humb., Bonpl. & Kunth subsp. **lappula** (D. Don) Bogin in Mem. N.Y. Bot. Gard. 9: 192. f. 5. 1955; Subram., Aquatic Angiosp. 87. 1962. *S. lappula* D. Don, Prodr. Fl. Nepal. 22. 1825. *S. guayanensis auct. non* Humb., Bonpl. & Kunth, 1816: Hook. *f.*, Fl. Brit. India 6: 561. 1893. **Fig. 23.**

Herbs, annual, aquatic. Leaves broadly ovate, 3-10 x 2-8 cm, floating, obtuse or rounded at apex, deeply cordate at base. Racemes *ca* 8 cm long; peduncles *ca* 20 cm long, flaccid, floating, ribbed, hairy towards apex. Flowers greenish white; lower whorls bisexual, upper ones male. Sepals *ca* 10 mm long. Petals obovate-suborbicular, 12-18 mm long. Achenes ellipsoid, 3-4 mm long, surrounded by broad, blunt, spiny wing. Seeds brown.

In marshy places, ponds and ditches. Bilaspur, Panna, Raigarh, Raipur, Rajnandgaon, Rewa, Sagar, Satna. *Fl. & Fr.*: April - Oct.

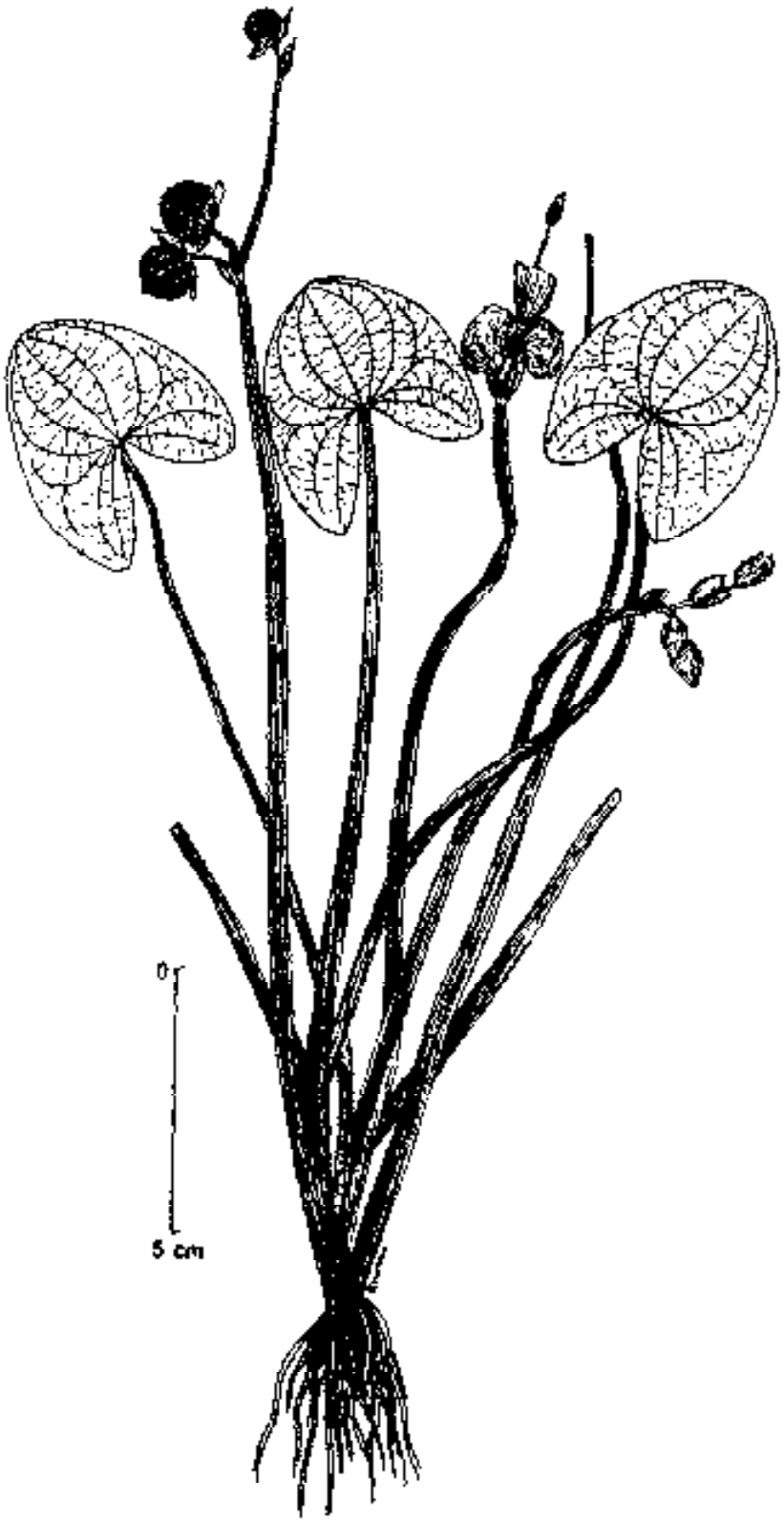

Fig. 23. Sagittaria guayanensis Humb., Bonpl. & Kunth subsp. **lappula** (D. Don) Bogin

2. Sagittaria trifolia L., Sp. Pl. 993. 1753. *S. sagittifolia auct. non* L., 1753: Hook. *f.*, Fl. Brit. India 6: 561. 1893; Subrami., Aquatic Angiosp. 87. 1962. *S. sagittifolia* L. var. *leucopetala* Miq., Ill. Fl. Archip. Ind. 2: 49. 1870. *S. sagittifolia* L. subsp. *leucopetala* (Miq.) Hartog in Steenis, Fl. Males. 1, 5: 332. 1957. **Fig. 24.**

Herbs, aquatic, erect. Rhizomes thick, stoloniferous. Mature leaves hastate or sagittate, 5-20 cm long, acute or acuminate at apex: young and floating leaves often strap-shaped or cordate-oblong; petioles trigonous, up to 60 cm long. Flowers white; lower female, nearly sessile; upper male, with longer pedicels. Stamens *ca* 24. Bisexual flowers rare. Petals white; claw usually purple. Achenes obliquely obovate, winged.

In ponds and streams. Bilaspur, Rewa, Satna, Surguja. *Fl. & Fr.*: Dec. May.

157. BUTOMACEAE

(S.K. Srivastava and O.P. Misra)

Four genera and about 13 species; tropical and subtropical regions and temperate Eurasia; one species in M.P.

BUTOMOPSIS Kunth

Herbs, annual, marshy, scapigerous; sap milky. Leaves radical, acute. Flowers bisexual, umbellate on the scape; whorls sometimes superbased, bracteate. Sepals 3, herbaceous, persistent. Petals 3, membranous, deciduous, larger than the sepals. Stamens 8-12 (usually 9), hypogynous; 6 outer in pairs, opposite the sepals; 3 inner single, opposite the petals; filaments filiform; anthers oblong. Carpels 6-9, whorled on the flat receptacle, sessile, shortly connate; ovules many, small; style short. Fruits of 6-7, erect, membranous follicles. Seeds numerous.

A monotypic genus; tropical regions of Old World.

Butomopsis latifolia (D. Don) Kunth, Enum. Pl. 3: 165. 1841. *Butomus latifolius* D. Don, Prodr. Fl. Nepal. 22. 1825. *B. lanceolatus* Roxb., Fl. Ind. 2: 315. 1832. *Butomopsis lanceolata* (Roxb.) Kunth, Enum. Pl. 3: 165. 1841; Hook. *f.*, Fl. Brit. India 6: 562. 1893. *Tenagocharis*

Fig. 24. Sagittaria trifolia L.

latifolia (D. Don) Buchenau in Abh. Naturw. Ver. Bremen 2: 6. 1868; Subram., Aquatic Angiosp. 88. 1962. **Fig. 25.**

Herbs, annual, aquatic, submerged; sap milky. Rootstocks short. Leaves elliptic to oblong-lanceolate, 5-15 x 2-6 cm. Flowers pale bluish or white, in terminal umbels, sometimes flowers in two whorls; peduncles 25-50 cm long; pedicels unequal, 5-14 cm long. Sepals 4-9 mm long. Petals slightly longer. Follicles 9-12 mm long, reticulately veined, tapering into short beaks. Seeds many.

In shallow water, lakes and ponds. Balaghat, Bastar, Bilaspur, Durg, Panna, Raigarh, Raipur, Rajnandgaon, Rewa, Satna, Seoni, Surguja. *Fl. & Fr.*: Sept. - April.

158. NAJADACEAE

(S.K. Srivastava and O.P. Misra)

One genus with about 35 species; cosmopolitan; 4 species in M.P.

NAJAS L.

Herbs, annual, aquatic, submerged, monoecious or dioecious. Roots slender, creeping. Stems branched, filiform, smooth or muricate, rooting from the nodes. Leaves opposite-alternate or 3-nately whorled, linear, shortly sheathing at base. Flowers minute, axillary. Male perianth double; outer one tubular or inflated, entire or 4-fid; inner one hyaline. Stamen 1, adnate to the inner perianth; anthers 1 or 4-celled. Female perianth absent or hyaline, adherent to the carpel. Carpel solitary, sessile; ovule solitary, basal, erect, anatropous; stigmas 2-4, slender. Fruit an achene. Seeds with thin testa; embryo straight.

1a. Dioecious; leaves coarsely dentate or almost pinnatifid ...3. *N. marina*

1b. Monoecious; leaves finely dentate with very small teeth:

2a. Flowers of both sexes not enclosed in spathes ...1. *N. graminea*

2b. Male flowers enclosed in spathes:

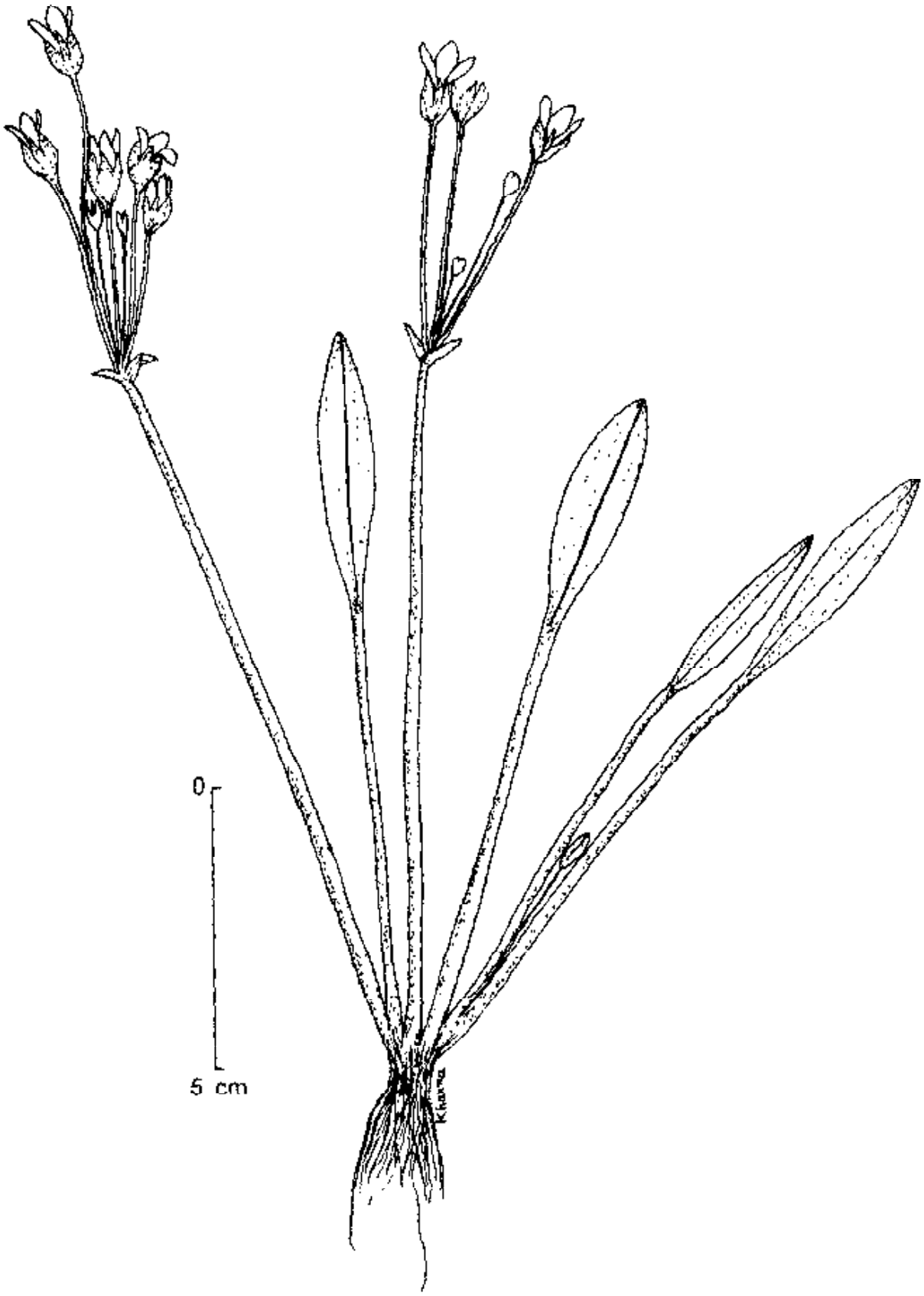

Fig. 25. Butomopsis latifolia (D. Don) Kunth

3a. Leaves with 10-17 marginal teeth on each side; areoles in 25-30 longitudinal rows ...2. *N. indica*

3b. Leaves with 6-10 marginal teeth on each side; areoles with 12-18 longitudinal scalariform bands ...4. *N. minor*

1. Najas graminea Delile, Descr. Egypte Hist. Nat. 2: 282. t. 50. f. 3. 1813; Hook. *f.*, Fl. Brit. India 6: 569. 1893; Subram., Aquatic Angiosp. 100. 1962. *N. seminuda* Griff. *ex* Voigt, Hort. Suburb. Calcutt. 694. 1845.

Herbs, annual, aquatic, submerged, short grass-like, plumose. Stems slender, fragile, with densely foliose branchlets. Leaves narrowly linear, 2.5-3.5 cm long, 0.7-1 mm broad, with numerous oblique spinules on each side; sheaths long auricled, very conspicuous, auricle lanceolate, *ca* 2 x 0.7 mm, denticulate. Flowers solitary or 2-4 together. Pistil *ca* 2 mm long. Achenes ellipsoid-oblong. Areoles minute, subquadrate or polyhedral, irregularly disposed or in distinct longitudinal lines.

Common in tanks, ponds and water logged areas with *Vallisneria* and *Ottelia* spp. Balaghat, Seoni. *Fl. & Fr.*: Aug. Oct.

2. Najas indica (Willd.) Cham. in Linnaea 4: 501. 1829; Subram., Aquatic Angiosp. 101. 1962. *Caulinia indica* Willd. in Mem. Acad. Berl. 89. f. 3. 1798. *Najus falciculata* A. Brown in J. Bot. 2: 278. f. 4. 1864. *N. minor auct. non* All., 1785: Hook. *f.*, Fl. Brit. India 6: 569. 1893, *p.p. maj.*

Herbs, annual, aquatic, submerged, rooting below in shallow water. Leaves linear, flat or subterete, 2-5 cm long, 0.8-1.5 mm broad, usually conspicuously spinulous dentate. Sheath-auricles mostly small and rounded, sometimes triangular. Male flowers: Spathe *ca* 3 mm long. Anthers subsessile. Female flowers: Spathe absent or 2-3 mm long. Pistil *ca* 2 mm long. Achenes ellipsoid. Seeds tetragonal, with areoles in longitudinal rows.

In tanks with *Sagittaria* sp. Raipur, Rajnandgaon. *Fl. & Fr.*: Aug. Sept.

3. Najas marina L., Sp. Pl. 1015. 1753. *N. major* All., Fl. Pedem. 2: 221. 1785; Hook. *f.*, Fl. Brit. India 6: 569. 1893.

Herbs, annual, aquatic, dioecious. Stems rather stout, fragile, dentate. Leaves subternately whorled, linear, almost pinnatifidly dentate, with 4-8 teeth on either side and a few on the back; sheaths with rounded sides, entire or minutely denticulate. Outer perianth or spathe present in the male flowers. Anthers 4-celled. Achenes oblong-ellipsoid.

In fresh water areas. Bhopal, Hoshangabad. *Fl.* & *Fr.*: Sept. Feb.

4. Najas minor All., Auct. Syn. Meth. Stirp. Hort. Taurin. 3. 1774; Hook.*f.*, Fl. Brit. India 6: 569. 1893, *p.p.*; Subram., Aquatic Angiosp. 101. 1962.

Herbs, aquatic, floating. Stems very slender, much branched, fragile. Leaves very narrowly linear, with small, 6-10 teeth on either side; sheaths rounded or truncate, dentate. Flowers axillary. Outer perianth present in the male flowers. Ovary ellipsoid; styles 2. Achenes brown, ellipsoid. Areoles in the shape of ladder like pits.

Common in ponds and lakes. Bilaspur, Raipur, Sidhi, Tikamgarh. *Fl.* & *Fr.*: Oct. Feb.

159. APONOGETONACEAE

(S.K. Srivastava and O.P. Misra)

One genus with about 44 species; tropical regions of Old World and S. Africa; 2 species in M.P.

APONOGETON L. *f., nom. cons.*

Herbs, aquatic (fresh water), scapigerous. Rootstocks tuberous or stoloniferous, covered with numerous root fibres. Leaves floating or submerged, oblong, membranous. Flowers bisexual, on long scapes bearing solitary or geminate, often unilateral spikes; young spike enclosed in a conical, quickly deciduous sheath. Tepals pink, white or pale blue, 1-3, equal or unequal or obsolete. Stamens 6 or more; filaments subulate, unequal, persistent; anthers didymous. Carpels 3-6; ovules 2 or more in each carpel, basal, anatropous; style short or absent; stigma discoid, persistent. Fruit of 3 or more follicles. Seeds erect; testa thick or thin, albumen absent; embryo straight.

1a. Leaf-base narrowed into petiole; spikes laxly flowered; ovules 2 ...1. *A. crispum*

1b. Leaf-base cordate; spikes densely flowered; ovules 4-8 ...2. *A. natans*

1. Aponogeton crispum Thunb., Nov. Gen. Pl. 4: 73. 1784; Hook. *f.*, Fl. Brit. India 6: 564. 1893, *p.p.*; Subram., Aquatic Angiosp. 92. 1962.

Herbs, aquatic. Roots tuberous. Submerged leaves ovate or linear, 3-30 x 2-6 cm, straight, waved or crisped on margin; floating leaves rare, oblong-obovate, up to 7 x 2 cm. Spikes solitary, rather laxly flowered, long stalked. Flowers white or pink. Tepals obovate, *ca* 2 x 2 mm. Follicles 3-4, shorter than the tepals, smooth, 1-2-seeded.

In tanks and ponds. Bilaspur, Mandla, Rewa, Seoni, Sidhi. *Fl. & Fr.*: July - Aug.

2. Aponogeton natans (L.) Engl. & K. Krause in Engl., Pflanzenr. 24: 11. 1906; Subram., Aquatic Angiosp. 92. 1962. *Saururus natans* L., Mant. Pl. 227. 1771. *Aponogeton monostachyon* L. *f.*, Suppl. Pl. 214. 1782; Hook. *f.*, Fl. Brit. India 6: 564. 1893. **Fig. 26.**

Herbs, aquatic, floating. Rootstocks stoloniferous. Leaves oblong to linear-oblong or oblong-lanceolate, 3-7 cm long, acute or rounded; petiole slender, much longer than the blade. Spikes terminal, solitary, densely flowered. Flowers bright pink or bluish purple. Tepals 2, obovate or suborbicular. Stamens 6; anthers bluish purple. Follicles exceeding the tepals, smooth. Seeds 4-8, oblong, ribbed.

In marshy places like rice fields, edge of ponds etc. Bastar, Durg, Raipur, Rewa. *Fl. & Fr.*: Aug. Oct.

Rootstock is edible.

160. POTAMOGETONACEAE

(S.K. Srivastava and O.P. Misra)

Two genera and about 90 species; cosmopolitan; one genus with 6 species in M.P.

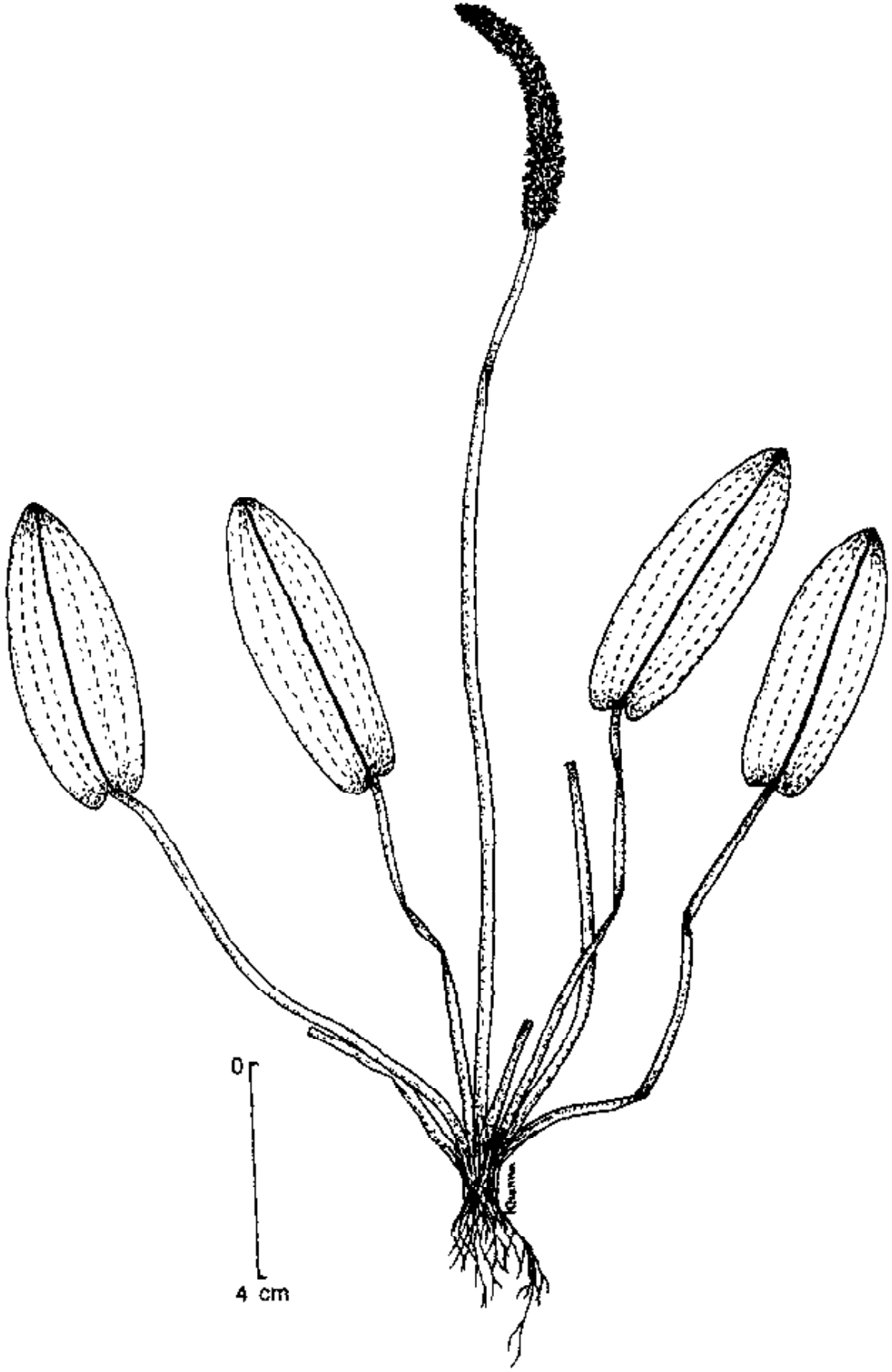

Fig. 26. Aponogeton natans (L.) Engl. & K. Krause

POTAMOGETON L.

Herbs, aquatic. Rootstocks creeping. Leaves submerged or floating, opposite or alternate, linear, lanceolate, oblong or rounded, entire, rarely dentate, petiolate or sessile; stipules membranous. Flowers spicate on a lateral peduncle rising above the surface of the water from the membranous spathe or sheath, 4-merous throughout, ebracteate. Tepals green, 4, concave, valvate. Stamens 4; anthers sessile, didymous. Carpels 4, free, sessile, 1-locular; ovule solitary in each locule, campylotropous; stigma subsessile or decurrent, persistent. Fruit drupe-like when fresh; the drupelets more or less compressed. Seeds subreniform.

About 90 species; cosmopolitan; 6 in M.P.

1a. Upper or all leaves floating:

2a. Floating leaves large, submerged ones lanceolate ...3. *P. nodosus*

2b. Floating leaves small, submerged ones linear or filiform ...4. *P. octandrus*

1b. Leaves submerged:

3a. Leaves all filiform, 0.1-0.15 cm broad ...5. *P. pectinatus*

3b. Leaves linear, lanceolate, ovate-lanceolate, elliptic or oblong-lanceolate, 0.3-2.5 cm broad:

4a. Leaves narrow, crisped and serrulate on margins ...1. *P. crispus*

4b. Leaves ovate-lanceolate, elliptic or oblong-lanceolate, neither crisped nor serrulate on margins:

5a. Leaves ovate-lanceolate, amplexicaul at base ...6. *P. perfoliatus*

5b. Leaves elliptic or oblong-lanceolate, rounded at base ...2. *P. malaianus*

1. Potamogeton crispus L., Sp. Pl. 126. 1753; Hook. *f.*, Fl. Brit. India 6: 566. 1893. **Fig. 27.**

Fig. 27. Potamogeton crispus L.

Herbs, aquatic, floating or submerged. Stems compressed, dichotomously branched. Leaves narrow, 2-7 x 0.3-0.7 cm, finely serrulate, distichous, half amplexicaul, sessile, 3-nerved; stipules small, obtuse, caducous. Spikes generally aerial, small. Flowers green, *ca* 2 mm long. Tepals suborbicular. Drupelets oblique-obovoid, *ca* 3 mm long, turgid, shortly beaked, rounded and obscurely 3-keeled on the back.

Common in rivers, streams and tanks in association with *Hydrilla* sp. Bilaspur, Mandla, Rewa, Sagar, Satna, Seoni, Sidhi, Surguja. *Fl. & Fr.*: Jan. April.

2. Potamogeton malaianus Miq., Ill. Fl. Archip. Ind. 46. 1871. *P. mucronatus* K. Presl, Epimel. Bot. 245. 1849; Hook. *f.*, Fl. Brit. India 6: 567. 1893.

Herbs, perennial, aquatic, submerged. Leaves all submerged, elliptic or oblong-lanceolate, 5-10 x 1-2 cm, translucent, acute or cuspidate at apex, rounded at base; petioles 1-2 cm long; stipules exceeding the petiole. Spikes *ca* 3 cm long, many-flowered; peduncles long, pinkish. Tepals greenish, suborbicular, *ca* 2 mm across, shortly clawed. Drupelets *ca* 3 mm long, shortly beaked.

In ponds. Raipur. *Fl. & Fr.*: April - June.

3. Potamogeton nodosus Poir. in Lam., Encycl. Suppl. 4: 535. 1816; Subram., Aquatic Angiosp. 95. 1962. *P. indicus* Roxb., Fl. Ind. (Carey & Wallich ed.) 1: 452. 1820; Hook. *f.*, Fl. Brit. India 6: 565. 1893, *non* Roth *ex* Roem. & Schult., 1818. *P. oblongus auct. non* Viv., 1802: Hook. *f.*, Fl. Brit. India 6: 566. 1893, *p.p.*.

Herbs, aquatic, floating or marshy, brownish pale purple throughout. Stems creeping below, smooth, branched. Leaves petiolate; lower leaves submerged, very thin with short petioles; upper ones floating, alternate or uppermost opposite, 3-6 x 2-3 cm, many-nerved; petioles 2-5 cm long; stipules scarious. Spikes generally above the surface of water, erect, reddish brown; peduncles axillary or leaf opposed. Fruits 3-ribbed on the back.

In ponds, canals, lakes and river banks. Bilaspur, Raigarh, Raipur, Rajnandgaon, Satna, Seoni, Shivpuri. *Fl. & Fr.*: Oct. - June.

4. Potamogeton octandrus Poir. in Lam., Encycl. Suppl. 4: 534. 1816; Subram., Aquatic Angiosp. 95. 1962. *P. javanicus* Hassk. in Verh. Nat. Ver. Ned. Ind. 1: 26. 1856; Hook. *f.*, Fl. Brit. India 6: 566. 1893.

Herbs, floating. Stems very slender, up to 1 m long, usually much branched. Leaves elliptic-oblong, ovate-oblong or elliptic, 1.2-2.5 cm long, acute at both ends, 5-7-nerved including midrib; submerged leaves linear or filiform; petioles shorter. Spikes 5-15 cm long, interrupted; peduncles 1-3.5 cm long. Flowers 4-12. Tepals ovate or orbicular, *ca* 1 mm long. Drupelets ovoid, semilunar, 2-4 mm long, tubercled with hooked beak.

In ponds. Surguja. *Fl.*: Feb.

5. Potamogeton pectinatus L., Sp. Pl. 127. 1753; Hook. *f.*, Fl. Brit. India 6: 567. 1893; Subram., Aquatic Angiosp. 95. 1962.

Herbs, aquatic, grass like, much-branched. Stems slender. Leaves alternate, filiform, 2-10 x 0.1-0.15 cm, flaccid, opaque with slightly thickened or inrolled margins, 1-3-nerved; stipules long sheathing. Spikes 5-20 mm long. Flowers interruptedly whorled on a spike. Drupelets obovoid, *ca* 4 mm long, oblique, hard keeled, ridged.

Frequent in ponds and water-logged places. Bilaspur, Mandla, Raipur, Satna, Tikamgarh. *Fl. & Fr.*: Nov. - April.

6. Potamogeton perfoliatus L., Sp. Pl. 126. 1753; Hook. *f.*, Fl. Brit. India 6: 566. 1893; Subram., Aquatic Angiosp. 95. 1962.

Herbs, aquatic. Stems terete, slightly branched. Leaves ovate-lanceolate, 2-4 x 1.3-2.5 cm, membranous, 5-9-nerved, sessile; upper leaves opposite; stipules small, caducous. Spikes densely flowered; peduncles stout, short. Tepals elliptic-obovate, with long claw. Drupelets obliquely ovoid, with a short, usually curved beak.

In ponds and tanks. Bilaspur, Gwalior, Sagar. *Fl. & Fr.*: Nov. - March.

Notes: Oommachan (1977) has reported *P. natans* and *P. illinoensis* from Bhopal but its occurrence in Madhya Pradesh appears to be doubtful

as *P. natans* is a plant of Kashmir and Punjab (Hook. *f.*, 1893) while *P. illinoensis* is an American element.

161. ZANNICHELLIACEAE

(O.P. Misra and B.K. Shukla)

About 4 genera and 7 species; cosmopolitan; one species in M.P.

ZANNICHELLIA L.

Herbs, perennial, submerged, fresh or brackish water, monoecious. Rootstocks slender. Stems slender, simple or cymosely branched, leafy. Leaves mostly opposite, linear or filiform, entire, with sheathing or free stipules. Flowers minute, naked, axillary, both sexes enclosed together in a membranous, deciduous spathe, one staminate and 2-5 pistillate flowers often in the same axillary, cupular involucre. Staminate flower without a perianth. Stamen solitary; filament filiform; anther linear, 2-3-celled. Female flower with a cupular perianth. Carpels 1-9, sessile or stipitate; ovule pendulous, orthotropous; style short or long; stigma peltate. Drupelets usually 4, compressed, curved, coriaceous, dentate or entire along the margin, stipitate. Seeds oblong, pendulous; testa thin; embryo cylindrical.

A monotypic genus; cosmopolitan, usually polymorphic.

Zannichellia palustris L., Sp. Pl. 969. 1753; Hook. *f.*, Fl. Brit. India 6: 568. 1893. *Z. palustris* L. subsp. *pedicellata* Wahlenberg & Rosén in Nov. Act. Soc. Sci. Upsal. 8: 227, 254. 1821; Subram., Aquatic Angiosp. 97. 1962.

Herbs, perennial, submerged, rhizomatous, 15-20 cm long. Leaves opposite or in whorls, narrowly linear or filiform, 2-6 cm long. Flowers axillary; spathe hyaline, deciduous, cupular, enclosing 1 male and 2-5 female flowers. Male flowers: Perianth absent. Female flowers: Perianth cupular, hyaline. Carpels 1-9, sessile. Drupelets 2-5, curved and dentate on back.

Common in ponds and stagnant water or rivers. Damoh, Indore, Sagar, Satna. *Fl. & Fr.*: Feb. March.

162. ERIOCAULACEAE

(K.K. Khanna, Anand Kumar and Ram Lal)

About 14 genera and 1200 species; tropical and subtropical regions, especially of America, few in temperate zone; one genus and 21 species in M.P.

ERIOCAULON L.

Herbs, annual or perennial, monoecious. Rootstocks present or absent. Stems usually absent, rarely present. Leaves rosulate or cauline, narrow. Flowers in involucral heads, unisexual, 3-merous, sometimes 2-merous, sessile or pedicellate, bracteate; peduncles few to many, enclosed in a sheath at base. Male flowers: Sepals 2 or 3, free or laterally connate to form an open or closed spathe. Petals 2 or 3, equal or unequal, with or without a black gland in each. Stamens 4 or 6; anthers white, yellow, dark brown or black. Female flowers: Sepals 1-3, usually free, rarely connate, sometimes reduced to hair-like structures, flat or cymbiform, equal or unequal. Petals 0-3, free, equal or unequal, with or without a black gland in each, stipitate or not. Ovary usually 3-locular, rarely 2-locular, sessile or stipitate; style 3 or 2-fid. Seeds minute; cells of seed coat isodiametric or elongated vertically or transversely, with or without appendages on the radial walls; appendages setiform, ribbon-like or rectangular structures, rarely represented by ridges on the surface of seeds.

About 400 species; tropical and subtropical regions of both hemispheres; 21 in M.P.

1a. Cells of seed coat isodiametric ...5. *E. elenorae*

1b. Cells of seed coat vertically or transversely elongated:

2a. Cells of seed coat vertically elongated ...20. *E. truncatum*

2b. Cells of seed coat transversely elongated:

3a. Anthers white; seed surface without appendages:

4a. Male petals unequal or subequal; female sepals oblong; female petals 3:

5a. Leaves 8-30 cm long; involucral bracts suborbicular; male petals unequal ...1. *E. breviscapum*

5b. Leaves 2-3 cm long; involucral bracts oblong-obovate; male petals subequal ...17. *E. ritchieanum*

4b. Male petals equal; female sepals linear or reduced to hairs; female petals absent ...2. *E. cinereum*

3b. Anthers dark brown or black; seed surface furnished with appendages (except *E. rajendrababui*):

6a. Male sepals free:

7a. Male and female sepals 3; male petals distinctly unequal ...8. *E. longicuspis*

7b. Male and female sepals 2; male petals equal or subequal:

8a. Appendages of seeds setiform, arising only from transverse radial walls:

9a. Floral bracts sparsely hoary; female sepals broadly keeled; female petals hoary, glandular ...3. *E. cuspidatum*

9b. Floral bracts glabrous; female sepals not keeled; female petals glabrous, eglandular ...4. *E. duthiei*

8b. Appendages of seeds ribbon like, arising from both transverse and vertical radial walls:

10a. Involucral bracts smaller than floral bracts, subacute at apex; floral bracts glabrous, straw-coloured; female petals hyaline ...6. *E. hamiltonianum*

10b. Involucral bracts larger than floral bracts, acute or acuminate at apex; floral bracts dorsally sparsely hoary, blackish; female petals black ...14. *E. raipurense*

6b. Male sepals connate into a spathe:

11a. Floral bracts glabrous; seed surface without appendages ...15. *E. rajendrababui*

11b. Floral bracts hoary; seed surface furnished with appendages:

12a. Leaves and sheaths on peduncles usually turning to purple on drying; appendages of seeds ribbon like or rectangular structures:

13a. Involucral bracts elliptic, acute, 3-3.7 mm long, longer than floral bracts; female petals eglandular ...9. *E. martianum*

13b. Involucral bracts oblong-obovate, obtuse, up to 1.7 mm long, shorter than floral bracts; female petals glandular ...13. *E. quinquangulare*

12b. Leaves and sheath on peduncles never turning to purple on drying; appendages of seeds setiform:

14a. Involucral bracts obovate-orbicular, broader than longer; male spathe closed, not distinctly lobed, straw-coloured, glabrous ...18. *E. sexangulare*

14b. Involucral bracts obovate, oblanceolate, oblong-lanceolate or oblong-spathulate, longer than broader; male spathe split on one side, distinctly 3-lobed at least in the upper half, black, sparsely or densely hoary towards apex:

15a. Female sepals equal or subequal, one sepal never narrower than others:

16a. Involucral bracts obovate; floral bracts acuminate or cuspidate; male petals eglandular:

17a. Female sepals linear-elliptic, minutely keeled; appendages of seed coat arising from the middle of transverse radial wall of each cell appearing in vertical rows on the surface of seeds ...10. *E. nepalense*

17b. Female sepals oblanceolate, two lateral ones strongly keeled; appendages of seed coat spread uniformally on the transverse radial wall appearing in transverse rings on the surface of seeds ...11. *E. oryzetorum*

16b. Involucral bracts oblong-spathulate; floral bracts subacute or subacuminate; male petals glandular ...19. *E. trilobum*

15b. Female sepals distinctly unequal, one sepal much narrower than two lateral ones:

18a. Involucral bracts acuminate; floral bracts straw-coloured, truncate at apex; male spathe with truncate lobes ...21. *E. xeranthemum*

18b. Involucral bracts obtuse or subacute; floral bracts black, acute, subacute or acuminate at apex; male spathe with obtuse, acute or subacute lobes:

19a. Plants with a rootstock; leaves more than half the length of peduncle ...16. *E. richardianum*

19b. Plants without a rootstock; leaves less than half the length of peduncle:

20a. Involucral bracts 2.8-3.1 mm long; female middle sepal hoary towards apex ...7. *E. heterolepis*

20b. Involucral bracts up to 2.5 mm long; female middle sepal glabrous ...12. *E. parviflorum*

1. Eriocaulon breviscapum Koern. in Linnaea 27: 676. 1856; Hook. *f.*, Fl. Brit. India 6: 575. 1893; Ansari & Balakr., Eriocaul. India 168. 1994. **Fig. 28.**

Herbs. Rootstocks present. Leaves linear, 8-30 x 0.2-0.3 cm, glabrous. Heads grey, hemispherical, 4-9 mm across; peduncles 5-20 cm long; sheaths 3-8 cm long; involucral bracts straw-coloured, suborbicular, 2-2.5 x 1.8-2.2 mm, glabrous; floral bracts black, oblanceolate, 2.2-2.5 x 0.8-1 mm, hoary (white-pilose) towards apex. Male flowers: Sepals connate into a 3-lobed spathe, black, hoary towards apex. Petals 3, unequal, hoary, with a black gland in each; middle one larger. Anthers white. Female flowers: Sepals 3, unequal, straw-coloured, oblong, hoary towards apex. Petals 3, subequal, hyaline, spathulate, with a black gland in each. Seeds subglobose, 0.45-0.55 x 0.35-0.5 mm; cells of seed coat transversely elongated; appendages absent.

In flowing streams and drains. Bastar, Raigarh, Surguja. *Fl. & Fr.*: Nov. March.

2. Eriocaulon cinereum R. Br., Prodr. 254. 1810; Ansari & Balakr., Eriocaul. India 179. 1994; Khanna & Anand Kumar in J. Econ. Tax. Bot. 24(1): 235-240. 2000. *E. sieboldianum* Siebold & Zucc. *ex* Steud., Syn. Pl. Glumac. 2: 272. 1855; Hook. *f.*, Fl. Brit. India 6: 577. 1893. *E. redactum* Ruhland in Engl., Pflanzenreich. 13. IV. 30: 113. 1903; Ansari & Balakr., Eriocaul. India 181. 1994.

Herbs. Rootstocks absent. Leaves acicular, 2-5 x 0.15-0.2 cm, glabrous. Heads black, hemispherical, 2.5-4 mm across; peduncles 3-9 cm long; sheaths 1-2 cm long; involucral bracts straw-coloured, obovate-oblong, 1.5-1.8 x 0.8-1 mm, obtuse, glabrous; floral bracts black, linear-elliptic, 1.5-1.8 x 0.3-0.4 mm, glabrous. Male flowers: Sepals connate into a 3-lobed spathe, black, glabrous. Petals 3, minute, glabrous or sparsely hairy. Anthers white. Female flowers: Sepals 1 or 2, black, linear. Petals absent. Seeds ovoid-ellipsoid, 0.3-0.35 x 0.2-0.3 mm; cells of seed coat transversely elongated; appendages absent.

In moist places along rivers and ponds, sometimes in paddy fields. Damoh, Hoshangabad, Mandla, Morena, Panna, Raigarh, Raipur, Sagar, Shivpuri. *Fl. & Fr.*: Aug. Nov.

3. Eriocaulon cuspidatum Dalzell in Hook., J. Bot. Kew Gard. Misc. 3: 281. 1851; Hook. *f.*, Fl. Brit. India 6: 581. 1893; Ansari & Balakr., Eriocaul. India 91. 1994.

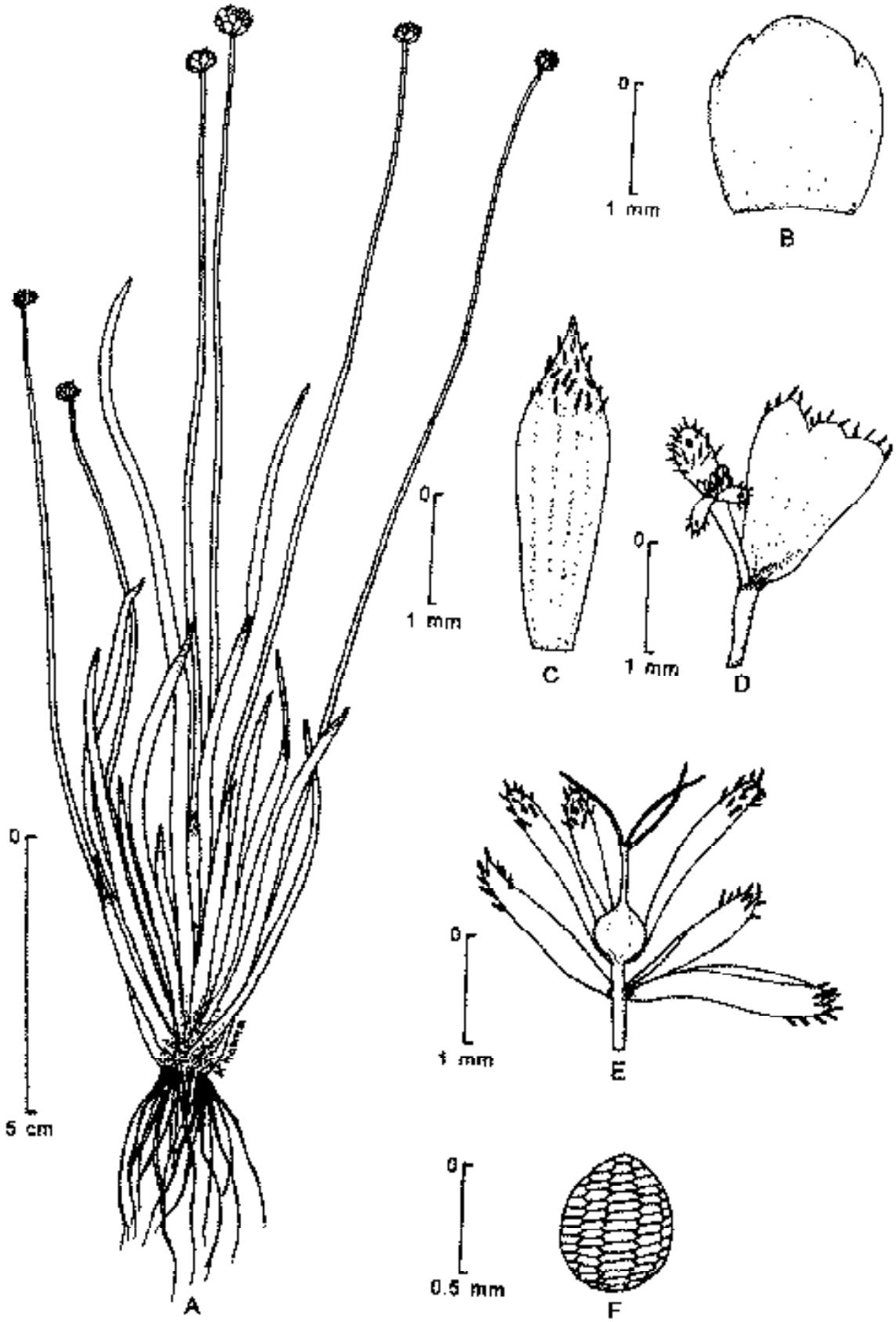

Fig. 28. Eriocaulon breviscapum Koern.

A. Habit; **B.** Involucral bract; **C.** Floral bract; **D.** Male flower; **E.** Female flower; **F.** Seed.

Herbs. Rootstocks absent. Leaves oblong, 6-8 x 0.3-0.5 cm, glabrous. Heads straw-coloured, hemispherical, 5-6 mm across; peduncles 15-20 cm long; sheaths 8-10 mm long; involucral bracts straw-coloured, ovate-oblong, 2-2.2 x 1.3-1.5 mm, glabrous; floral bracts hyaline, oblanceolate, 1.8-2 x 0.6-0.7 mm, sparsely hoary. Male flowers: Sepals 2, free, hoary towards apex. Petals 3, subequal, hoary, with a black gland in each. Anthers black. Female flowers: Sepals 2, equal, oblanceolate, conduplicate, broadly keeled, glabrous. Petals 3, hyaline, spathulate, hoary towards apex, with a black gland in each. Seeds pale purple, obovoid, 0.7-0.75 x 0.5 mm; cells of seed coat transversely elongated; appendages setiform, 1-2 from transverse radial walls.

Rare. In sandy wet soil near running stream. Bastar (Arora, 1968). *Fl. & Fr.*: Aug. Oct.

4. Eriocaulon duthiei Hook. *f.*, Fl. Brit. India 6: 578. 1893; Ansari & Balakr., Eriocaul. India 95. 1994.

Herbs. Rootstocks absent. Leaves linear, 2.5-3 x 0.3-0.4 cm, glabrous. Heads grey or black, hemispherical, *ca* 4 mm across; peduncles 8-14 cm long; sheaths 2-3 cm long; involucral bracts straw-coloured, lanceolate-oblong, *ca* 2.2 x 1 mm, chartaceous; floral bracts black, oblong-lanceolate, *ca* 1.5 x 0.5 mm, glabrous. Male flowers: Sepals 2, free, black, linear, not keeled, glabrous. Petals 3, equal, glabrous, eglandular. Anthers black. Female flowers: Sepals 2, black, linear, not keeled, glabrous. Petals 3, hyaline, linear, glabrous, eglandular. Seeds ovoid-oblong, *ca* 0.4 x 0.2 mm; cells of seed coat transversely elongated; appendages setiform, arising from transverse radial walls.

Endemic to Central India. Rare. East Nimar. *Fl. & Fr.*: Sept. Dec.

5. Eriocaulon elenorae Fyson in J. Ind. Bot. 2: 316. 1921; Ansari & Balakr., Eriocaul. India 137. 1994.

Herbs. Rootstocks absent. Leaves linear, 3-5 x 0.1 cm, glabrous. Heads straw-coloured, ovoid, 3-4 mm across; peduncles up to 10 cm long; sheaths 2-2.3 cm long; involucral bracts straw-coloured, elliptic, 1.4-1.5 x 0.5 mm, glabrous; floral bracts hyaline, oblanceolate, 1.6-1.7 x 0.6-0.7 mm, sparsely hoary dorsally towards apex. Male flowers: Sepals connate into a 3-lobed spathe, black, sparsely hoary towards apex. Petals 3, glabrous,

with a black gland in each. Anthers black. Female flowers: Sepals 3, oblanceolate, conduplicate, hoary; two lateral ones shortly keeled; middle one broadly keeled. Petals 3, subequal, sparsely hairy towards apex, eglandular. Seeds purple, ellipsoid, *ca* 0.3 x 0.2 mm; cells of seed coat isodiametric; appendages absent.

Rare. In moist places. Jhabua (Samvatsar, 1996). *Fl. & Fr.*: Oct. Dec.

6. Eriocaulon hamiltonianum Mart. in Wallich, Pl. Asiat. Rar. 3: 29. 1832; Hook. *f.*, Fl. Brit. India 6: 579. 1893 (*quoad syn.* under *E. oryzetorum*); Ansari & Balakr., Eriocaul. India 122. 1994. *E. hamiltonianum* Mart. var. *minor* Fyson in J. Ind. Bot. 2: 313. 1921.

Herbs. Rootstocks absent. Leaves linear-lanceolate, 1-2 x 0.15-0.2 cm, glabrous. Heads straw-coloured, globose, 2-4 mm across; peduncles 3-6.5 cm long; sheaths 1-1.5 cm long; involucral bracts straw-coloured, oblong-lanceolate, 1.2-1.5 x 0.5-0.7 mm, subacute; floral bracts straw-coloured, oblanceolate, *ca* 2.25 x 0.75 mm, glabrous. Male flowers: Sepals 2, free, black, glabrous. Petals 3, minute, equal. Anthers black. Female flowers: Sepals 2, glabrous. Petals 3, hyaline, eglandular. Seeds ovoid-ellipsoid, *ca* 0.35 x 0.2 mm; cells of seed coat transversely elongated; appendages a pair of continuous ribbon like bands from transverse and vertical radial walls.

Endemic to India. In marshy places. Raipur. *Fl. & Fr.*: Sept. - Oct.

7. Eriocaulon heterolepis Steud., Syn. Pl. Glumac. 2: 271. 1855; Hook. *f.*, Fl. Brit. India 6: 585. 1893; Ansari & Balakr., Eriocaul. India 48. 1994. *E. dianae* Fyson in J. Ind. Bot. 2: 259. 1921, *incl. var. longi-bracteata* Fyson.

Herbs. Rootstocks absent. Leaves linear-lanceolate, 1.5-3 x 0.2-0.3 cm, glabrous. Heads grey or white, hemispherical, 2-3 mm across; peduncles 4-8 cm long; sheaths 1.5-2.5 cm long; involucral bracts straw-coloured, oblong-lanceolate, 2.8-3.1 x 0.8-1 mm, subacute; floral bracts black, oblanceolate, 1.8-2.2 x 0.8-0.9 mm, acuminate, hoary towards apex. Male flowers: Sepals connate into a 3-lobed spathe, black, hoary towards apex. Petals 3, sparsely hoary, with a black gland in each. Anthers black. Female flowers: Sepals 3, unequal, black; two lateral ones oblanceolate,

conduplicate, keeled, hoary; middle one linear, much narrower, not keeled, hoary towards apex. Petals 3, subequal, hyaline, spathulate, with or without a black gland in each. Seeds oblong, 0.35-0.4 x 0.25 mm; cells of seed coat transversely elongated; appendages setiform, 5-6 from transverse radial walls.

Rare. In rock crevices near water fall. Panna. *Fl. & Fr.*: Oct. Nov.

8. Eriocaulon longicuspis Hook. *f.*, Fl. Brit. India 6: 573. 1893; Ansari & Balakr., Eriocaul. India 102. 1994. *E. polycephalum* Hook. *f.*, Fl. Brit. India 6: 573. 1893. *E. longicuspis* Hook. *f.* var. *polycephalum* (Hook. *f.*) Fyson in J. Ind. Bot. 2: 308. 1921.

Herbs. Rootstocks absent. Leaves lanceolate, 7-12 x 0.4-0.5 cm, glabrous. Heads grey to black, globose, 6-8 mm across; peduncles 12-33 cm long; sheaths 3.5-5.5 cm long; involucral bracts black or straw-coloured, oblong-obovate, 2-2.7 x 1.2-1.6 mm, entire or lacerate, chartaceous; floral bracts black, oblanceolate, 3.5-3.7 x 0.8-1 mm, acuminate, hoary towards apex. Male flowers: Sepals 3, free, black, oblong-lanceolate, *ca* 1.7 mm long, minutely hoary towards apex. Petals 3, unequal with a black gland in each; lateral ones minute; middle one oblong, *ca* 2 mm long. Anthers black. Female flowers: Sepals 3, black, oblong, hoary towards apex. Petals 3, subequal, hyaline, spathulate, hoary, with a black gland in each. Seeds oblong or ovoid, *ca* 0.4 x 0.3 mm; cells of seed coat transversely elongated; appendages rectangular, 2-3 from transverse radial walls.

Rare. In swamps. Hoshangabad. *Fl. & Fr.*: Dec. Feb.

9. Eriocaulon martianum Wallich *ex* Koern. in Linnaea 27: 642. 1856; Ansari & Balakr., Eriocaul. India 107. 1994. *E. quinquangulare* L. var. *martiana* (Wallich) Fyson in J. Ind. Bot. 2: 204. 1921.

Herbs. Rootstocks absent. Leaves linear-lanceolate, 3-7 x 0.4-0.5 cm, glabrous, usually turning to purple on drying. Heads grey with black dots, hemispherical or globose, 4-6 mm across; peduncles 3-10 cm long; sheaths 1-1.5 cm long, usually turning to purple on drying; involucral bracts straw-coloured, elliptic, 3-3.7 x 1-1.25 mm, acute, glabrous; floral bracts black, oblanceolate, 1.7-2 x 0.8-1 mm, acuminate, hoary towards apex. Male flowers: Sepals connate into a 3-lobed spathe, black, glabrous; lobes obtuse. Petals 3, hoary, with a black gland in each. Anthers dark brown. Female

flowers: Sepals 3, black, glabrous. Petals 3, hyaline, spathulate, hoary, eglandular. Seeds obovoid, 0.3-0.4 x 0.3 mm; cells of seed coat transversely elongated; appendages solitary, ribbon like, arising from transverse radial walls and conforming to the length of cells.

Endemic to India. Rare. In moist shady places usually in sandy soil. Bilaspur. *Fl. & Fr.*: Oct. Dec.

10. Eriocaulon nepalense Prescott *ex* Bong. in Act. Acad. Petrop. ser. 6, 1: 610. 1831; Hook. *f.*, Fl. Brit. India 6: 581. 1893; Ansari & Balakr., Eriocaul. India 32. 1994. *E. luzulaefolium* Mart. in Wallich, Pl. Asiat. Rar. 3: 28. 1832; Hook. *f.*, Fl. Brit. India 6: 582. 1893.

Herbs. Rootstocks absent. Leaves linear-lanceolate, *ca* 1 x 0.15 cm, glabrous. Heads black, hemispherical or globose, 3-4 mm across; peduncles 1.5-4 cm long; sheaths 0.5-0.7 cm long; involucral bracts straw-coloured, obovate, 1.6-2 x 1-1.3 mm, entire or lacerate, chartaceous, glabrous; floral bracts black, oblanceolate, 1.5-1.7 x 0.5-0.6 mm, acuminate, hoary towards apex. Male flowers: Sepals connate into a 3-lobed spathe, black, hoary towards apex. Petals 3, glabrous, eglandular. Anthers black. Female flowers: Sepals 3, equal or subequal, linear-elliptic, conduplicate. Petals 3, subequal, hyaline, linear-spathulate, hoary. Seeds ellipsoid-oblong, 0.35-4 x 0.25-0.3 mm; cells of seed coat transversely elongated; appendages setiform, 1-4, from about the middle of transverse radial walls appearing in vertical rows on the seed surface.

Rare. In damp places. Surguja. *Fl. & Fr.*: Nov. Dec.

11. Eriocaulon oryzetorum Mart. in Wallich, Pl. Asiat. Rar. 3: 28. 1832; Hook. *f.*, Fl. Brit. India 6: 579. 1893, *p.p. excl. syn. E. hamiltonianum* Mart.; Ansari & Balakr., Eriocaul. India 41. 1994.

Herbs. Rootstocks absent. Leaves oblong-lanceolate, 8-10 x 0.7-0.8 cm, glabrous. Heads straw-coloured, hemispherical, 6-7 mm across; peduncles 15-20 cm long; sheaths 7-9 cm long; involucral bracts straw-coloured, glabrous; floral bracts straw-coloured, obovate, 3-3.2 x 1.3-1.5 mm, acuminate or cuspidate, hoary. Male flowers: Sepals connate into a 3-lobed spathe, black, sparsely hoary towards apex. Petals 3, unequal, eglandular. Anthers black. Female flowers: Sepals 3, subequal, straw-coloured, oblanceolate, hoary; two lateral ones conduplicate, strongly

keeled; middle one flat. Petals 3, subequal, hoary, eglandular. Seeds purple, globose or ovoid, *ca* 0.5 x 0.4 mm; cells of seed coat transversely elongated; appendages setiform, 3-6 from transverse radial walls.

Rare. In moist places. Hoshangabad (Rao and Narayanaswamy, 1960; Mukherjee, 1984). *Fl. & Fr.*: Oct. Dec.

12. Eriocaulon parviflorum (Fyson) Ansari & Balakr., Eriocaul. India 53. 1994. *E. dianae* Fyson var. *parviflora* Fyson in J. Ind. Bot. 2: 260. 1921. *E. dianae* Fyson var. *triloboides* Fyson in J. Ind. Bot. 2: 260. 1921.

Herbs. Rootstocks absent. Leaves linear, 1.5-3.5 x 0.2-0.3 cm, glabrous. Heads grey, globose or hemispherical, 3-5 mm across; peduncles 4-11 cm long; sheaths 1.5-2.5 cm long; involucral bracts straw-coloured, oblong-oblanceolate, 2-2.5 x 0.8-1 mm, obtuse, spreading; floral bracts black, oblanceolate, 1.7-1.9 x 0.6-0.75 mm, acuminate, hoary towards apex. Male flowers: Sepals connate into a 3-lobed spathe, black, hoary towards apex. Petals 3, sparsely hoary, with a black gland in each. Anthers dark brown. Female flowers: Sepals 3, unequal; two lateral ones oblanceolate, keeled, hoary along keel and margin; middle one narrower, glabrous. Petals 3, hyaline, spathulate, hoary, with a black gland in each. Seeds ovoid or oblong, *ca* 0.35 x 0.25 mm; cells of seed coat transversely elongated; appendages setiform, arising from transverse radial walls.

Endemic to India. In muddy places and rock crevices near streams. Bastar, Hoshangabad, Panna, Raipur, Raigarh, Shivpuri. *Fl. & Fr.*: Oct. Feb.

13. Eriocaulon quinquangulare L., Sp. Pl. 87. 1753; Hook. *f.*, Fl. Brit. India 6: 582. 1893, *excl. syn. E. martianum* Wallich *ex* Koern.; Ansari & Balakr., Eriocaul. India 104. 1994. *E. argenteum* Mart. in Wallich, Pl. Asiat. Rar. 3: 28. 1832.

Herbs. Rootstocks absent. Leaves linear or lanceolate, 3-6 x 0.2-0.5 cm, glabrous, usually turning pinkish purple on drying. Heads grey or white, globose or cylindrical, 3-6 mm across; peduncles 5-20 cm long; sheaths 2-4 cm long, usually turning purple on drying; involucral bracts straw-coloured, oblong-obovate, 1.5-1.7 x 1-1.2 mm, obtuse, chartaceous, glabrous; floral bracts black, oblanceolate, 1.8-2 x 0.8-1 mm, acuminate, hoary towards apex. Male flowers: Sepals connate into a 3-lobed spathe,

black, hoary towards apex. Petals 3, subequal, hoary, with a black gland in each. Anthers black. Female flowers: Sepals 3, black, spathulate, hoary towards apex. Petals 3, unequal, spathulate, hoary, with a black gland in each. Seeds ovoid or oblong, 0.35-0.4 x 0.2-0.25 mm; cells of seed coat transversely elongated; appendages of 2-4, rectangular structures or ribbon like arising from transverse radial walls.

In drains, moist swampy marshy places usually in association with *Cyperus* sp., *Lindernia* sp. and *Anagallis* sp., sometimes along the margin of cultivated fields. Balaghat, Bastar, Bilaspur, Durg, Hoshangabad, Jabalpur, Panna, Raigarh, Raipur, Rajnandgaon, Seoni, Shahdol, Surguja, Tikamgarh. *Fl. & Fr.*: Sept. - April.

14. Eriocaulon raipurense K.K. Khanna, V. Mudgal & Anand Kumar in Nordic J. Bot. 20(4): 413. f. 1. 2000. **Fig. 29.**

Herbs. Rootstocks absent. Leaves linear-lanceolate, up to 2 cm long, glabrous. Heads grey to blackish, hemispherical, 2-4 mm across; peduncles few, 3-6.5 cm long; sheaths up to 1.6 cm long; involucral bracts straw-coloured, elliptic or elliptic-lanceolate, 2.5-3.8 x 0.9-1.3 mm, acute or acuminate, chartaceous, glabrous, usually spreading; floral bracts blackish, oblanceolate, 1.7-2 x 0.6-0.8 mm, acute or subacuminate, chartaceous, sparsely hoary towards apical half on dorsal surface. Male flowers: Sepals 2, free, black, glabrous. Petals 3, small, equal. Anthers black. Female flowers: Sepals 2, black, glabrous. Petals 3, subequal, pale black, with 2-3 white hairs at apex, eglandular. Seeds pale yellow, ovoid, 0.3-0.35 x 0.25 mm; cells of seed coat transversely elongated; appendages a pair of continuous ribbon like bands from transverse and vertical radial walls.

Endemic. In damp soil along streams. Raipur, Surguja. *Fl. & Fr.*: Oct. Nov.

15. Eriocaulon rajendrababui Ansari & Balakr., Eriocaul. India 149. 1994.

Herbs. Rootstocks absent. Leaves linear, 1-3 cm long, glabrous. Heads straw-coloured, globose or ovoid, *ca* 3 mm across; peduncles 4-7 cm long; sheaths 1-1.3 cm long; involucral bracts straw-coloured, elliptic-lanceolate, 1.4-1.5 x 0.6-0.7 mm, subacute or obtuse; floral bracts elliptic-oblanceolate, 1.1-1.5 x 0.5-0.6 mm, chartaceous, glabrous. Male flowers: Sepals connate

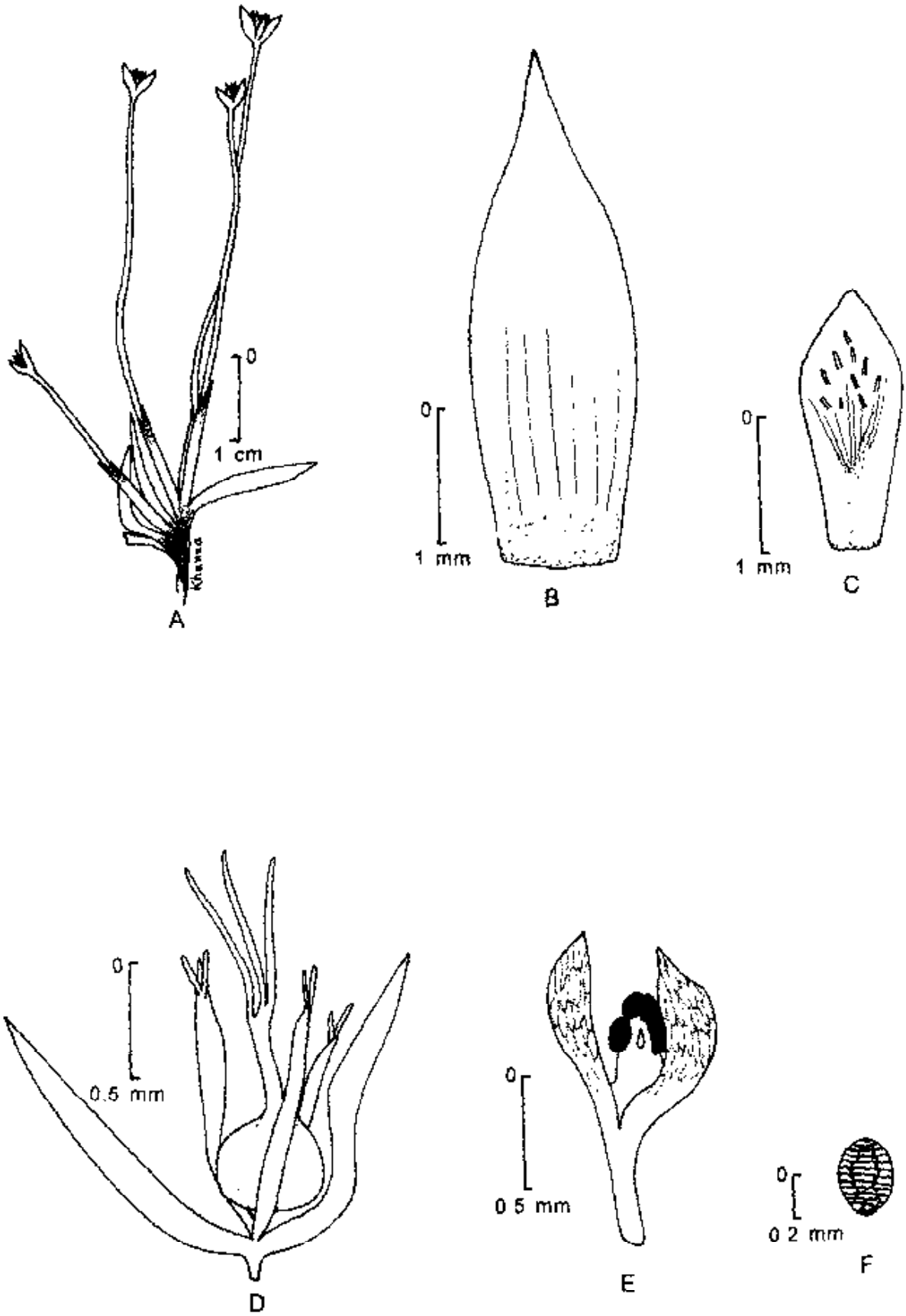

Fig. 29. Eriocaulon raipurense K.K. Khanna, V. Mudgal & Anand Kumar

A. Habit; **B.** Involucral bract; **C.** Floral bract; **D.** Female flower; **E.** Male flower; **F.** Seed.

into a 3-lobed spathe, straw-coloured. Petals 3, minute, glabrous, with a black gland in each. Anthers black. Female flowers: Sepals 3, straw-coloured, glabrous. Petals 3, hyaline, linear, glabrous, eglandular. Seeds oblong-ovoid, *ca* 0.3 x 0.2 mm; cells of seed coat transversely elongated; appendages absent.

Endemic. Rare. In moist places. Rajnandgaon. *Fl. & Fr.*: Nov.

16. Eriocaulon richardianum (Fyson) Ansari & Balakr., Eriocaul. India 51. 1994. *E. dianae* Fyson var. *richardiana* Fyson in J. Ind. Bot. 2: 260. 1921.

Herbs. Rootstocks present. Leaves linear, 4-9 x 0.3-0.5 cm, glabrous. Heads grey, globose-hemispherical, 3-5 mm across; peduncles 4-12 cm long; sheaths 3-4 cm long; involucral bracts straw-coloured, oblanceolate, 2.5-3 x 1-1.25 mm, subacute, glabrous; floral bracts black, oblanceolate, 1.2-1.6 x 0.5-0.7 mm, acuminate, hoary towards apex. Male flowers: Sepals connate into a 3-lobed spathe, black, hoary towards apex. Petals 3, unequal, sparsely hoary, with a black gland in each. Anthers dark brown to black. Female flowers: Sepals 3, unequal, black; two lateral ones oblanceolate, conduplicate, keeled; middle one linear, much narrower, not keeled. Petals 3, subequal, hyaline, spathulate, hoary towards apex, with a black gland in each. Seeds ellipsoid, 0.4-0.45 x 0.27 0.3 mm; cells of seed coat transversely elongated; appendages setiform, 5-6 from transverse radial walls.

Rare. Mandla. *Fl. & Fr.*: Oct. Nov.

17. Eriocaulon ritchieanum Ruhland in Engl., Pflanzenreich. 13. IV. 30: 73. 1903; Ansari & Balakr., Eriocaul. India 170. 1994.

Herbs. Rootstocks absent. Leaves linear, 2-3 x 0.2-0.3 cm, glabrous. Heads grey or black, hemispherical, 4-6 mm across; peduncles 10-18 cm long; sheaths 4-4.5 cm long; involucral bracts black, oblong-obovate, 1-1.2 x 0.6-0.7 mm, chartaceous; floral bracts black, oblanceolate, 1.8-2 x 0.4-0.5 mm, hoary towards apex. Male flowers: Sepals connate into a 3-lobed spathe, black, hoary towards apex. Petals 3, subequal, hoary, with a black gland in each. Anthers white. Female flowers: Sepals 3, black, oblong, sparsely hoary towards apex. Petals 3, hyaline, spathulate, hoary towards apex, with a black gland in each. Seeds pale purple, ellipsoid, *ca* 0.4 x 0.3 mm; cells of seed coat transversely elongated; appendages absent.

Rare. In water logged places. Shahdol (Saxena, 1970). *Fl. & Fr.*: Aug. Oct.

18. Eriocaulon sexangulare L., Sp. Pl. 87. 1753; Hook. *f.*, Fl. Brit. India 6: 580. 1893, *excl.* var. *longifolium*; Ansari & Balakr., Eriocaul. India 79. 1994. *E. wallichianum* Mart. *ex* Wallich, Pl. Asiat. Rar. 3: 26. 1832.

Herbs. Rootstocks absent. Leaves linear or linear-lanceolate, 6-8 x 0.6-1 cm, glabrous. Heads grey, ovoid, *ca* 6 mm across; peduncles up to 25 cm long; sheaths up to 10 cm long; involucral bracts reddish brown, obovate-orbicular, 1.8-2 x 2.2-2.5 mm, coriaceous, glabrous; floral bracts reddish brown, obovate, 2.3-2.5 x 2-2.2 mm, minutely hoary dorsally towards apex. Male flowers: Sepals connate into a closed, indistinctly lobed spathe, straw-coloured, glabrous. Petals 3, equal, sparsely pubescent, with a black gland in each. Anthers dark brown. Female flowers: Sepals 3, unequal, glabrous; two lateral ones obovate, conduplicate; middle one oblong, flat. Petals 3, subequal, linear, hoary towards apex, with a black gland in each. Seeds dark purple, *ca* 0.5 x 0.4 mm; cells of seed coat transversely elongated; appendages setiform, solitary from the transverse radial walls.

Rare. In moist places. Raisen (Gupta, 1977). *Fl. & Fr.*: Sept. Dec.

19. Eriocaulon trilobum Buch.-Ham. *ex* Koern. in Linnaea 27: 645. 1856; Hook. *f.*, Fl. Brit. India 6: 583. 1893; Ansari & Balakr., Eriocaul. India 46. 1994.

Herbs. Rootstock absent. Leaves linear, 2-4 x 0.2-0.3 cm, glabrous. Heads grey or black, globose, 4-6 mm across; peduncles 3-12 cm long; sheaths 1-2.5 cm long; involucral bracts straw-coloured, oblong-spathulate, 2.4-3.5 x 1-1.3 mm, obtuse, glabrous; floral bracts black, oblanceolate, 1.8-2.2 x 0.7-0.9 mm, subacute or subacuminate, hoary towards apex. Male flowers: Sepals connate into a 3-lobed spathe, black, hoary towards apex. Petals 3, sparsely hoary, with a black gland in each. Anthers black. Female flowers: Sepals 3, subequal, black, oblanceolate, conduplicate, keeled, hoary. Petals 3, hyaline, spathulate, hoary, with a black gland in each. Seeds ellipsoid, 0.35-0.45 x 0.25-0.3 mm; cells of seed coat transversely elongated; appendages setiform, 3-6 from transverse radial walls appearing in transverse rings on the seed surface.

In moist places near river, sometimes in black and red morrum soils. Bastar, Raipur, Shivpuri, Surguja. *Fl. & Fr.*: Oct. – Feb.

20. Eriocaulon truncatum Buch.-Ham. *ex* Mart. in Wallich, Pl. Asiat. Rar. 3: 29. 1832; Hook. *f.*, Fl. Brit. India 6: 578. 1893; Ansari & Balakr., Eriocaul. India 118. 1994. *E. truncatum* var. *malaccense* Hook. *f.*, Fl. Brit. India 6: 578. 1893. **Fig. 30.**

Herbs. Rootstocks absent. Leaves lanceolate, 3-6 x 0.2-0.6 cm, glabrous. Heads straw-coloured, subglobose, 4-5 mm across; peduncles 5-13 cm long; sheaths 2.5-3.5 cm long; involucral bracts hyaline, oblong-obovate, 2.3-2.5 x 1.2-1.5 mm, glabrous; floral bracts hyaline, obovate, 1.7-1.9 x 0.9-1 mm, glabrous. Male flowers: Sepals connate into a 2-lobed spathe, black, sparsely hoary towards apex. Petals 3, subequal, with a black gland in each. Anthers black. Female flowers: Sepals 2 or 3, black, linear, glabrous. Petals 3, subequal, hyaline, spathulate, sparsely hoary, with a black gland in each. Seeds oblong or ovoid, *ca* 0.35 x 0.25 mm; cells of seed coat rectangular, vertically elongated; appendages ribbon like, paired and continuous from vertical walls, and solitary and incomplete from transverse radial walls.

Along river bank and drains. Bilaspur, Raigarh, Surguja. *Fl. & Fr.*: April – Dec.

21. Eriocaulon xeranthemum Mart. in Wallich, Pl. Asiat. Rar. 3: 29. 1832; Hook. *f.*, Fl. Brit. India 6: 584. 1893; Ansari & Balakr., Eriocaul. India 58. 1994. *E. pygmaeum* Dalzell in Hook., J. Bot. Kew Gard. Misc. 3: 281. 1851.

Herbs. Rootstocks absent. Leaves linear, 3-4 x 0.2-0.3 cm, glabrous. Heads straw-coloured, hemispherical, 5-6 mm across; peduncles 5-6 cm long; sheaths 2-3 cm long; involucral bracts straw-coloured, oblanceolate, 3-3.5 x 0.4-0.6 mm, acuminate, glabrous; floral bracts straw-coloured, conical, 1-1.2 x 0.4-0.5 mm, truncate and hoary at apex. Male flowers: Sepals connate into a 3-lobed spathe, black, hoary at apex. Petals 3, subequal, glabrous, with a black gland in each. Anthers black. Female flowers: Sepals 3, unequal, hoary towards apex; two lateral ones oblanceolate; middle one narrower. Petals 3, subequal, hyaline, spathulate, hoary, with a black gland in each. Seeds pale yellow, oblong, *ca* 0.4 x 0.2 mm; cells of seed coat transversely elongated; appendages setiform, 2-4 from transverse radial walls.

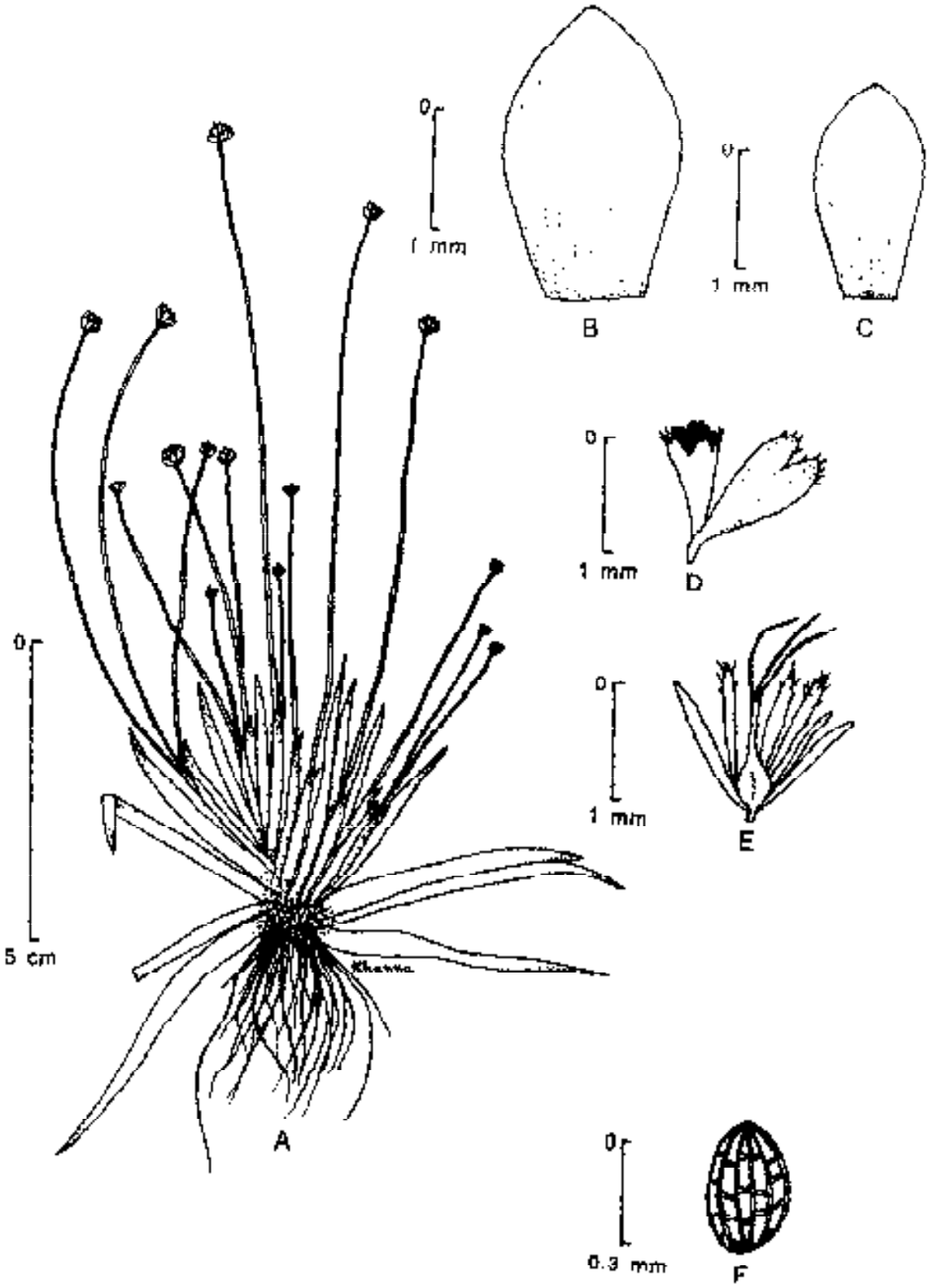

Fig. 30. Eriocauton truncatum Buch.-Ham. *ex* Mart.

A. Habit; **B.** Involucral bract; **C.** Floral bract; **D.** Male flower; **E.** Female flower; **F.** Seed.

Rare. In marshy places. Hoshangabad (Saxena, 1971; Mukherjee, 1984). *Fl. & Fr.*: Aug. Nov.

163. CYPERACEAE

(D.M. Verma)

About 80 genera and 4000 species; cosmopolitan, especially in temperate regions; 11 genera and 131 species in M.P.

1a. Nut enclosed in an utricle ...2. *Carex*

1b. Nut not enclosed in an utricle:

2a. Nut bearing glumes devoid of perfect stamens; nuts bony ...11. *Scleria*

2b. Nut bearing glumes also containing perfect stamens; nuts not bony:

3a. Empty glumes at base of the spikelets 3 or more; style-base dilated; nuts beaked ...9. *Rhynchospora*

3b. Empty glumes at base of the spikelets 0-3; style-base uniformly slender or dilated; nuts beaked or not:

4a. Glumes distichous (spiral in *Cyperus michelianus* & *C. pygmaeus*); perianth absent ...3. *Cyperus*

4b. Glumes spiral (sometimes lower distichous in some *Fimbristylis* spp.); perianth of scales and/or bristles, or absent:

5a. Style-base dilated, constricted or articulated above the nut:

6a. Leaves all reduced to sheaths; perianth of bristles; style usually persistent ...4. *Eleocharis*

6b. Plants not with above combination of characters; leaves with well developed blades or some or all reduced to sheaths; perianth of bristles or scales or absent; style persistent or caducous:

7a. Style caducous leaving a minute button like tumour on the nut ...1. *Bulbostylis*

7b. Style persistent, or if caducous then not leaving a tumour on the nut ...6. *Fimbristylis*

5b. Style-base not dilated, continuous with the nut:

8a. Perianth of two elliptic hyaline scales more or less adherent to the nut and closely clasping it ...8. *Lipocarpha*

8b. Perianth of bristles or scales, or both, not clasping the nut as above:

9a. Perianth of 6 bristles divided to the base into numerous long exserted hair like segments, particularly in fruits, thus making the spikelets comose ...5. *Eriophorum*

9b. Perianth absent or of 1-6 undivided scales or bristles, or both, the spikelets never comose:

10a. Glumes always awned on the back from below the apex; perianth when present usually of scales alternating with bristles ...7. *Fuirena*

10b. Glumes not awned or awned from the apex; perianth when present of bristles only ...10. *Scirpus*

1. BULBOSTYLIS Kunth, *nom. cons.*

Herbs, annual, tufted, slender. Leaves in basal clusters, almost capillary; sheaths hairy or glabrescent below, almost bearded at the mouth, sometimes the hairs falling with age. Inflorescence capitate or anthelate, sometimes reduced to a solitary spikelet; bracts foliaceous or glumaceous. Spikelets several-flowered; rhachilla persistent, narrowly winged. Glumes

spiral, acropetally caducous, keeled, lower 1-2 empty. Flowers bisexual, terminal male or barren. Perianth absent. Stamens 1-3. Style as long as the nut, articulated with the ovary, bulbous at the base, glabrous, style-base persisting for a long time like a button at the top of the nut but ultimately decaying; stigmas 3. Nuts obovoid, triquetrous, smooth or verrucose, shortly stipitate.

About 100 species; mostly tropical and subtropical regions: 3 in M.P.

1a. Inflorescence capitate:

2a. Bracts all setaceous; nuts smooth ...1. *B. barbata*

2b. Bracts lower two foliaceous; nuts transversely wrinkled ...3. *B. puberula* var. *gracilis*

1b. Inflorescence anthelate ...2. *B. densa*

1. Bulbostylis barbata (Rottb.) C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 651. 1893. *Scirpus barbatus* Rottb., Descr. Pl. Rar. 27. 1772 & Descr. Icon. Rar. Pl. 52. t. 17. f. 4. 1773. **Fig. 31.**

Annuals, 4-25 cm tall. Leaves shorter to subequalling the stem, *ca* 0.3 mm broad, involute; sheaths white hairy at the mouth. Inflorescence capitate, 4-18 mm across; bracts 3, setaceous. Spikelets linear, polygonal, 2-9 x 1-1.3 mm; rhachilla zig-zag. Glumes laxly imbricating, brown, 1.5-2.2 mm long, acute or mucronate, glabrous or hispidulous. Nuts stramineous to pale brown, 0.5-0.8 x 0.4-0.7 mm, smooth; surface cells isodiametric.

In roadside ditches and stream beds. Balaghat, Bilaspur, Damoh, Durg, Indore, Raigarh, Raipur, Rajnandgaon, Satna, Sidhi, Surguja. *Fl. & Fr.*: Sept. Dec.

2. Bulbostylis densa (Wallich) Hand.-Mazz. in G. Karst. & Schenk, Vegetationsb. 20.7: 16. 1930; Verma & Chandra in Rec. Bot. Surv. India 21(2): 226. 1981. *Scirpus densus* Wallich in Roxb., Fl. Ind. (Carey & Wallich ed.) 1: 231. 1820. *Bulbostylis capillaris* Kunth var. *trifida* (Nees) C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 652. 1893. *Isolepis trifida* Nees in Wight, Contr. Bot. India 108. 1834.

Annuals, 5-40 cm tall. Leaves shorter than the stem, *ca* 0.2 mm broad; sheaths white hairy at the mouth. Anthela lax, simple or compound; bracts

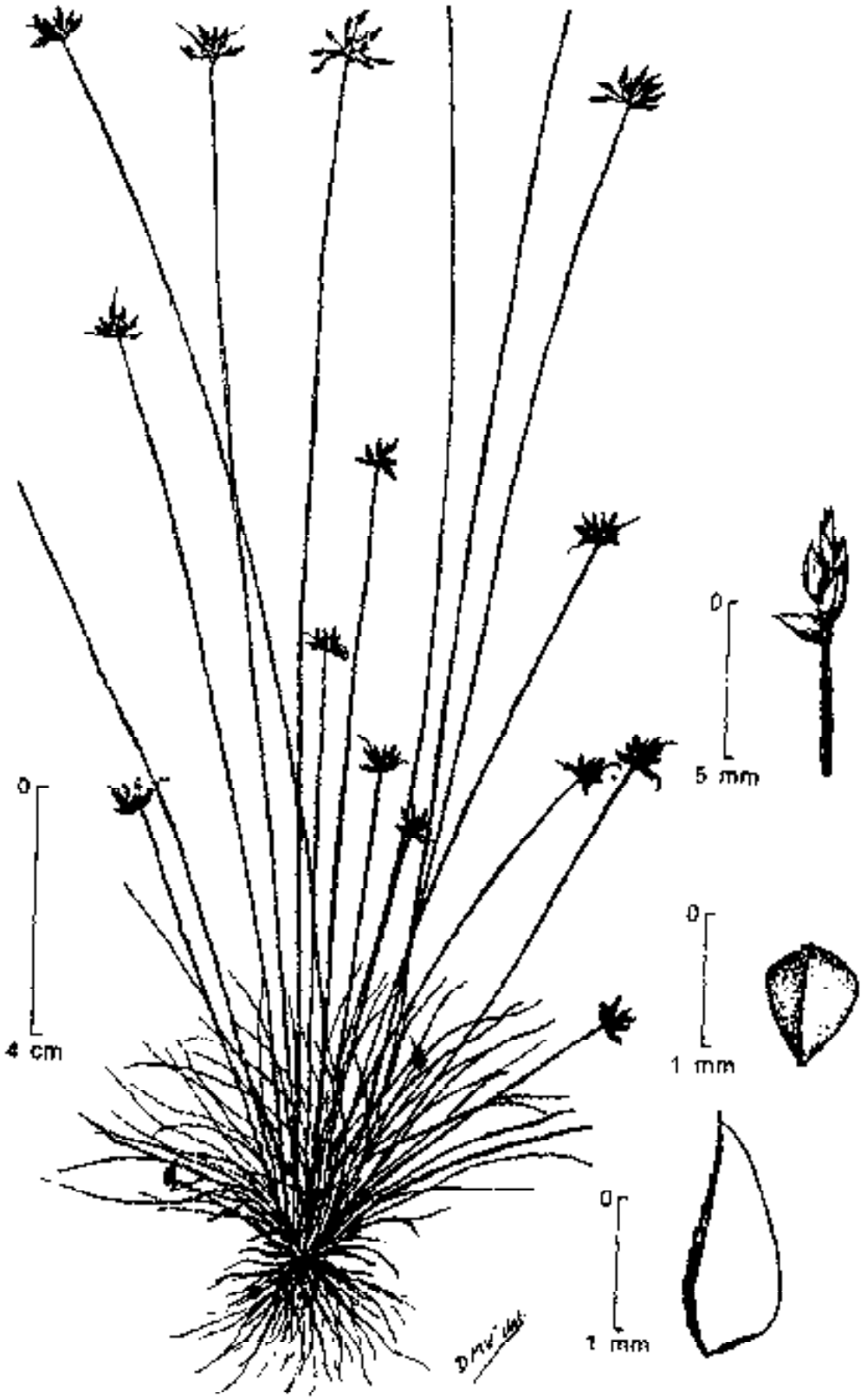

Fig. 31. Bulbostylis barbata (Rottb.) C.B. Clarke

setaceous, awned; rays one to several, ascending. Spikelets usually solitary, sometimes a few clustered, oblong-ovoid, polygonal, 3-6 x 1.8-2.3 mm. Glumes laxly imbricating, brown, 1.5-2 mm long, acute or muticous. Nuts stramineous or ultimately brown, oblong-obovoid, 0.7-0.9 x 0.5-0.8 mm, verruculose, transversely lineolate; surface cells transversely oblong.

In wastelands and around ditches. Raipur. *Fl. & Fr.*: Sept.

3. Bulbostylis puberula Kunth var. **gracilis** Fischer in Gamble, Fl. Madras 3: 1662. 1931.

Annuals. Stems very slender, up to 15 cm high, puberulous. Leaves shorter than to sometimes longer than the stem, puberulous; sheaths finely hairy at least at the mouth. Anthela sometimes lax; bracts 2, foliaceous, up to 8 cm long. Spikelets lanceolate, *ca* 2 mm long, puberulous. Nuts stramineous, obovoid, trigonous.

Jabalpur (Sebastine and Balakrishnan, 1963).

2. CAREX L.

Herbs, perennial, monoecious. Rhizomes short or long, creeping. Leaves in a basal cluster and/or scattered all along the stem; sheaths usually closed. Inflorescence paniculate, racemose, spicate or of a solitary terminal spikelet; bracts various; branchlets and lateral spikelets usually surrounded at the base by an utriculiform or ocreiform bract (cladoprophyll). Spikelets unisexual or bisexual with male and female flowers variously distributed. Glumes spiral. Flowers unisexual. Perianth absent. Stamens 3. Ovary completely enclosed in a sac-like organ (utricle or perigynium); style continuous with the ovary, caducous or the base sometimes persistent; stigmas 2-3. Utricles sometimes inflated, trigonous, lenticular or subglobose, often beaked, membranaceous or coriaceous. Nuts trigonous or lenticular, sessile or stipitate, falling along with the utricle.

About 1000 species; cosmopolitan, especially in temperate and cold wet places; 8 in M.P.

1a. Inflorescence of partial panicles with few to numerous spikelets in the axil of all or at least the lower bracts:

2a. Spikelets all or almost all 2.5-10 cm long:

3a. Utricles strongly inflated, broadly obovoid or subglobose, bright red on maturity ...1. *C. baccans*

3b. Utricles not inflated, ellipsoid-oblong, pale or castaneous on maturity ...4. *C. myosurus*

2b. Spikelets all 0.4-1.5 cm long:

4a. Female glumes uniformly whitish stramineous, without reddish brown dots or streaks ...8. *C. stramentitia*

4b. Female glumes reddish brown or if stramineous then with reddish brown dots and streaks:

5a. Panicles rigid; mature utricles subinflated, 1.2-1.7 mm broad, abruptly beaked ...2. *C. cruciata*

5b. Panicles slender; utricles never inflated, 0.5-0.8 mm broad, gradually beaked ...3. *C. filicina*

1b. Inflorescence racemose or spicate with a solitary spikelet in the axil of each bract, or spikelet solitary, terminal:

6a. Spikelets subsessile, 1-2 cm long, all androgynous ...7. *C. speciosa*

6b. Spikelets, at least the lower, pedunculate, 1.3-9 cm long, sexuality highly variable:

7a. Utricles covered with elevated glands ...5. *C. phacota*

7b. Utricles covered with glands sunk in the surface ...6. *C. praelonga* var. *angustior*

1. Carex baccans Nees in Wight, Contr. Bot. India 122. 1834; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 722. 1894.

Perennials, up to 2 m tall. Leaves exceeding the stem, 5-13 mm broad, coriaceous; lower sheaths ladder-fibrillosely splitting. Panicles 30-85 cm

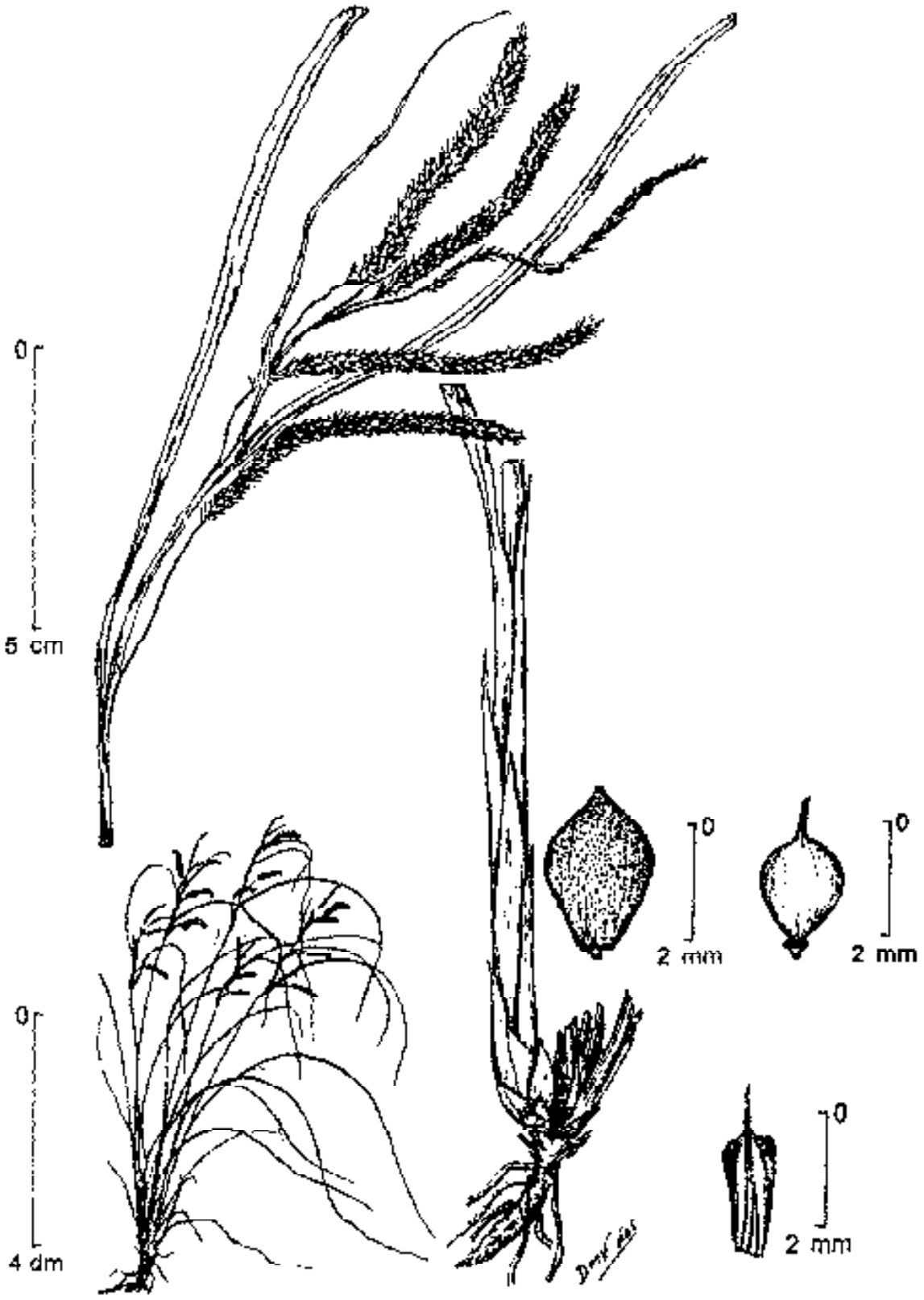

Fig. 32. Ca-ex phacota Spreng.

Perennials, up to 60 cm tall. Leaves several in a basal cluster, shorter or longer than the stem, 2-3 mm broad. Spikelets few, aggregated at the top or 1-2 lower down on slender peduncles, subcylindrical; cladoprophylls ocreaeform. Terminal spikelet female above, male below. Male glumes oblanceolate, 3.7-4.2 mm long, shortly awned; female glumes obovate, 1.5-1.8 mm long with up to 1.7 mm long awn. Utricles yellowish green, broadly ovate, lenticular, *ca* 2.5 mm long, enerved; beak medium, slender. Nuts obovoid, *ca* 1.5 x 1 mm, shortly stipitate.

Bastar (Tiwari and Maheshwari, 1964). *Fl. & Fr.*: April May.

7. Carex speciosa Kunth, Enum. Pl. 2: 504. 1837; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 729. 1894; Rao & Verma, Cyper. N. E. India 79. 1982. *C. speciosa* var. *abscondita* Kuekenth. in Bull. Jard. Bot. Buitenz. ser. 3, 16: 316. 1940.

Perennials, up to 40 cm tall. Stems sometimes winged. Leaves clustered at the base, longer than the stem, 2-8 mm broad. Inflorescence racemose, consisting of usually 2 distant, rarely 1-4, spikelets; bracts foliaceous. Spikelets almost hidden among leaves, subsessile or shortly exserted, subcylindrical, 1-2 cm long, androgynous. Glumes stramineous, muticous. Stigmas 3. Utricles slightly inflated, greenish stramineous, ellipsoid, triquetrous, 4.5-5.5 x 1.8-2.3 mm, subcoriaceous, many-nerved, sub-abruptly beaked, hispidulous. Nuts brown, ellipsoid, triquetrous, 3.3-3.8 x 1.8-2.2 mm, apiculate.

Raipur, Surguja. *Fl. & Fr.*: Sept. - Jan.

8. Carex stramentitia Boott *ex* Boeck. in Linnaea 40: 351. 1876; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 717. 1894. **Fig. 33.**

Perennials, up to 1 m tall. Leaves all along and exceeding the stem, 7-16 mm broad, coriaceous. Panicles 10-35 cm long, mildly fragrant; partial panicles 2-5, lower long exserted; lower bracts much exceeding the panicle. Spikelets numerous, 5-15 mm long, androgynous; cladoprophylls utriculiform. Glumes whitish stramineous, ovate-lanceolate, female mucronate. Styles thickened at the base; stigmas 3. Utricles slightly inflated, greenish, obovoid, trigonous, 3.7-4.5 x 1.5-1.8 mm, abruptly beaked, several-nerved; beak glabrous or hispidulous, 2-dentate. Nuts yellowish brown, ovoid-ellipsoid, triquetrous.

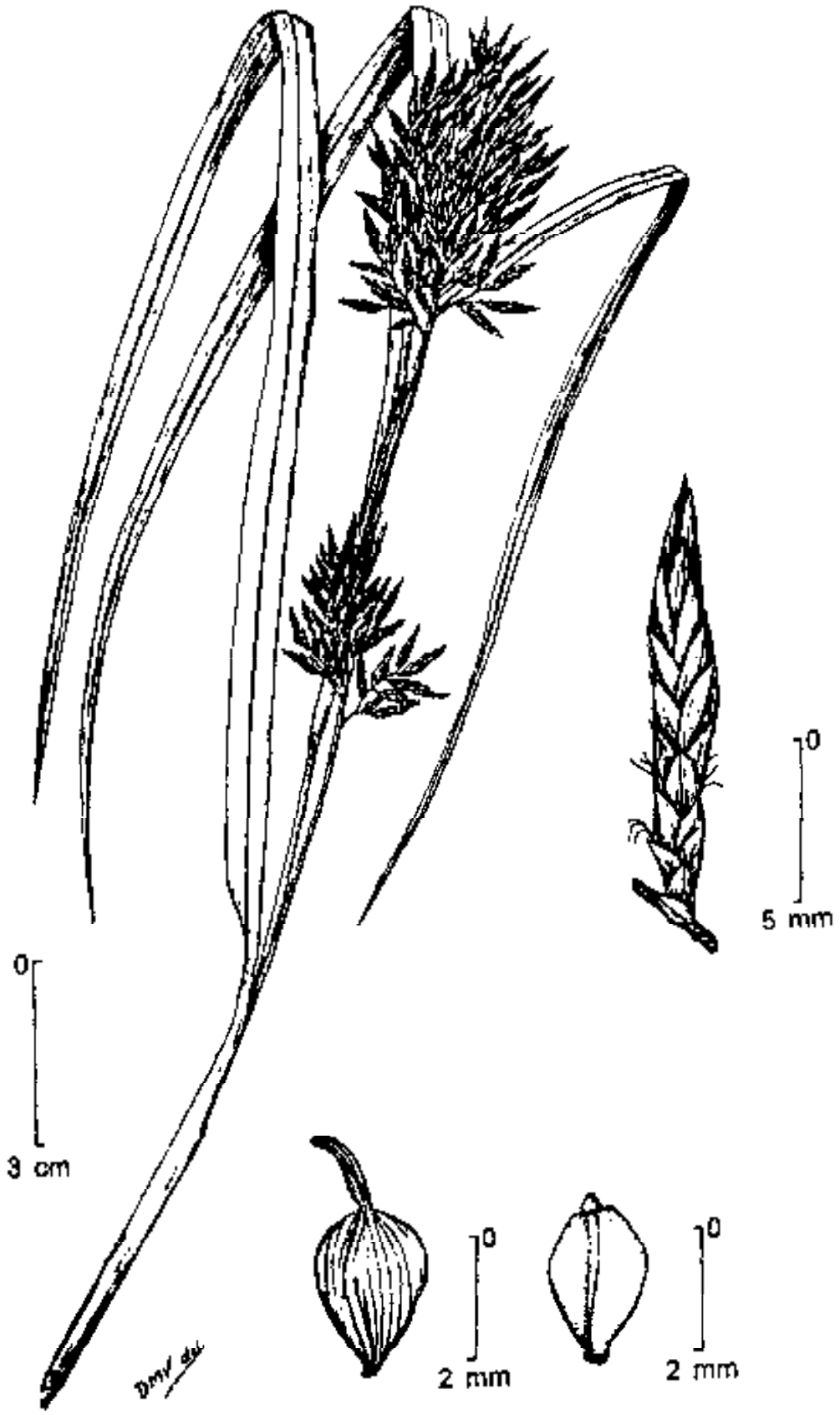

Fig. 33. Carex stramentitia Boott *ex* Boeck.

Bastar (Tiwari and Maheshwari, 1964). *Fl. & Fr.*: April - June.

3. CYPERUS L.

Herbs, annual or perennial. Rhizomes, if present, short or long creeping. Stems usually trigonous or triquetrous, sometimes terete. Leaves usually clustered at the base, sometimes reduced to bladeless sheaths. Inflorescence anthelate or capitate; bracts usually foliaceous. Spikelets digitately or spicately arranged, usually compressed, rarely subcylindrical, one to many-flowered; rhachilla sometimes winged by the persistent decurrent glume bases. Glumes alternate, distichous, rarely spiral, lower 1-2 empty. Flowers all bisexual or upper one to few male or barren. Perianth absent. Stamens 1-3; filaments ligulate; anthers linear-oblong. Styles uniformly slender, continuous with the ovary, caducous; stigmas 2-3. Nuts ellipsoid, oblong or obovoid, lenticular, trigonous or triquetrous.

About 600 species; tropical and subtropical regions; 53 in M.P.

1a. Nuts corky-thickened on the angles:

2a. Inflorescence capitate; style entire or 3-notched ...7. *C. cephalotes*

2b. Inflorescence anthelate; style deeply 3-fid ...41. *C. platystylis*

1b. Nuts not corky-thickened on the angles:

3a. Stigmas 2; nuts lenticular:

4a. Inflorescence capitate; glumes all spiral ...34. *C. michelianus*

4b. Inflorescence anthelate or capitate; glumes all distichous or the lower spiral (*C. pygmaeus*):

5a. Inflorescence capitate with each spikelet maturing a solitary nut:

6a. Keel of the glume distinctly winged:

7a. Keel of the glume with a broad hyaline incise-dentate crest ...32. *C. metzii*

7b. Keel of the glume with a narrow spinulose crest ...26. *C. kyllingia*

6b. Keel of the glume not winged:

8a. Rhizomes creeping:

9a. Rhizomes slender, 1-2(-3) mm thick; stems triquetrous with flat sides; leaves usually well developed; stamens 1-2(-3); nuts yellowish brown ...4. *C. brevifolius*

9b. Rhizomes stout, 3-4 mm thick; stems sharply triquetrous with more or less concave sides; leaves mostly reduced to sheaths, sometimes upper sheaths bearing small blades; stamens 3; nuts black ...31. *C. melanospermus*

8b. Rhizomes not creeping ...53. *C. triceps*

5b. Inflorescence anthelate or if capitate then each spikelet maturing more than one nut:

10a. Inflorescence a pseudolateral cluster of spikelets with a solitary erect stem-like bract ...27. *C. laevigatus*

10b. Inflorescence various, distinctly terminal with several spreading bracts:

11a. Glumes mucronate or mucronulate:

12a. Stout annuals or perennials, more than 25 cm high; leaves flat, 7-15 mm broad; glumes 5-7-nerved ...1. *C. alopecuroides*

12b. Slender annuals, up to 25 cm high; leaves canaliculate, 1-2 mm broad; glumes 3-5-nerved:

13a. Inflorescence of a few glomerules collected into a head; spikelets 3-5 mm long; lower glumes spiral, upper distichous ...47. *C. pygmaeus*

13b. Inflorescence anthelate; spikelets 5-13 mm long; glumes all distichous ...46. *C. pumilus*

11b. Glumes acute or muticous:

14a. Nuts with transverse wavy lines ...28. *C. latespicatus*

14b. Nuts not as above:

15a. Glumes usually with a depression on each side, keel arcuate ...49. *C. sanguinolentus*

15b. Glumes without any depression, keel straight:

16a. Leaves 1-2 mm broad; nuts obovoid ...22. *C. flavidus*

16b. Leaves 2-4 mm broad; nuts linear or narrowly oblong:

17a. Spikelets more or less erect, in dense clusters; anthers 0.4 mm long ...42. *C. polystachyos*

17b. Spikelets spreading or suberect, in somewhat lax branched spikes; anthers 1-1.2 mm long ...33. *C. micans*

3b. Stigmas 3; nuts trigonous:

18a. Rhachilla of the spikelets caducous, the spikelets thus falling off as a whole along with the persistent glumes:

19a. Inflorescence a lobed head ...18. *C. dubius*

19b. Inflorescence anthelate, though the anthela may be sometimes much contracted:

20a. Anthelas compound or decompound; spikes subglobose:

21a. Spikelets 6-12 mm long, each maturing 4-14 nuts; glumes muticous ...8. *C. compactus*

21b. Spikelets 3-4 mm long, each maturing 1-2 nuts; glumes mucronate ...44. *C. pseudokyllingioides*

20b. Anthelas simple; spikes cylindrical:

22a. Rhizome emitting slender stolons; spikelets bearing only 1 nut ...39. *C. paniceus*

22b. Rhizome not emitting any stolon; spikelets bearing 1-4 nuts:

23a. Spikes exactly cylindrical, usually distinctly pedunculate; nuts linear-oblong, *ca* 0.5 mm broad ...13. *C. cyperoides*

23b. Spikes attenuate to the base, sessile or subsessile; nuts oblong-ellipsoid, 0.5-1 mm broad ...12. *C. cyperinus*

18b. Rhachilla of the spikelets persistent, the glumes acropetally caducous:

24a. Stamen 1(-2); nuts linear or narrowly oblong with almost parallel sides ...6. *C. castaneus*

24b. Stamens 1-3; nuts obovoid-oblong or subglobose:

25a. Inflorescence capitate:

26a. Small, annual herbs; glumes long aristate, the arista about half as long as to equalling the main body ...11. *C. cuspidatus*

26b. Small or large, annual or perennial herbs; glumes muticous or shortly mucronate:

27a. Spikelets 10-35 mm long, 3-6 mm broad; stamens 3:

28a. Spikelets green; stigmas *ca* 0.5 mm long ...9. *C. compressus*

28b. Spikelets pale stramineous to almost white; stigmas *ca* 2 mm long ...36. *C. niveus*

27b. Spikelets 3-8 mm long, 1-3 mm broad; stamens 1-2:

29a. Glumes broadly obovate-suborbicular, 0.5-0.8 mm long ...14. *C. difformis*

29b. Glumes elliptic, oblong or lanceolate, more than 1 mm long:

30a. Spikelets 1.5-2 mm broad; glumes 3-nerved ...45. *C. pulchellus*

30b. Spikelets 3-4 mm broad; glumes 5-nerved ...29. *C. leucocephalus*

25b. Inflorescence anthelate with distinct rays:

31a. Spikelets in well elongated spikes; the rhachis several times longer than the spikelets:

32a. Glumes orbicular or broadly ovate, about as broad as long:

33a. Rhachis of the spike smooth; keel of the glume 3-5-nerved, not winged ...25. *C. iria*

33b. Rhachis of the spike scabrid on the angles; keel of the glume 7-nerved, winged, the wing serrate above ...2. *C. alulatus*

32b. Glumes linear-lanceolate, ovate or oblong, about half or less as broad as long:

34a. Rhachis hispidulous:

35a. Anthela simple or subcompound; spikelets 10-35 mm long; nuts *ca* 1.5 mm long ...43. *C. procerus*

35b. Anthela compound; spikelets 6-12 mm long; nuts 1-1.3 mm long ...40. *C. pilosus*

34b. Rhachis glabrous:

36a. Connective of the anther produced into a setulose crest about one-third to half as long as the anther cells ...19. *C. elatus*

36b. Connective of the anther scarcely produced, smooth:

37a. Spikes penicillate, 2-10 mm broad, with ascending spikelets ...37. *C. nutans*

37b. Spikes cylindrical or flattened, 10-20 mm broad with divaricate spikelets:

38a. Spikelets subterete or slightly compressed; rhachilla wings soon caducous ...16. *C. digitatus*

38b. Spikelets strongly compressed; rhachilla wings long persistent:

39a. Anthelas compound or decompound; spikes sessile and pedunculate, lax with spreading spikelets; glumes with an erect mucro ...21. *C. exaltatus*

39b. Anthelas simple or compound; spikes all subsessile, very dense, with ascending spikelets; glumes with a slightly curved mucro ...24. *C. imbricatus*

31b. Spikelets digitate or in very short spikes, the rhachis obscure or much shorter than to about as long as the spikelets:

40a. Spikelets digitate, 3-20 mm long:

41a. Glumes mucronate:

42a. Leaves 1.5-4 mm broad; bracts all shorter than or scarcely equalling the anthela ...23. *C. halpan*

42b. Leaves 5-20 mm broad; lower bracts much exceeding the anthela ...15. *C. diffusus*

41b. Glumes muticous or mucronulate:

43a. Spikelets numerous together; nuts equalling the glume ...14. *C. difformis*

43b. Spikelets 2-10 together; nuts much shorter than the glume:

44a. Stamen 1; nuts obpyramidal, triquetrous ...3. *C. amabilis*

44b. Stamens 1-2; nuts broadly obovoid or subglobose, trigonous with one of the angles almost rounded:

45a. Rhachilla hidden by the ascending and appressed glumes; glumes 1-1.7 mm long ...23. *C. halpan*

45b. Rhachilla visible between the widely spreading glumes (prominently so in the mature spikelets); glumes 0.7-1 mm long ...52. *C. tenuispica*

40b. Spikelets shortly spicate, 5-60 mm long:

46a. Anthela simple; glumes distinctly mucronate, the mucro 0.5-1.5 mm long:

47a. Spikelets squarrose; glumes 1-2 mm long (excluding mucro); nuts narrowly obovoid, *ca* 1.2 mm long ...50. *C. squarrosus*

47b. Spikelets not squarrose; glumes 3-4.5 mm long; nuts obovoid, 1.5-1.7 mm long ...9. *C. compressus*

46b. Anthela simple or compound; glumes muticous or mucronulate:

48a. Stems stout, 4-8 mm thick in the middle; leaves absent or solitary:

49a. All bracts short, rarely as long as the anthela ...10. *C. corymbosus*

49b. Lower bracts much exceeding the anthela ...38. *C. pangorei*

48b. Stems slender or stout, 1-5 mm thick in the middle; leaves 2-several:

50a. Spikelets acicular, *ca* 1 mm broad; glumes 1.5-2 mm long ...17. *C. distans*

50b. Spikelets compressed, 1-3 mm broad; glumes 2-4.5 mm long:

51a. Stolons absent; bracts shorter than the anthela ...30. *C. macer*

51b. Stolons present; bracts equalling or longer than the anthela:

52a. Stem base enclosed in a hard irregularly splitting coat; involucral bracts distinctly separated from one another or only the lowermost obvious ...5. *C. bulbosus*

52b. Stem base covered with membranaceous scales when young, the scales soon disintegrating into fibres; involucral bracts close together or only the lowermost a little distant:

53a. Ripe spikelets turgid, subterete; nuts dorsoventrally compressed, the ventral side usually somewhat concave, the dorsal side with a raised angle ...51. *C. stoloniferus*

53b. Ripe spikelets never turgid, always compressed; nuts equally trigonous (rarely maturing in *C. rotundus* so ovaries to be examined):

54a. Stolons woody, never bearing tubers ...35. *C. mitis*

54b. Stolons soft, always bearing tubers:

55a. Tubers covered with grey tomentum; spikelets 5-18 mm long, 8-16-flowered; glumes with 7-9 prominent nerves equally distributed over the whole breadth (outermost nerves near the margins), golden yellow to pale brown ...20. *C. esculentus*

55b. Tubers without grey tomentum; spikelets 10-35 mm long, 10-40-flowered; glumes with 5-7 nerves, the lateral nerves becoming much less prominent away from the keel, usually deep brown, rarely yellowish ...48. *C. rotundus*

1. Cyperus alopecuroides Rottb., Descr. Pl. Rar. 20. 1772. *Juncellus alopecuroides* C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 595. 1893.

Annuals or perennials. Rootstocks short. Stems stout, up to 1.2 m high, 2-3 cm thick at base. Leaves 7-15 mm broad, coriaceous. Anthela large, compound, 20-40 cm across; bracts several, foliaceous, up to 1 m long. Spikes dense, cylindrical, 25-40 x 15-20 mm, sessile and pedunculate. Spikelets densely crowded, green or stramineous, elliptic-oblong or lanceolate, 4-6 mm long; rhachilla rather stout, subquadrangular. Glumes ovate, mucronulate. Stamens 3. Stigmas 2. Nuts pale brown or blackish, obovoid, plano-convex, about one-third as long as the glume.

In river beds and ditches. Dhar, Raipur, Rajnandgaon, Shivpuri. *Fl. & Fr.*: July - Dec.

2. Cyperus alulatus Kern in Reinwardtia 1: 463-66. f. 1. 1952; Verma & Chandra in Rec. Bot. Surv. India 21(2): 236. 1981. *C. iria auct. non* L., 1753: C.B. Clarke in Ill. Cyper. t. 14. 1909. *C. iria* var. *rectangularis* Kuekenth. in Engl., Pflanzenf. heft 101: 152. 1935.

Annuals, tufted, up to 50 cm high. Stems trigonous. Leaves as long as or longer than the stem, 2-5 mm broad. Anthela simple or compound, lax, 5-15 cm across; bracts foliaceous, spreading; rays compressed, up to 10 cm long; rhachis of the spike scabrid on the angles. Spikelets numerous, linear-oblong, 5-10 mm long. Glumes loosely imbricating, yellow, broadly ovate or suborbicular, *ca* 1.3 mm long, keeled, muticous or mucronulate; keel 7-nerved, with a narrow, serrate wing towards top. Style 3-fid almost to the base. Nuts brown, obovoid, triquetrous, about as long as the glumes, apiculate, broadly stipitate.

In moist wastelands. Balaghat, Bilaspur, Damoh, Durg, Hoshangabad, Indore, Mandla, Raipur, Ratlam, Satna, Sidhi, Surguja, Tikamgarh, West Nimar. *Fl. & Fr.*: July - Dec.

3. Cyperus amabilis Vahl, Enum. Pl. 2: 318. 1805; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 598. 1893.

Annuals, tufted, 5-20 cm high. Leaves flaccid, *ca* 2 mm broad. Anthela simple or compound, with up to 10 cm long rays, sometimes decompound, or sometimes reduced to a head; bracts foliaceous, up to 5 cm long. Spikelets 3-10 in a spike, golden brown, linear, 3-10 mm long. Glumes ovate-oblong, *ca* 1 mm long, truncate, shortly mucronate; keel 3-5-nerved; sides nerveless. Stamen 1. Stigmas 3. Nuts brown, obpyramidal, triquetrous, *ca* 0.3 mm long, rugulose.

Chhatarpur (Tiwari and Maheshwari, 1964). *Fl. & Fr.*: April Dec.

4. Cyperus brevifolius (Rottb.) Hassk., Cat. Hort. Bot. Bogor. 24. 1844. *Kyllinga brevifolia* Rottb., Descr. Icon. Rar. Pl. 13. t. 4. f. 3. 1773; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 588. 1893. **Fig. 34.**

Perennials, 10-90 cm high. Rhizomes creeping, simple or sometimes branched, 3-40 cm long, 1.5-2 mm thick, pinkish or purplish. Stems 1-3 cm apart. Leaves much shorter than to equalling the stem, 1.5-3.5 mm broad. Inflorescence capitate; bracts 3-4, foliaceous, spreading or deflexed;

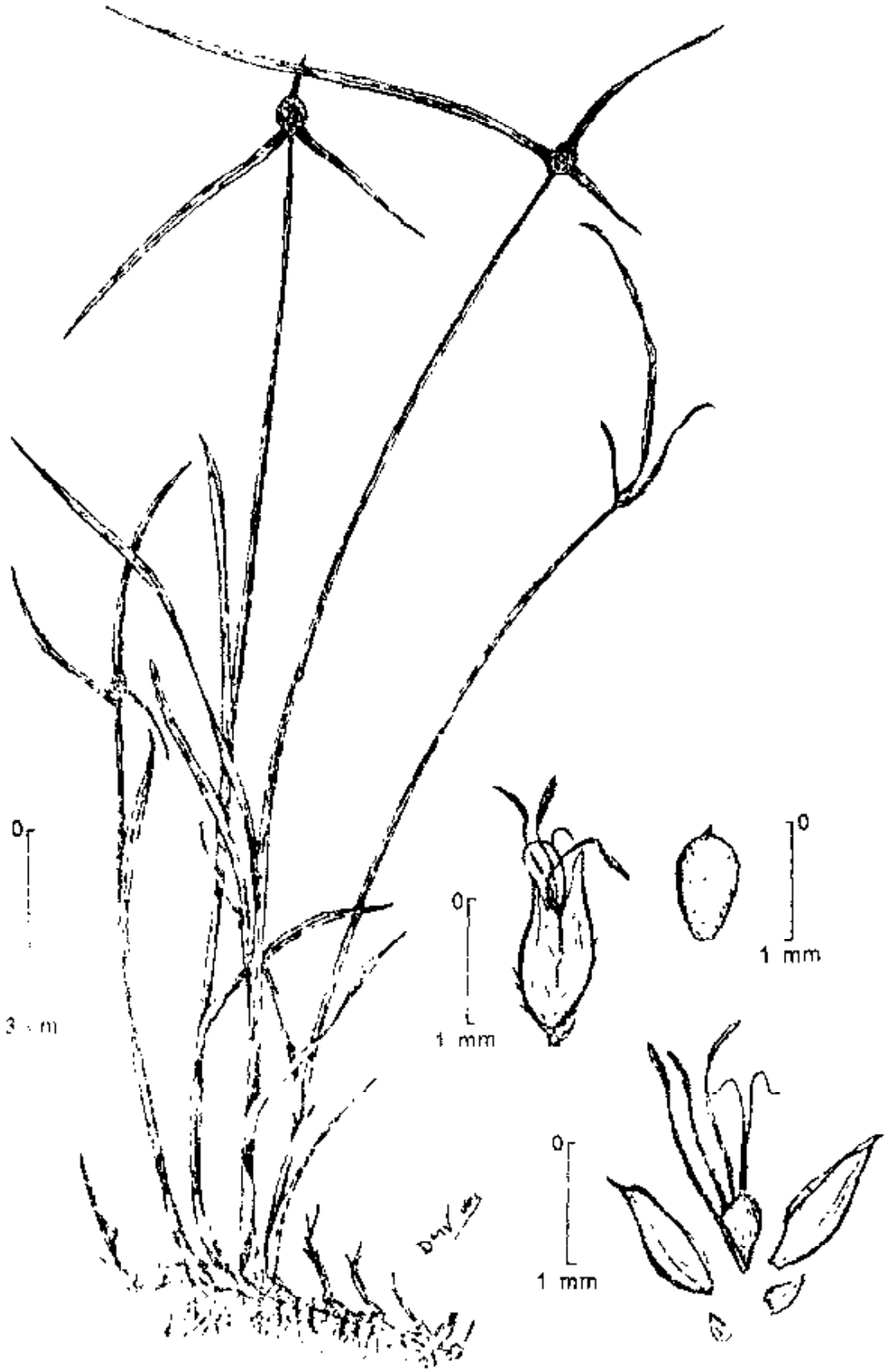

Fig. 34. Cyperus brevifolius (Rottb.) Hassk.

capitula 3-10 mm broad, of a solitary spike or sometimes with 2-3 smaller additional spikes, flowering green, fruiting brownish stramineous. Spikelets numerous, congested, elliptic-lanceolate, 2.5-3.5 x 1 mm, 1-flowered. Glumes keeled, mucronate; keel with spinules up to two third way up; sides sometimes with brownish dots and streaks. Stamens 1-2 (-3). Styles deeply 2-fid. Nuts yellowish or ultimately brown, obovoid or oblong-obovoid, 1-1.5 x 0.7 mm.

In open moist places. Balaghat, Bastar, Bilaspur, Damoh, Durg, Hoshangabad, Mandla, Panna, Raigarh, Raipur, Sagar, Satna, Seoni, Shivpuri, Sidhi, Surguja. *Fl. & Fr.*: Throughout the year.

5. Cyperus bulbosus Vahl, Enum. Pl. 2: 342. 1805; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 611. 1893; Kern in Steenis, Fl. Males. ser. 1. 7(3): 605. 1974.

Perennials, 10-30 cm high. Rhizomes bearing long slender stolons. Stems solitary, bulbously swollen at base due to a cover of several stiff and irregularly splitting chestnut brown or blackish scales. Leaves usually shorter than the stem. Anthela usually simple, with up to 2 cm long divaricate rays, sometimes subcapitately contracted; bracts 4-8, foliaceous. Spikes cylindrical, 1-3 cm long. Spikelets linear-ellipsoid, bearing a solitary nut. Glumes stramineous, oblong-lanceolate, subacute, 9-11-nerved, with a green keel. Nuts dark brown or blackish, ellipsoid-obovoid, *ca* 1.5 x 0.5 mm.

In stagnant water. Satna. *Fl. & Fr.*: Feb.

6. Cyperus castaneus Willd., Sp. Pl. 1: 278. 1797; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 598. 1893.

Annuals, tufted, 3-15 cm high. Leaves filiform, usually about as long as the stem. Anthela usually simple, sometimes compound, or sometimes reduced to a head; bracts filiform, up to 10 cm long. Spikelets 3-30 in a cluster, chestnut brown (or sometimes pale), linear, 5-20 mm long, *ca* 1.5 mm broad. Glumes oblong-spathulate, plicate, 1-1.5 mm long, with a 3-nerved keel excurrent into a greenish yellow recurved mucro. Stamens 1(-2). Stigmas 3. Nuts dark red, linear or narrowly oblong with almost parallel sides, *ca* 1 mm long.

Raipur. *Fl. & Fr.*: Aug.

7. Cyperus cephalotes Vahl, Enum. Pl. 2: 311. 1805; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 597. 1893. **Fig. 35.**

Herbs, perennial, aquatic, floating. Stolons long, slender, *ca* 2 mm thick. Stems somewhat compressed-trigonous, 15-60 cm long. Leaves greyish green, 2-3.5 mm broad, rigidulous, keeled, gradually narrowed to a triquetrous scabrid tip. Inflorescence of 1-4 capitately contracted spikes, 1-2 cm across; bracts foliaceous, purple striate. Spikelets congested, ovate-lanceolate, 4-12 x 3-4 mm. Glumes ovate, 3-4 mm long, mucronate, subcoriaceous, faintly cellular-reticulate; keel very sharp to narrowly winged, smooth or scabrid. Stamens 3. Style slightly exserted, entire or 3-notched at apex, inflated at base, trigonous, long persistent. Nuts glossy brown, ovoid-oblong, triquetrous, stipitate, *ca* 2.2 mm long including *ca* 1 mm long stipe; stipe at first narrowly 3-winged, ultimately corky-thickened, thickenings stramineous, subentire.

Bastar, Bilaspur. *Fl. & Fr.*: March - April.

8. Cyperus compactus Retz., Observ. Bot. 5: 10. 1789. *C. dilutus* Vahl, Enum. Pl. 2: 357. 1805. *Mariscus microcephalus* K. Presl, Reliq. Haenk. 1: 182. 1828; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 624. 1893.

Perennials, 0.2-1 m high. Stems spongy, subterete or trigonous, 2-6 mm thick. Leaves 3-11 mm broad, with transverse nervules more or less distinctly raised, canaliculate at base, spinulous on margins and midrib beneath. Anthela compound or decompound, young greenish, mature bright reddish brown; bracts up to 1 m long. Spikes subglobose, 15-20 mm across. Spikelets digitate, stellately spreading, linear-lanceolate, 6-12 x 1-1.5 mm; rhachilla hyaline-winged. Glumes oblong-lanceolate, 3-4 mm long, obtuse; keel green; sides reddish brown on maturity. Stamens 3. Styles 3-fid. Nuts deep brown, linear-oblong, trigonous, slightly curved, 1.5-2 mm long, apiculate or rostrate, densely puncticulate.

Along streams. Balaghat, Bilaspur, Hoshangabad, Mandla, Raigarh, Raipur, Surguja. *Fl. & Fr.*: Sept. - Jan.

9. Cyperus compressus L., Sp. Pl. 46. 1753; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 605. 1893.

Annuals, 3-40 cm high. Stems compressed-trigonous. Leaves greyish green, 1.5-4 mm broad, subcoriaceous. Anthela simple, lax; bracts 3-7,

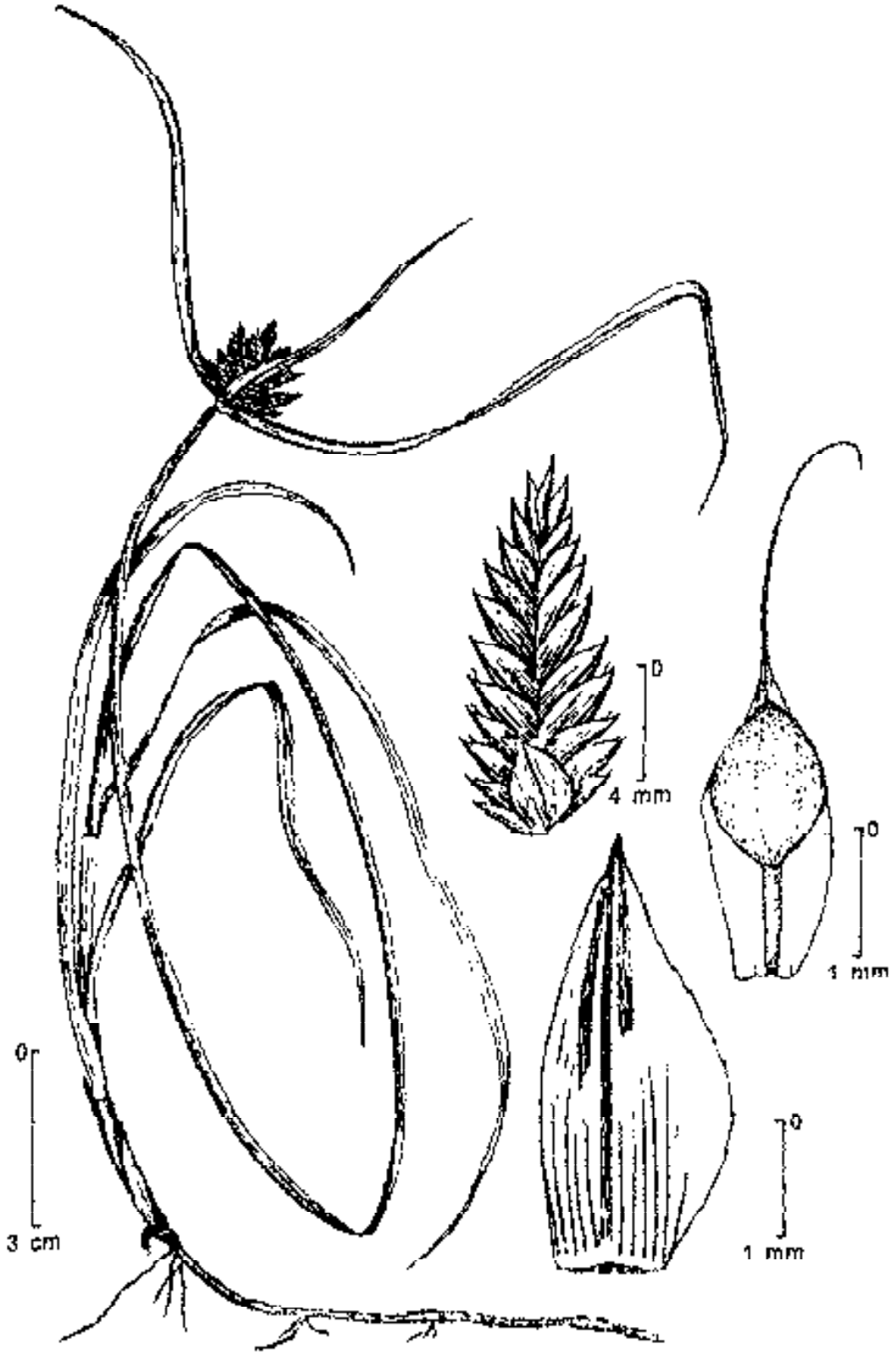

Fig. 35. Cyperus cephalotes Vahl

foliaceous; rays divaricately spreading, sometimes absent in depauperated form. Spikelets in clusters of 3-13, linear-oblong, 10-35 x 3-5 mm; rhachilla young hyaline-margined. Glumes pale yellowish or brownish, ovate, 3-4.5 mm long, mucronate, several-nerved, broadly scarious-margined. Stamens 3. Stigmas 3. Nuts glossy, blackish brown, obovoid, triquetrous, 1.5-1.7 mm long, apiculate, shortly stipitate.

In open places and sal forests. Bilaspur, Damoh, Hoshangabad, Indore, Jabalpur, Mandla, Morena, Raipur, Rajnandgaon, Satna, Shivpuri, Sidhi, Tikamgarh, Ujjain. *Fl. & Fr.*: July - Dec.

10. Cyperus corymbosus Rottb., Descr. Icon. Rar. Pl. 42. t. 7. f. 4. 1773; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 612. 1893.

Perennials, 0.5-1 m high. Rhizomes creeping. Stems spongy, faintly septate, 5-8 mm thick, terete below, trigonous above. Leaves absent or solitary, up to 13 cm long, 4-6 mm broad. Anthela compound, 15-20 cm across; bracts with spinulous revolute margins, lowest 2-10 cm long. Spikelets clustered, 4-8 together, linear, 6-40 x 1 mm; rhachilla wings linear, hyaline. Glumes stramineous, reddish brown striolate along the nerves, ovate-oblong, 2.5-3 mm long, obtuse. Stamens 3. Stigmas 3. Nuts blackish, narrowly obovoid-ellipsoid, trigonous, *ca* 1.5 mm long, apiculate.

In river-beds. Indore, Raipur. *Fl. & Fr.*: Dec.- Jan.

11. Cyperus cuspidatus Kunth in Humb., Bonpl. & Kunth, Nov. Gen. Sp. 1: 204. 1816; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 598. 1893. *C. uncinatus* C.B. Clarke in Durand & Schinz., Consp. Fl. Africa 5: 580. 1895. **Fig. 36.**

Annuals, 1-20 cm high. Stems slender, trigonous. Leaves 0.5-1 mm broad. Anthela simple or compound, contracted or evolute; bracts 2-4, foliaceous; rays suberect or spreading, sometimes absent in depauperated forms. Spikelets up to 22 together, linear, 4-12 x 1-1.3 mm. Glumes obliquely spreading, usually fuscous ferrugineous, sometimes hyaline, ovate, *ca* 2 mm long, aristate; arista *ca* 1 mm long, recurved. Stamens (1-) 2-3. Stigmas 3. Nuts chestnut brown, obovoid, trigonous, *ca* 0.8 mm long, apiculate, puncticulate.

In moist depressions. Balaghat, Damoh, Hoshangabad, Indore, Raigarh, Raipur, Sidhi. *Fl. & Fr.*: Aug. - Nov.

Fig. 36. Cyperus cuspidatus Kunth

12. Cyperus cyperinus (Retz.) Valck.-Suring., Cyperus 154. t. 6. f. 10. 1898. *Kyllinga cyperina* Retz., Observ. Bot. 6: 21. 1791. *Mariscus cyperinus* Vahl, Enum. Pl. 2: 377. 1805; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 621. 1893.

Perennials, 10-60 cm high. Rootstocks short, not bearing any stolon. Leaves 4-8 mm broad. Anthela simple, with usually several well developed pedunculate rays; bracts 4-8, foliaceous, up to 35 cm long. Spikes 1-3.5 cm long, sessile or on up to 3.5 cm long peduncles. Spikelets erect or suberect, subulate, often curved, 2-4-flowered. Glumes elliptic, obtuse; keel 3-nerved; sides 3-4 striate. Stigmas 3. Nuts brown, oblong-ellipsoid, usually slightly curved, apiculate, muricate.

Balaghat, Hoshangabad. *Fl. & Fr.*: Aug. Dec.

13. Cyperus cyperoides (L.) Kuntze, Revis. Gen. Pl. 3 (2): 333. 1898. *Scirpus cyperoides* L., Mant. Pl. 181. 1771. *Mariscus sieberianus* Nees *ex* C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 622. 1893.

Perennials, up to 1 m high. Stems trigonous, slightly swollen at the base. Leaves 2.5-10 mm broad. Anthela simple, usually evolute, sometimes contracted; bracts foliaceous, up to 50 cm long. Spikes cylindrical, 7-40 x 6-13 mm. Spikelets linear-lanceolate, 3-5 mm long, flowering obliquely spreading, fruiting divaricate or the lower even deflexed, usually maturing 2 nuts, sometimes maturing 1, 3 or 4 nuts; rhachilla winged. Glumes greenish, sometimes red striolate, ovate-oblong. Stamens 3. Stigmas 3. Nuts yellowish when young, mature deep brown, linear-oblong, trigonous, slightly curved, *ca* 2.2 x 0.5 mm, apiculate.

In wastelands. Balaghat, Bastar, Bilaspur, Damoh, Hoshangabad, Indore, Mandla, Panna, Raipur, Rajnandgaon, Satna, Sidhi. *Fl. & Fr.*: Aug. March.

14. Cyperus difformis L., Cent. Pl. 2: 6. 1756; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 599. 1893.

Annuals, 5-65 cm high. Roots reddish. Stems compressed-triquetrous. Leaves 1.5-5 mm broad, rather abruptly acuminate. Anthela simple, evolute or almost capitately contracted; bracts 2-3, foliaceous, up to 25 cm long. Spikelets numerous together forming 5-15 mm broad, subglobose heads,

linear-lanceolate, 3-8 x 1 mm. Glumes hyaline with a reddish brown band on each side of the midrib, sometimes discolouring, broadly obovate-suborbicular with rotundate tips, 0.5-0.8 mm long, muticous or mucronulate, membranaceous. Stamens 1-2. Stigmas 3. Nuts yellowish brown, obovoid, trigonous, about as long as the glumes, apiculate, sessile.

In moist depressions and paddy fields. Balaghat, Bastar, Bilaspur, Chhatarpur, Damoh, Dhar, Durg, Hoshangabad, Indore, Jabalpur, Panna, Raigarh, Raipur, Rajnandgaon, Ratlam, Rewa, Satna, Seoni, Shivpuri, Sidhi, Surguja, West Nimar. *Fl. & Fr.*: July - April.

15. Cyperus diffusus Vahl, Enum. Pl. 2: 321. 1805; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 603. 1893.

Perennials, 20-80 cm high. Stems stout, trigonous below, triquetrous above, 2-5 mm thick. Leaves 5-20 mm broad, subcaudate. Anthela decompound to supradecompound, 10-30 cm across; bracts 4-12, foliaceous, up to 50 cm long; rays spreading. Spikelets usually in clusters of 2-4 or more, or sometimes solitary, 3-12 x 3-4 mm. Glumes rather remote and spreading thus exposing the rhachilla, reddish with a green keel, broadly ovate or suborbicular, 1.5-2 mm long, mucronate; mucros setulose, sometimes curved. Stamens (2-)3. Stigmas 3. Nuts blackish brown, ellipsoid, triquetrous, *ca* 1.5 mm long, acute.

Shahdol (Tiwari, 1968). *Fl. & Fr.*: May - Feb.

16. Cyperus digitatus Roxb., Fl. Ind. 1: 209. 1820; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 618. 1893.

Perennials, 0.5-1.5 m high. Rhizomes creeping. Stems stout, trigonous or triquetrous. Leaves flat or plicate, 4-10(-15) mm broad, coriaceous. Anthela compound or decompound, 25-40 cm across; bracts 3-8, foliaceous, up to 70 cm long. Spikes cylindrical, 3-6 x 1-2 cm. Spikelets numerous, divaricate, linear, 5-20 x 1-1.5 mm; rhachilla wings yellowish, lanceolate. Glumes stramineous or rufous, elliptic-oblong, 2-2.3 mm long, keeled, muticous or mucronulate. Stamens 2. Styles long; stigmas 3, long exserted. Nuts yellowish brown, oblong-ellipsoid, trigonous, 1-1.3 mm long, apiculate.

Bastar (Saxena and Khotele, 1976). *Fl. & Fr.*: May Dec.

17. Cyperus distans L. *f.*, Suppl. Pl. 103. 1782; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 607. 1893.

Perennials, 0.2-1 m high. Rhizomes short, bearing short stout stolons. Stems stout, triquetrous, swollen at base. Leaves 3-10 mm broad. Anthela usually decompound, sometimes compound or supradecompound, 10-30 cm across. Spikes lax, pyramidal. Spikelets young ascending, older divaricate or deflexed, linear or somewhat acicular, 6-60 x 1 mm; rhachilla flexuous, the internodes *ca* 1 mm apart; rhachilla wings hyaline, lanceolate, soon caducous. Glumes rather remote, appressed, usually reddish brown, sometimes yellowish, elliptic, 1.5-2 mm long, muticous, scarcely keeled, slightly inrolled on margins. Stamens 3. Stigmas 3. Nuts deep brown, ellipsoid, trigonous, 1.3-1.6 mm long, apiculate.

In wastelands and among rock boulders. Bilaspur, Mandla, Raigarh, Raipur, Rewa, Satna. *Fl. & Fr.*: Sept. Feb.

18. Cyperus dubius Rottb., Descr. Icon. Rar. Pl. 20. t. 4. f. 5. 1773; Verma & Chandra in Rec. Bot. Surv. India 21(2): 240. 1981. *Mariscus dregeanus* Kunth, Enum. Pl. 2: 120. 1837; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 620. 1893. *M. dubius* Fischer in Gamble, Fl. Madras 3: 1644. 1931.

Perennials, 10-50 cm high. Stems slender, tufted, triquetrous, thickened at base by turgid chestnut brown sheaths. Leaves flaccid, 2-3 mm broad. Inflorescence a solitary (rarely 2-4 together), terminal, ovoid, dense, 7-15 mm broad head; bracts 3-5 or more, foliaceous, up to 35 cm long. Spikelets numerous congested into the head, ovoid, 5-8 mm long, bearing 2-6 nuts; rhachilla wings elliptic. Glumes pale brown, ovate-triangular, muticous. Stamens 2-3. Stigmas 3. Nuts black, oblong-subovoid, trigonous, slightly shorter than the glume.

Bilaspur, Hoshangabad. *Fl. & Fr.*: Oct. Nov.

19. Cyperus elatus L., Cent. Pl. 2: 301. 1756; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 618. 1893.

Perennials, 0.4-1.2 m high. Stems stout, trigonous above. Leaves nearly as long as the stem, up to 15 mm broad. Anthela large, compound; bracts several, foliaceous, up to 70 cm long. Spikes narrowly cylindrical, clustered

at the ends of the rays and a few sessile at the base of the partial anthela, 3-8 cm long. Spikelets more or less densely spirally inserted, erect, linear, hardly compressed, *ca* 5 mm long; rhachilla wings yellowish, lanceolate. Glumes closely imbricating, pale or yellowish brown, ovate, *ca* 1 mm long, acute or mucronulate. Stigmas 3. Nuts pale brown or greyish, ellipsoid, trigonous, subacute at both ends, about one-half to two-third as long as the glume.

Sagar (Singhai, 1954). *Fl. & Fr.*: May.

20. Cyperus esculentus L., Sp. Pl. 45. 1753; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 616. 1893.

Perennials, 10-50 cm high. Rhizomes emitting slender stolons bearing tubers, mature tubers woody, regularly zoned. Stems usually solitary, trigonous. Leaves almost equalling the stem, 3-6 mm broad. Anthela usually compound; bracts 3-5, foliaceous. Spikelets alternate, at the ends of rays, yellow or yellowish brown, linear-lanceolate, 10-20 mm long. Glumes rather laxly imbricating, ovate, 2.5-3 x 2-2.3 mm, obtuse, plicate, striately nerved and green keeled. Stigmas 3. Nuts greyish black, broadly obovoid, trigonous, *ca* 1.5 x 1 mm, obtuse.

Satna. *Fl. & Fr.*: Aug.

21. Cyperus exaltatus Retz., Observ. Bot. 5: 11. 1789; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 617. 1893. *C. tokiensis* C.B. Clarke in Kew Bull. Add. Ser. 8: 9. 1908.

Perennials, 1-2 m high. Rhizomes short. Stems robust, spongy below, trigonous above, usually solitary. Leaves short or long, up to 1 cm broad. Anthela large, compound; bracts 3-6, foliaceous, up to 90 cm long. Spikes umbellate or corymbose, some at least pedunculate, cylindrical, dense or lax, 3-8 cm long. Spikelets numerous, approximate or distant, erect or horizontally spreading, elliptic or oblong-lanceolate, strongly compressed, 3.5-7 x 1.2-2 mm; rhachilla wings oblong. Glumes closely or laxly imbricating, broadly ovate, bright brown, red-brown or chestnut, *ca* 1.2 mm long, cuspidate; keel green or pale. Stigmas 3. Nuts yellowish, dark brown or black, very small, broadly ellipsoid, trigonous, narrowed at both ends.

In dried river-beds and along ponds. Balaghat, Indore, Mandla, Panna, Raipur, Rajnandgaon, Satna, Sagar, Shivpuri, Sidhi. *Fl. & Fr.*: Sept. - Feb.

22. Cyperus flavidus Retz., Observ. Bot. 5: 13. 1789. *C. globosus* All., Fl. Pedem. 49. 1789, *non* Forssk., 1775. *Pycreus capillaris* Nees in Linnaea 9: 283. 1834; C.B. Clarke in Hook.*f.*, Fl. Brit. India 6: 591. 1893. **Fig. 37.**

Annuals or perennials, 10-80 cm high. Stems slender, trigonous. Leaves 1-2 mm broad; lower sheaths reddish brown. Anthela simple (or sometimes subcompound), evolute or capitately contracted; bracts 2-4, foliaceous; rays 1-4, up to 11 cm long. Spikelets numerous, congested, linear, 8-35 x 1.5-3 mm. Glumes closely imbricating, pale brown to chestnut, ovate-oblong, 1.5-2.5 mm long, muticous, glossy, hyaline on margins. Stamens 2. Style long, deeply 2-fid. Nuts blackish brown, obovoid, lenticular, 0.8-1.2 mm long, apiculate.

Bilaspur, Durg, Gwalior, Raigarh, Rajnandgaon, Shivpuri, Sidhi, Surguja. *Fl. & Fr.*: Sept. Nov.

23. Cyperus halpan L., Sp. Pl. 45. 1753, '*haspan*'; C.B. Clarke in Hook.*f.*, Fl. Brit. India 6: 600. 1893.

Perennials or rarely annuals, 8-70 cm high. Rhizomes slender, short or up to 5 cm long, creeping. Stems slender, compressed-trigonous, sometimes almost absent in depauperated plants. Leaves 1.5-4 mm broad, sometimes absent. Anthela compound or decompound, lax; bracts 2-3, foliaceous. Spikelets digitate, (2-)3-6 (-13) together, linear-lanceolate, 2.5-13 x 1-1.5 mm. Glumes ascending and appressed to the rhachilla, even in fruits, so that the rhachilla is invisible or scarcely visible, yellowish red, ovate-oblong, 1-1.7 mm long, mucronulate, inrolled on margins. Stamens 1(-3). Style short, 3-fid. Nuts yellowish, broadly obovoid, trigonous, 0.4-0.5 mm long, apiculate, shortly stipitate.

In damp places and river-beds. Bastar, Bilaspur, Panna, Raigarh, Raipur, Rajnandgaon, Sidhi, Surguja. *Fl. & Fr.*: Aug. - Dec.

24. Cyperus imbricatus Retz., Observ. Bot. 5: 12. 1789. *C. radiatus* Vahl, Enum. Pl. 2: 369. 1805; C.B. Clarke in Hook.*f.*, Fl. Brit. India 6: 617. 1893.

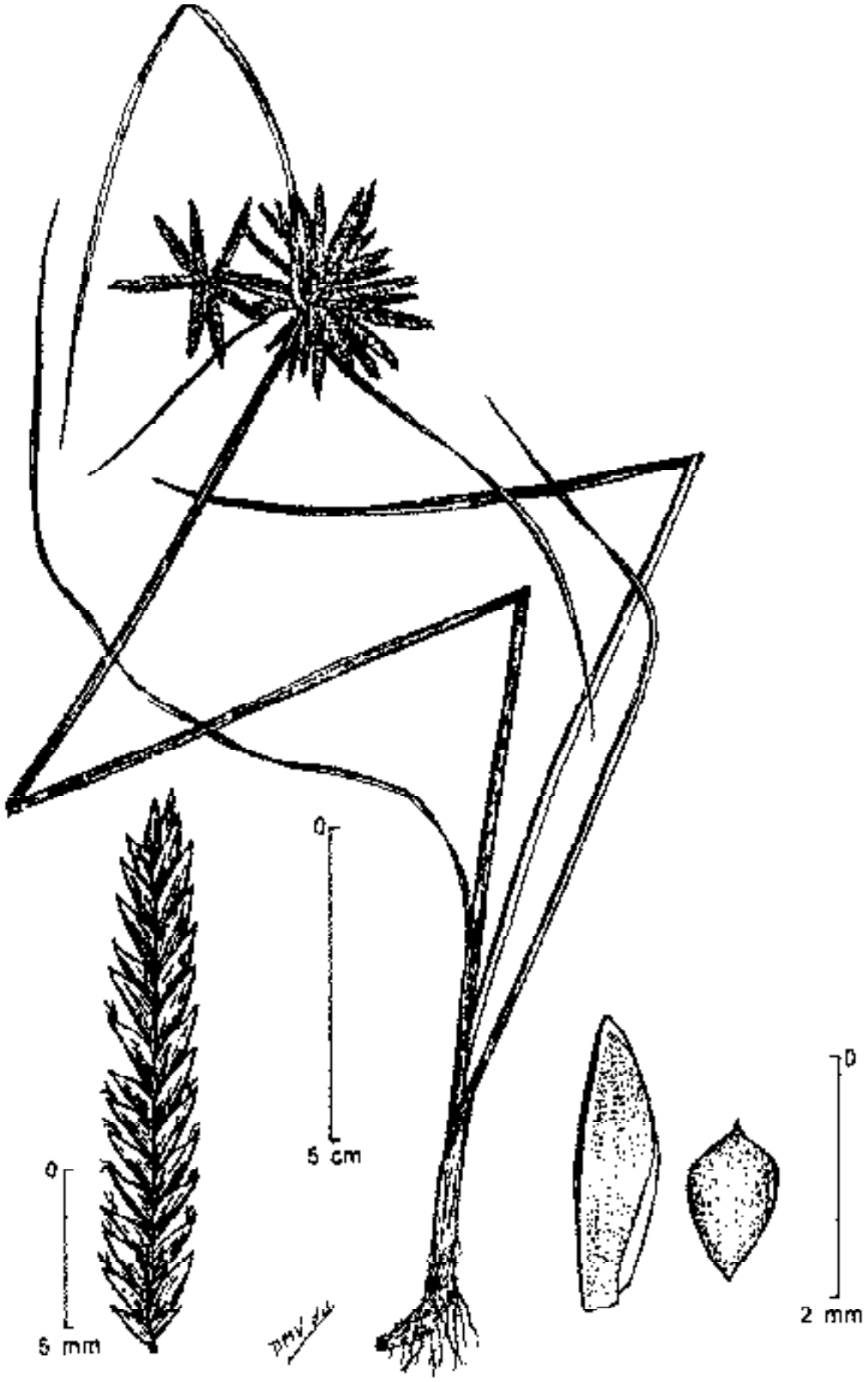

Fig. 37. Cyperus flavidus Retz.

Annuals, 30-90 cm high. Stems solitary, stout, triquetrous. Leaves up to 8 mm broad. Anthela simple or compound, dense. Spikes all subsessile, digitate, dense, cylindrical, 2.5-4 cm long; bracts 5-7, foliaceous, up to 60 cm long. Spikelets ovate or oblong-lanceolate, 3-5 x 1.2 mm, ascending; rhachilla wings oblong. Glumes closely imbricating, dull brownish green, broadly ovate, *ca* 1.2 mm long, muticous or shortly cuspidate, plicate. Stigmas 3. Nuts black, ovoid or broadly ellipsoid, trigonous, *ca* 0.5 mm long.

In muddy places. Satna. *Fl. & Fr.*: Aug.

25. Cyperus iria L., Sp. Pl. 45. 1753; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 606. 1893 & in Ill. Cyper. t. 4. f. 2., *non* f. 1. 1909.

Annuals, 5-50 (-80) cm high. Stems compressed-trigonous. Leaves 1.5-5 (-8) mm broad. Anthela simple or compound, lax, 5-20 cm across; bracts 3-7, foliaceous, up to 30 cm long; rays compressed; anthelules subdense. Spikes narrow, 1-4 cm long, bearing 5-23 spikelets. Spikelets approximate or remote, suberect, linear-oblong, 3-8 (-13) x 1.5-2 mm. Glumes loosely imbricating, broadly obovate to suborbicular, 1.2-1.5 mm long, muticous or mucronulate; keel green, 3-5-nerved; sides cellular reticulate, yellow, 1-2 striate, scarious on margins. Stamens 2 (-3); anthers 0.3 mm long. Style short, 3-fid almost to the base. Nuts glossy, deep brown, obovoid-ellipsoid, triquetrous, 1-1.5 mm long, apiculate, broadly stipitate.

Common in open moist places. Balaghat, Bastar, Bilaspur, Damoh, Hoshangabad, Indore, Mandla, Raigarh, Raipur, Rajnandgaon, Rewa, Sagar, Sidhi, Surguja, Ujjain. *Fl. & Fr.*: Aug. - Feb.

26. Cyperus kyllingia Endl., Cat. Hort. Vindob. 1: 94. 1842. *Kyllinga monocephala* Rottb., Descr. Icon. Rar. Pl. 13. t. 4. f. 4. 1773; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 588. 1893. *K. nemoralis* (J.R. Forster & G. Forster) Dandy *ex* Hutch. in Fl. W. Trop. Africa ed. 1. 2: 487. 1936. *Thyrocephalon nemorale* J.R. Forster & G. Forster, Char. Gen. Pl. 130. 1775, *non Cyperus nemoralis* Cherm., 1921.

Perennials, 8-40 cm high. Rhizomes 1-5 cm long, creeping, aromatic. Stems slender, usually 2-3, sometimes up to 8 in linear succession, compressed-trigonous. Leaves 1.5-4 mm broad. Inflorescence capitate; bracts 3-4, foliaceous, spreading or reflexed. Spikes solitary (or up to 4), greenish white in flower, brownish on maturity, subglobose, 5-10 mm broad.

Spikelets numerous, congested, ovate-elliptic, 2.5-3 x 1 mm, 1-2-flowered. Glumes keeled, mucronulate, 5-7-nerved, conspicuously with red dots throughout; keel lunately crested in upper half, crest ciliolate-spinulous, with red dots. Stamens 3; anthers 0.5-1 mm long, crest ovate. Styles deeply 2-fid. Nuts blackish brown, obovoid-oblong, lenticular, 1.2-1.5 x 0.5 mm.

Jabalpur, Raipur, Ujjain. *Fl. & Fr.*: Aug. - Oct.

27. Cyperus laevigatus L., Mant. Pl. 179. 1771. *Juncellus laevigatus* C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 596. 1893.

Perennials. Rhizomes slender, creeping, short or long, 10-60 cm high, with chestnut-red sheaths at base. Leaves long, short or absent, 2-3 mm broad. Inflorescence capitate; bracts 2, one very short and broad, the other up to 5 cm long, erect and appearing as though a continuation of the stem. Spikelets few to several in a densely congested pseudolateral head, stramineous or with red tinge, linear-oblong, 5-12 mm long, somewhat turgid, 16-40-flowered. Glumes broadly ovate, mucronulate. Stamens 3. Stigmas 2. Nuts obovoid, plano-convex, more or less compressed at right angles to the rhachilla, about half to two-third as long as the glume.

Shivpuri. *Fl. & Fr.*: July - Sept.

28. Cyperus latespicatus Boeck. in Flora 42: 441. 1859. *Pycreus latespicatus* C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 590. 1893. *Cyperus diaphanus* Schrad. *ex* Roem. & Schult. var. *latespicatus* Kern in Steenis, Fl. Males. ser. I. 7(3): 653. 1974.

Annuals, 5-40 cm high. Stems rigid, subtrigonous. Leaves 2-3 mm long. Anthela simple, evolute or contracted; bracts 2-4, foliaceous. Spikelets congested, 3-6 together, spreading, oblong-lanceolate, 10-17 x 3-4 mm. Glumes fulvous, castaneous or purplish, ovate-oblong, 2.5-3.5 mm long, undulate on margins. Stamens 2. Styles long, deeply 2-fid. Nuts blackish, broadly obovoid, lenticular, *ca* 1.5 mm long, apiculate, transversely undulately zonate.

1a. Spikelets *ca* 9 x 2.5 mm; glumes *ca* 2 mm long; nuts *ca* 1 mm long ...28.1. var. *gracilescence*

1b. Spikelets 10-17 x 3-4 mm; glumes 2.5-3.5 mm long; nuts *ca* 1.5 mm long ...28.2. var. *latespicatus*

28.1. var. **gracilescence** Kuekenth. in Engl., Pflanzenr. heft 101: 393. 1936. *Cyperus diaphanus* var. *gracilescence* Saxena in Indian For. 99: 505-507. 1973. *Pycreus diaphanus* var. *gracilescence* Hooper in Saldanha & Nicolson, Fl. Hassan Dist. 692. 1976.

Probably not a distinct variety.

Hoshangabad (Saxena, 1973).

28.2. var. **latespicatus**

In moist sandy places. Raipur, Surguja, Ujjain. *Fl. & Fr.*: Aug. Sept.

29. Cyperus leucocephalus Retz., Observ. Bot. 5: 11. 1789; C.B. Clarke in Hook.*f.*, Fl. Brit. India 6: 602. 1893.

Perennials, 10-30 cm high. Rhizomes short, woody. Leaves very narrow. Inflorescence a terminal, dense, white or yellowish brown, subglobose, 12-15 mm broad head; bracts 3-5, foliaceous, up to 10 cm long. Spikelets many congested in a head, elliptic, 10-12 x 3-4 mm. Glumes loosely imbricating, oblong-lanceolate, *ca* 2.5 mm long, muticous, 5-nerved. Stamen 1. Stigmas 3. Nuts black, oblong-ellipsoid, trigonous, *ca* 1.2 mm long, white reticulate.

Hoshangabad (Tiwari and Maheshwari, 1964). *Fl. & Fr.*: May.

30. Cyperus macer C.B. Clarke in J. Linn. Soc. London (Bot.) 21: 160. 1884 & in Hook.*f.*, Fl. Brit. India 6: 613. 1893.

Perennials, 30-80 cm high. Rhizomes short, creeping. Stems slender, trigonous or triquetrous. Leaves much shorter than the stem, 1.5-2.5 mm broad. Anthela usually simple, sometimes compound; bracts 2-3, foliaceous, up to 8 cm long. Spikelets subdigitate, 3-5 together, linear, 6-20 x 1.5-2 mm; rhachilla wings narrow, hyaline, with red streaks. Glumes remote, stramineous with red dots, ovate-oblong, *ca* 3 mm long, keeled, obtuse, enrolled on margins. Stamens 3. Style 3-fid almost to the base, with red dots. Nuts blackish, obovate-oblong, trigonous, about half as long as the glumes, apiculate.

Mandla. *Fl. & Fr.*: Jan.

31. Cyperus melanospermus (Nees) Valck.-Suring., Cyperus 50. t. 2. f. 8. 1898. *Kyllinga melanosperma* Nees in Wight, Contr. Bot. India 91. 1834; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 588. 1893.

Perennials, 0.4-1.2 m high. Rhizomes short, thick, woody, creeping, up to 5 cm long. Stems few to many, triquetrous above. Leaves much shorter than the stem, 3-5 mm broad. Inflorescence a solitary, terminal, greenish, ovoid or subglobose, up to 1 cm long and 5-7 mm broad head; bracts 3-4, foliaceous, up to 15 cm or more long. Spikelets numerous, congested in the head, *ca* 3 mm long, usually bearing one, rarely 2 nuts. Glumes ovate, acute; keel green, excurrent, smooth; sides fuscous, 3-4-striate. Stamens often 3. Stigmas 2. Nuts ultimately black, obovoid-oblong, about two-third as long as the glume.

Bastar (Saxena and Khotele, 1976).

32. Cyperus metzii (Hochst. *ex* Steud.) Mattf. & Kuekenth. in Engl., Pflanzenr. heft 101: 612. 1936. *Kyllinga metzii* Hochst. *ex* Steud., Syn. Pl. Cyper. 70. 1855. *K. squamulata* Thonn. *ex* Vahl, Enum. Pl. 2: 381. 1805; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 589. 1893.

Annuals, 5-30 cm high. Stems slender, tufted, trigonous. Leaves usually exceeding the stem, *ca* 3 mm broad. Inflorescence a solitary, terminal, greenish or brownish, ovoid-subglobose, *ca* 5 mm across head, sometimes 1-2 smaller lateral heads also added; bracts 3-4, foliaceous, divaricately spreading, up to 15 cm long. Spikelets numerous congested in the head, elliptic-oblong, *ca* 3 mm long, bearing a solitary nut. Glumes ovate, subacute, with a green excurrent recurved keel; keel of the flowering glume with a very broad, hyaline, incise-dentate crest. Stigmas 2. Nuts brown.

Balaghat. *Fl. & Fr.*: Sept. Oct.

33. Cyperus micans Kunth, Enum. Pl. 2: 12. 1837. *C. ferrugineus* Poir. in Lam., Encycl. 7: 261. 1806, *non* L., 1753. *Pycreus ferrugineus* (Poir.) C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 593. 1893. *P. micans* (Kunth) Karthik., Florae Ind. Enum. Monocot. 65. 1989.

Perennials. Leaves *ca* 3 mm broad. Anthela somewhat open; bracts 3-5, foliaceous. Spikelets with red tinge, oblong-lanceolate, 10-15 mm long,

spreading or suberect, many-flowered. Glumes oblong-lanceolate, *ca* 2 mm long, muticous. Stigmas 2. Nuts brown, narrowly oblong, lenticular, apiculate.

Along streams in sandy soil. Hoshangabad. *Fl. & Fr.*: Feb.

Fischer (in Gamble, Fl. Madras, Repr. ed., 3: 1132. 1957) is probably right in considering it as synonymous to *Pycreus odoratus* Urb. (=*Cyperus polystachyos* R. Br.).

34. Cyperus michelianus (L.) Delile, Hort. Bot. Berol. 1: 303. 1827. *Scirpus michelianus* L., Sp. Pl. 52. 1753; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 662. 1893. *Isolepis micheliana* Roem. & Schult., Syst. Veg. 2: 114. 1817.

Annuals, 2-15 cm high. Stems slender, compressed-trigonous, sometimes curved. Leaves 1-2 mm broad. Inflorescence capitate, of 4-6, ovoid-subglobose, 6-15 mm broad spikes; bracts 3-8, foliaceous, up to 8 cm long. Spikelets numerous, congested, subterete, 3-5 x 1-2 mm; rhachilla hyaline on margins. Glumes spiral, tightly imbricating, stramineous, sometimes with red dots, oblong-lanceolate, 1.5-2 mm long, mucronate; mucro stout, slightly excurved. Stamens usually 2, sometimes 1. Stigmas 2 (rarely 3). Nuts pale brown, linear-oblong, plano-convex (or rarely trigonous), *ca* 1 mm long, slightly stipitate; surface cells hyaline, inflated, the nut thus appearing to be narrowly marginate.

In cultivated fields and stream beds. Damoh, Narsimhapur, Raipur. *Fl. & Fr.*: Aug. Oct.

35. Cyperus mitis Steud., Syn. Pl. Glumac. 2: 316. 1855; Kuekenth. in Engl., Pflanzenr. heft 101: 103. 1935. *C. stenostachyus* var. *indica* C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 614. 1893. *C. tuberosus auct. non* Rottb., 1773: C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 616. 1893, *p.p. C. tenuiflorus* Roxb., Fl. Ind. 1: 199. 1832; C.B. Clarke in J. Linn. Soc. London (Bot.) 21: 174. 1884, *p.p.* (Pl. indicae).

Rhizomes bearing long, thin but woody stolons. Stems slender, conspicuously swollen at the base. Leaves narrow, 2-3 mm broad. Anthela simple or subcompound, with only a few branches; bracts 2-3, much exceeding the anthela; rays slender, up to 4 cm long. Spikelets obliquely spreading, narrowly linear, compressed, 7-10 x 1 mm, acute. Glumes laxly

imbricating, fuscous, ovate-lanceolate, 2-2.5 mm long, subobtuse, opaque, hyaline on margins and tips. Nuts obovoid-ellipsoid, trigonous.

Gwalior, *Maries* 111 (c.f. Kuekenth., *l.c.*).

36. Cyperus niveus Retz., Observ. Bot. 5: 12. 1789; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 601. 1893.

Perennials, 15-80 cm high. Rhizomes shortly creeping. Stems rather rigid, trigonous. Leaves glaucous green, 1.5-2 mm broad. Inflorescence capitate, 1-4 cm broad; bracts 2-3, foliaceous, spreading to deflexed, up to 8 cm long. Spikelets oblong-lanceolate, 10-25 x 4-6 mm; rhachilla broad, wingless. Glumes tightly imbricating, whitish stramineous, pale brown striolate, ovate-lanceolate, 4-5 mm long, mucronulate, chartaceous. Stamens 3. Stigmas 3. Nuts brown, obovoid, triquetrous, *ca* 1.5 mm long, apiculate, subsessile, densely puncticulate.

In wastelands, rock crevices and sal forests. Bastar, Bilaspur, Hoshangabad, Raigarh, Raipur, Rewa, Satna, Seoni, Shivpuri, Sidhi. *Fl. & Fr.*: Aug. Dec.

37. Cyperus nutans Vahl, Enum. Pl. 2: 363. 1805; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 607. 1893.

Perennials, 0.5-1 m high. Rhizomes short, bearing short stolons. Stems stout, trigonous below, triquetrous above. Leaves 6-12 mm broad, coriaceous. Anthela lax, compound or decompound; bracts 4-6, foliaceous, up to 60 cm long; rays obliquely spreading, compressed. Spikes dense, penicilliform, often somewhat nodding, 3-4.5 x 0.2-1 cm, bearing 15-25 spikelets. Spikelets linear-oblong, 5-14 x 2 mm, 8-16-flowered; rhachilla wings hyaline, lanceolate; internodes *ca* 0.7 mm long. Glumes elliptic, 2-2.5 x 1 mm, margins broadly scarious in the upper half, incised at the tip and mucronulate by the excurrent tip, 7-nerved; keel greyish green, sides pale fuscous. Stamens 3. Styles 3-fid almost to the base. Nuts brown, narrowly obovoid-oblong, triquetrous, *ca* 1.5 x 0.5 mm, apiculate.

1a. Spikelets 8-16-flowered; internodes of rhachilla *ca* 0.7 mm long; nuts *ca* 1.5 x 0.5 mm ...37.2. var. *nutans*

1b. Spikelets less than 8-flowered; internodes of rhachilla *ca* 0.5 mm long; nuts 1.1-1.3 x 0.6-0.7 mm ...37.1. var. *eleusinoides*

37.1. var. **eleusinoides** (Kunth) Haines, Bot. Bihar Orissa 5: 898. 1924. *Cyperus eleusinoides* Kunth, Enum. Pl. 2: 39. 1837; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 608. 1893. *C. nutans* subsp. *eleusinoides* Koyama in Gard. Bull. 30: 136. 1977.

Along drains and rivers. Bilaspur, Damoh, Dhar, Hoshangabad, Raigarh, Raipur, Shivpuri, Surguja. *Fl. & Fr.*: July - Dec.

37.2. var. **nutans**

Bastar (Subramanyam and Henry, 1966). *Fl. & Fr.*: May.

38. Cyperus pangorei Rottb., Descr. Icon. Rar. Pl. 31. t. 7. f. 3. 1773, *non C. corymbosus* var. *pangorei* C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 612. 1893. *C. tegetum* Roxb., Fl. Ind. 1: 208. 1832; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 613. 1893.

Perennials, 0.4-1 m high. Rhizomes long creeping, strongly aromatic, bearing several stolons. Stems subcylindrical below, trigonous above, 4-5 mm thick. Leaves usually all reduced to bladeless sheaths, sometimes the upper one bearing up to 20 cm long and 4-7 mm broad lamina. Anthela compound (rarely decompound), 20-40 cm across; bracts 3-5, foliaceous, up to 70 cm long. Spikelets clustered, 4-9 together, linear, 12-30 x 2.5-3 mm; rhachilla wings white hyaline to sanguineous, lanceolate, caducous. Glumes reddish (sometimes decolouring), elliptic-oblong, *ca* 3 mm long, muticous, inrolled on margins. Stamens 3. Style deeply 3-fid; stigmas long exserted. Nuts blackish brown, narrowly obovoid, trigonous, *ca* 1.5 mm long, scarcely apiculate.

Along streams. Balaghat, Bilaspur, Dhar, East Nimar, Hoshangabad, Indore, Mandla, Panna, Raigarh, Raipur, Rajnandgaon, Sagar, Satna, Seoni, Sidhi, Tikamgarh, West Nimar. *Fl. & Fr.*: Aug. - May.

39. Cyperus paniceus (Rottb.) Boeck. in Linnaea 36: 381. 1870, *p.p.*; Kern in Steenis, Fl. Males. ser. I. 7(3): 643. 1974. *Kyllinga panicea* Rottb., Descr. Icon. Rar. Pl. 15. t. 4. f. 1. 1773. *Mariscus paniceus* Vahl, Enum. Pl. 2: 373. 1805, *p.p.*; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 620. 1893.

Perennials, 25-70 cm high. Rhizomes short, aromatic. Stems rigid, trigonous. Leaves 2.5-10 mm broad. Anthela simple, usually capitately

contracted, sometimes evolute; bracts 7-11, foliaceous, up to 50 cm long; rays up to 5 cm long. Spikes cylindrical, 10-25 x 6-13 mm. Spikelets obliquely spreading, 6-10 x 0.8-1 mm, bearing a solitary nut, sometimes when fully mature divaricate; rhachilla winged. Glumes greenish, ovate-oblong, 3-4 mm long, subchartaceous, several-nerved. Stamens 3. Style 3-fid. Nuts brown, ellipsoid, trigonous, 1.8-2.5 mm long, apiculate.

Mandla. *Fl. & Fr.*: Sept. Oct.

40. Cyperus pilosus Vahl, Enum. Pl. 2: 354. 1805; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 609. 1893.

Perennials, 0.2-1 m high. Rhizomes bearing long slender stolons. Stems stout, compressed-triquetrous, scabrid on angles above. Leaves 6-10 mm broad, coriaceous. Anthela compound, 10-40 cm across; bracts 3-5, foliaceous, up to 70 cm long. Spikes 3-7 together, diverging, 2-5 cm long, subsessile; rhachis yellow hispidulous. Spikelets subdistichous, divaricate or lower deflexed, linear, 6-12 x 1.5-2 mm; rhachilla hyaline on margins. Glumes yellowish or reddish brown, ovate-elliptic, 1.5-2 mm long, muticous or mucronulate, broadly scarious and inrolled on margins. Stamens 3. Style short, deeply 3-fid, with red dots. Nuts blackish, obovoid, triquetrous, 1-1.3 mm long, apiculate, shortly stipitate.

In muddy places. Balaghat, Bilaspur, Hoshangabad, Raipur, Rajnandgaon, Sidhi, Surguja. *Fl. & Fr.*: July - March.

41. Cyperus platystylis R. Br., Prodr. 214. 1810; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 598. 1893. **Fig. 38.**

Perennials, aquatic. Rhizomes short. Stems triquetrous, 0.1-1 m long, smooth or scabrid at the tip. Leaves greyish green, 7-12 (-20) mm broad, coriaceous, transversely septate, scabrid on margins and midrib beneath; sheaths strongly keeled. Anthela decompound, 6-30 cm across; bracts 5-8, foliaceous, up to 80 cm long. Spikelets in clusters of 3-8, ovate-lanceolate, 6-15 (-20) x 2.5-3 mm. Glumes glossy yellowish brown, broadly ovate, 2-2.5 mm long, mucronate, membranaceous, cellular-reticulate. Stamens 3. Stigmas 3. Nuts greyish brown, ellipsoid, trigonous, ventrally concave, dorsally convex with raised angles, 1.7-2 mm long, apiculate, the angles in mature nuts corky thickened.

Along ponds. Mandla, Raipur. *Fl. & Fr.*: April - May.

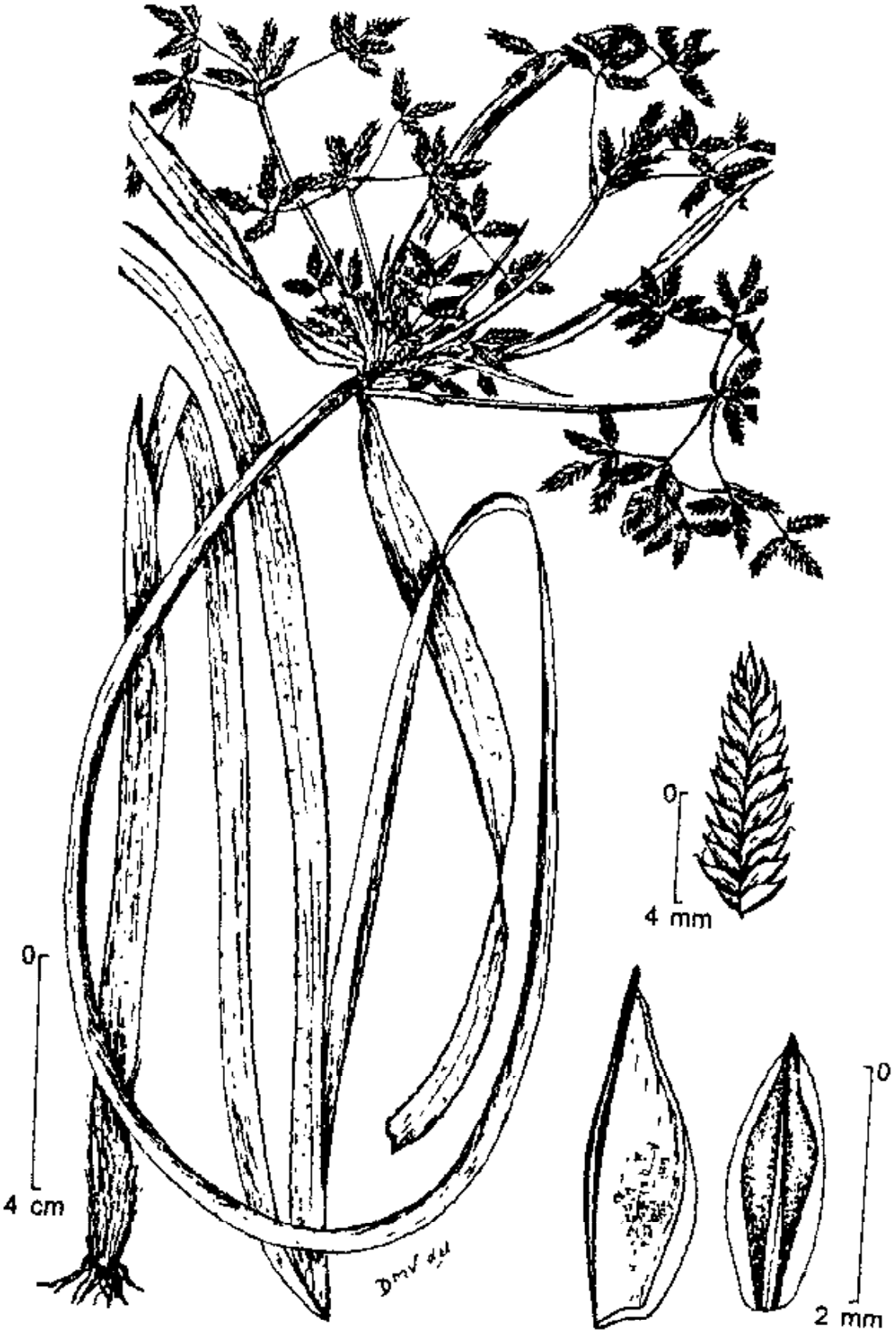

Fig. 38. Cyperus platystylis R. Br.

42. Cyperus polystachyos Rottb., Descr. Pl. Rar. 21. 1772 & Descr. Icon. Rar. Pl. 39. t. 21. f. 1. 1773. *Pycreus polystachyos* P. Beauv., Fl. Oware 2: 48. t. 86. f. 2. 1807; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 592. 1893. **Fig. 39.**

Annuals or perennials, 10-70 cm high. Stems compressed-trigonous. Leaves greyish green, 2-4 mm broad. Anthela compound, evolute or capitately contracted; bracts 3-6, foliaceous, up to 20 cm long. Spikelets numerous, congested, linear, 8-25 x 1.5 mm; rhachilla narrowly winged. Glumes stramineous or pale ferrugineous (rarely castaneous), ovate-lanceolate, 1.5-2 mm long, acute, membranaceous. Stamens 1-2. Styles deeply 2-fid. Nuts brown or ultimately glossy black, linear-oblong, lenticular, with almost truncate shoulders, 1-1.2 mm long, apiculate.

Surguja. *Fl. & Fr.*: Aug. - Nov.

43. Cyperus procerus Rottb., Descr. Icon. Rar. Pl. 29. t. 5. f. 3. 1773; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 610. 1893.

Perennials, tufted, up to 1.2 m high. Rhizomes stoloniferous. Stems stout, triquetrous. Leaves longer or shorter than the stem, 9-15 mm broad, coriaceous, canaliculate. Anthela simple or subcompound, 10-15 cm across; bracts foliaceous, exceeding the anthela; rays rigid, 2-10 cm long, spreading. Spikes diverging, shortly pedunculate; rhachis hyaline on margins, sparsely hispidulous. Spikelets oblong or broadly linear, 10-35 mm long, 10-50-flowered. Glumes loosely imbricating, reddish brown, ovate or elliptic, 2.5-3 mm long, mucronulate, 5-7-nerved, hyaline on margins. Stamens 3. Style deeply 3-fid. Nuts blackish brown, obovoid or ellipsoid, trigonous, *ca* 1.5 mm long, apiculate, subsessile.

In open moist depressions. Bastar, Rajnandgaon. *Fl. & Fr.*: Sept.

44. Cyperus pseudokyllingioides Kuekenth. in Engl., Pflanzenr. heft 101: 501. 1936. *Courtoisia cyperoides* Nees in Wight, Contr. Bot. India 92. 1834; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 625. 1893, *non Cyperus cyperoides* (L.) Kuntze, 1898.

Annuals, 10-50 cm high. Roots purplish. Stems slender, trigonous. Leaves 1.5-4 mm broad. Anthela compound or subcompound; bracts 3-7,

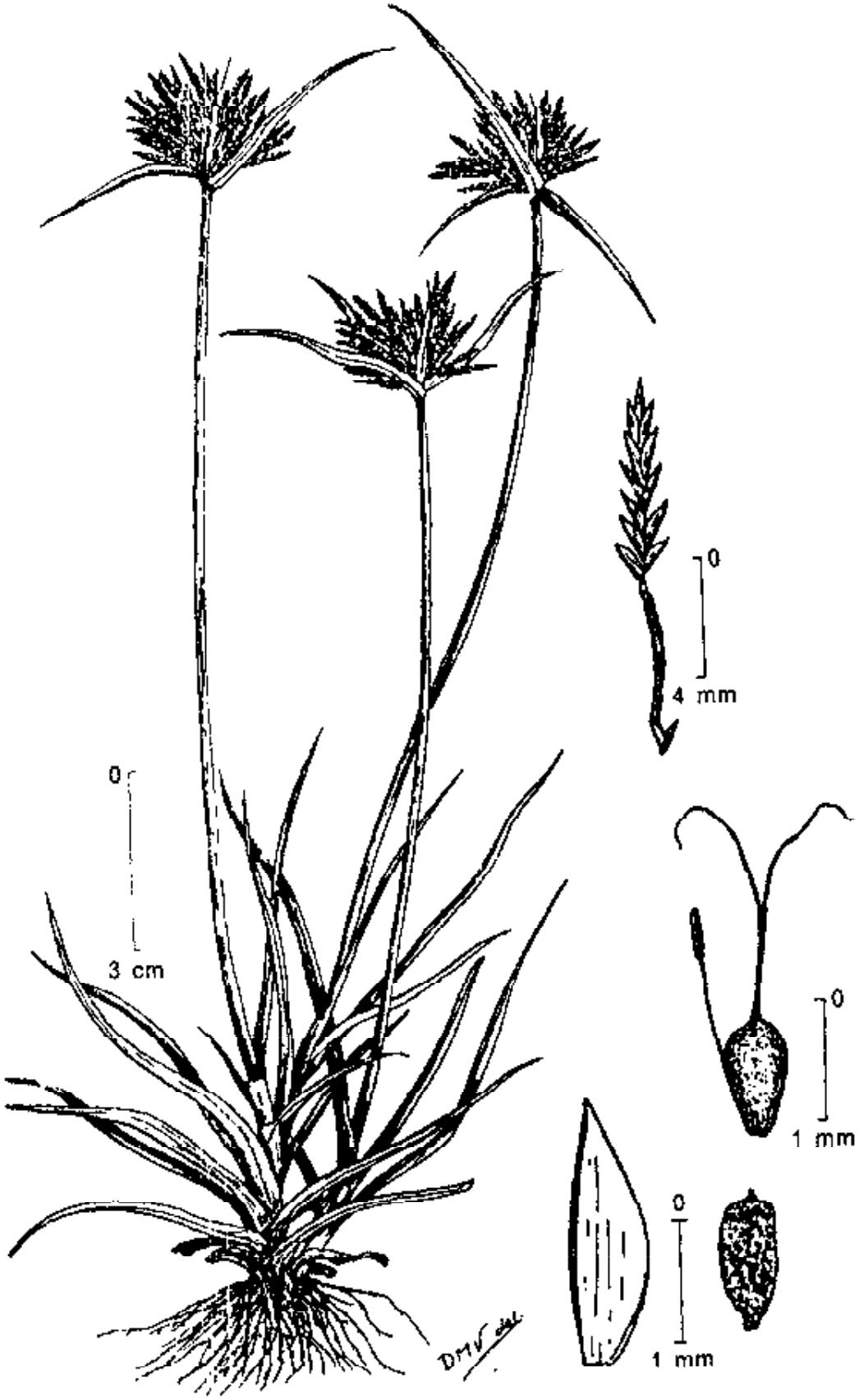

Fig. 39. Cyperus polystachyos Rottb.

foliaceous, rather distantly placed, up to 40 cm long; rays sometimes curved. Spikelets many together, congested in subglobose, 5-8 mm broad spikes, elliptic-oblong, strongly compressed, 3-4 x 1.2-1.5 mm, 1-2-flowered; rhachilla winged. Glumes brown, elliptic, 2.5-3 mm long, cellular reticulate, grooved, with a short stout mucro; keel yellow, broadly winged. Stamens 3. Stigmas 3. Nuts glossy deep brown, fusiform, trigonous, 2.3-2.7 mm long, long apiculate, puncticulate.

Along streams and waterlogged areas. Balaghat, Betul, Bilaspur, Mandla, Panna, Raigarh, Raipur, Rajnandgaon, Sidhi. *Fl. & Fr.*: Sept. March.

45. Cyperus pulchellus R. Br., Prodr. 213. 1810; Kern in Steenis, Fl. Males. ser. I. 7(3): 632. 1974. *C. leucocephalus* Nees in Hook., J. Bot. 21: 107. 1841, *p.p.*; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 602. 1893, *non* Retz., 1789.

Perennials, 10-30 cm high. Stems slender, slightly swollen at base. Leaves very narrow. Inflorescence a solitary, terminal head; heads dense, whitish or pale yellowish brown, globose, 5-12 mm across; bracts 3-5, foliaceous, up to 10 cm long. Spikelets numerous, congested, elliptic, 3-5 x 1.5-2 mm, several-flowered. Glumes loosely imbricating, oblong-lanceolate, 1-2 mm long, obtuse, obscurely 3-nerved. Stamen 1. Stigmas 3. Nuts black, oblong-ellipsoid, trigonous, about half as long as the glumes.

Bilaspur, Hoshangabad. *Fl. & Fr.*: Sept. - Nov.

46. Cyperus pumilus L., Cent. Pl. 2: 6. 1756. *Pycreus pumilus* Nees *ex* C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 591. 1893, *quoad. basion., excl. descr. P. nitens* Nees in Linnaea 9: 283. 1834 & in Nov. Act. Nat. Cur. 19. Suppl. 1: 53. 1843; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 591. 1893.

Annuals, 1-25 cm high. Stems compressed-trigonous. Leaves 1-2 mm broad, canaliculate. Antheia simple or subcompound, contracted or evolute; bracts 3-5, foliaceous, up to 18 cm long. Spikelets several to many congested together in subglobose heads, linear-oblong, 5-13 x 1-2 mm; rhachilla hyaline on margins. Glumes stramineous, sometimes brown striolate, ovate, 1-1.5 mm long, mucronate, truncate on shoulders; mucro

erect or slightly curved, *ca* 0.2 mm long. Stamens 1-2. Styles deeply 2-fid. Nuts blackish brown, narrowly obovoid, lenticular, *ca* 0.5 mm long, apiculate, shortly stipitate.

In wastelands. Balaghat, Bastar, Bilaspur, Dhar, Durg, Hoshangabad, Indore, Panna, Raipur, Rajnandgaon, Rewa, Sagar, Satna, Shivpuri, Sidhi, Ujjain. *Fl. & Fr.*: Aug. Nov.

47. Cyperus pygmaeus Rottb., Descr. Icon. Rar. Pl. 20. t. 14. f. 4-5. 1773. *Juncellus pygmaeus* C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 596. 1893. *Cyperus michelianus* var. *pygmaeus* Ascher. & Graebn., Syn. Mitteleur. Fl. 2. 2: 273. 1904; Hooper in Saldanha & Nicolson, Fl. Hassan Dist. 667. 1976.

Annuals, 3-20 cm high. Leaves numerous, flaccid, 1.5-2 mm broad. Spikelets numerous, congested in a terminal, 6-15 mm broad head, ovate, *ca* 5 x 2.5 mm, 8-20-flowered; bracts 2-6, foliaceous, up to 15 cm long; rhachilla sometimes curved or twisted. Glumes with brown streaks, oblong-lanceolate, 2.5-3 x 1 mm, cuspidate, broadly hyaline on margins. Stamens usually solitary, rarely 2. Stigmas 2. Nuts orange-brown, ellipsoid, plano-convex, *ca* 1 mm long.

Along streams and roadside ditches. Bhopal, Bilaspur, Hoshangabad, Indore, Mandla, Morena, Narsimhapur, Raipur, Sagar, Satna, Shivpuri, Ujjain. *Fl. & Fr.*: Aug. - Nov.

48. Cyperus rotundus L., Sp. Pl. 45. 1753; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 614. 1893; Kern in Steenis, Fl. Males. ser. I. 7(3): 604. 1974. - *Motha.*

Perennials, 10-50 cm high. Stolons long, slender, with intermittent ellipsoid aromatic tubers. Stems compressed-trigonous, sometimes tortuous, base tuberous. Leaves 2-5 mm broad. Anthela usually simple, sometimes compound; bracts 2-4, foliaceous, up to 15 cm long. Spikelets 3-10 together, linear-lanceolate, 10-35 x 1.5-2 mm, frequently curved; rhachilla wings with hyaline or red streaks, lanceolate. Glumes tightly imbricating, reddish or deep brown, broadly ovate, 3-3.5 mm long, muticous or mucronulate, keeled. Stamens 3. Styles long exserted; stigmas 3. Nuts glossy black, broadly obovate or obovoid-ellipsoid, trigonous, 1.5-1.7 mm long.

1a. Spikelets 1.5-2 mm broad; glumes reddish or deep brown, broadly ovate; nuts obovoid-ellipsoid ...48.1. subsp. *rotundus*

1b. Spikelets 2-2.5 mm broad; glumes pale ferrugineous, deep yellow or reddish yellow, ovate-lanceolate; nuts broadly obovate ...48.2. subsp. *tuberosus*

48.1. subsp. **rotundus**

In open moist places. Bastar, Betul, Bilaspur, Damoh, Gwalior, Hoshangabad, Indore, Mandla, Raigarh, Raipur, Rajnandgaon, Rewa, Satna, Seoni, Sidhi, Surguja, Ujjain, West Nimar. *Fl. & Fr.*: July - April.

48.2. subsp. **tuberosus** (Rottb.) Kuekenth. in Engl., Pflanzenr. heft 101: 113. 1935. *C. tuberosus* Rottb., Descr. Icon. Rar. Pl. 28. t. 7. f. 1. 1773; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 616. 1893, *p.p.*

Sagar (Singhai, 1954). *Fl. & Fr.*: Aug. - Jan.

49. Cyperus sanguinolentus Vahl, Enum. Pl. 2: 351. 1805. *Pycreus sanguinolentus* Nees in Linnaea 9: 283. 1834; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 590. 1893.

Annuals or perennials, 30-90 cm high. Rhizomes, if present, short or creeping to 15 cm. Stems usually decumbent at the base, compressed-trigonous. Leaves several clustered at the base, a few also upwards, 1.5-4 mm broad. Anthela open, evolute or capitately contracted; bracts 2-5, foliaceous, up to 20 cm long; rays, if present, 1-3, up to 4 cm long. Spikelets congested, 3-21 together, ovate or oblong-lanceolate, 5-25 x 2-3 mm. Glumes sublaxly imbricating, ovate, 1.5-2.5 mm long, with a sanguineous band on both sides; keel green, 3-5-nerved. Stamens 2 or 3. Styles 1.5-2 mm long, 2-fid. Nuts blackish brown, broadly obovoid or suborbicular, 1-1.3 x 0.8-1 mm, apiculate.

1a. Anthela usually open, sometimes capitately contracted; glumes 1.5-2 mm long; stamens 2; nuts *ca* 1 mm long ...49.1. subsp. *cyrtostachys*

1b. Anthela evolute or capitately contracted; glumes 2.2-2.5 mm long; stamens 3; nuts 1.1-1.3 mm long ...49.2. subsp. *sanguinolentus*

49.1. subsp. **cyrtostachys** (Miq.) Kern in Reinwardtia 3: 57. 1954. *C. eragrostis* var. *cyrtostachys* Miq., Fl. Ind. Bat. 3: 257. 1856.

Raipur, Surguja. *Fl. & Fr.*: Oct.

49.2. subsp. **sanguinolentus**

In muddy places. Balaghat, Indore, Raigarh, Sidhi, Surguja. *Fl. & Fr.*: Aug. March.

50. Cyperus squarrosus L., Cent. Pl. 2: 6. 1756; Kern in Steenis, Fl. Males. ser.I. 7(3): 631. 1974. *C. aristatus* Rottb., Descr. Pl. Rar. 22. 1772; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 606. 1893. *Mariscus squarrosus* C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 623. 1893, *quoad syn.*; Hooper in Saldanha & Nicolson, Fl. Hassan Dist. 690. 1976.

Annuals, 5-15 cm high. Stems trigonous. Leaves flaccid, 1.5-2.5 mm broad. Anthela simple, evolute, with 2-5 rays, or capitate; bracts 2-5, foliaceous, up to 10 cm long. Spikelets numerous, congested, usually brownish, oblong, 5-8 x 3-4 mm, 6-20-flowered. Glumes pale or brown, oblong-lanceolate, *ca* 3 mm long (including the mucro), strongly keeled, mucronate; sides many nerved; mucro 1-1.5 mm long, recurved. Stamen 1. Stigmas 3. Nuts reddish brown, narrowly obovoid, trigonous, *ca* 1.2 mm long, apiculate.

In low-lands. Betul, Damoh, Dhar, Hoshangabad, Indore, Mandla, Raipur, Rajnandgaon, Ratlam, Rewa, Satna, Sidhi, Tikamgarh. *Fl. & Fr.*: Sept. - Nov.

51. Cyperus stoloniferus Retz., Observ. Bot. 4: 10. 1786; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 615. 1893.

Perennials, 10-30 cm high. Rhizomes long creeping, branched. Stems wiry, often flexuous, swollen at base, trigonous above. Leaves filiform or very narrow, rigid, usually squarrosely recurved. Anthela simple, contracted; bracts 3, foliaceous, up to 10 cm long; rays almost absent to 3 cm long. Spikelets ovate or linear-oblong, scarcely compressed, 6-15 mm long, 8-20-flowered. Glumes closely packed, red, broadly ovate, *ca* 2.5 mm long, plicate, acute, with broadly hyaline margins. Stigmas 3, long. Nuts dark brown, obovoid, plano-convex, dorsal surface hardly keeled, somewhat curved.

Jabalpur (Tiwari and Maheshwari, 1964). *Fl. & Fr.*: Dec.

52. Cyperus tenuispica Steud., Syn. Pl. Cyp. 2: 11. 1854. *C. flavidus* C.B. Clarke in J. Linn. Soc. London (Bot.) 21: 122. t. 3. f. 25. 1884 & in Hook. *f.*, Fl. Brit. India 6: 600. 1893, *non* Retz., 1789.

Annuals, 4-25 cm high, usually short lived. Stems slender, trigonous, yellowish green or, alongwith the leaves, blackening with age. Leaves 1.5-3.5 mm broad. Anthela compound or decompound, 1.5-7 cm across; bracts 2-3, foliaceous, up to 12 cm long. Spikelets digitate, 3-9 together, linear-lanceolate, 3-7 x 1-1.5 mm, 8-28-flowered. Glumes laxly imbricating or ultimately widely spreading so that the rhachilla is distinctly visible, yellowish green to ferrugineous, purple striolate, ovate-oblong, 0.7-1 mm long, truncate on shoulders, keeled, acute or mucronulate; apices usually excurved. Stamens 1 (-2). Stigmas 3. Nuts marble white, broadly obovoid to subglobose, obscurely trigonous, 0.2-0.3 mm long, obtuse or apiculate, subsessile, tuberculate.

In moist places. Balaghat, Chhatarpur, Mandla, Raigarh, Raipur, Rajnandgaon, Sagar, Satna, Shivpuri, Sidhi. *Fl. & Fr.*: Nov. Feb.

53. Cyperus triceps Endl., Cat. Horti Vindob. 1: 94. 1842; Kern in Steenis, Fl. Males. ser. I. 7(3): 659. 1974. *Kyllinga triceps* Rottb., Descr. Icon. Rar. Pl. 14. t. 4. f. 6. 1773, *nom. illegit.*; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 587. 1893. *K. tenuifolia* Steud., Syn. Pl. Cyp. 2: 69. 1855; Hooper in Saldanha & Nicolson, Fl. Hassan Dist. 688. 1976.

Annuals or perennials, 5-40 cm high. Rhizomes short. Leaves 2-4 mm broad. Inflorescence capitate, ovoid-oblong or subcylindrical, 4-6 mm across, of a central head and usually with 2 lateral smaller heads; bracts 3-4, foliaceous, up to 8 cm long. Spikelets numerous, congested, ovate-lanceolate, *ca* 2 mm long, 1-flowered. Glumes green, not speckled with brown, ovate-lanceolate, 2-2.5 mm long, apiculate. Stamens 2. Stigmas 2. Nuts yellowish brown, oblong or ellipsoid-oblong, lenticular, *ca* 1.5 mm long.

In open moist places. Balaghat, Bilaspur, Damoh, Hoshangabad, Indore, Jabalpur, Mandla, Raipur, Rajnandgaon, Rewa, Satna, Shivpuri, Ujjain, West Nimar. *Fl. & Fr.*: Aug. Dec.

4. ELEOCHARIS R. Br.

Herbs, annual or perennial. Stems terete or angular, all fertile or some sterile and appearing like leaves. Leaves reduced to a few basal sheaths; sheaths sometimes bearing a short lamina. Inflorescence reduced to a solitary, terminal spikelet, rarely with a few additional branchlets terminated by smaller spikelets; bracts absent. Spikelets terete or angular; rhachilla persistent. Glumes all spiral or the lower few subdistichous, caducous, lower 1-3 usually empty. Flowers bisexual, upper few tabescent. Perianth of 4-10 retrorsely scabrid bristles (sometimes absent). Styles about as long as the nut, dilated at the base with a constriction above the nut, its base persistent; stigmas 2-3. Nuts lenticular or trigonal, crowned by the persistent style-base, smooth, reticulate, trabeculate or cancellate.

About 150 species; cosmopolitan; 8 in M.P.

1a. Stems rather stout, 2-10 mm thick; spikelets subcylindrical, about as thick as the stem; glumes 4-8 mm long:

2a. Stems terete, transversely septate; nuts smooth ...4. *E. dulcis*

2b. Stems triquetrous, not septate; nuts trabeculate:

3a. Perianth bristles 6-7; nuts constricted belowthe apex into a short distinct neck ...1. *E. acutangula*

3b. Perianth bristles 4-6; nuts not constricted as above, without any neck ...8. *E. spiralis*

1b. Stems filiform, 0.5-1.5 mm thick; spikelets ovoid-oblong, markedly thicker than the stem; glumes 1-4 mm long:

4a. Stigmas 2; nuts lenticular:

5a. Spikelets 7-15 mm long; nuts *ca* 1.5 mm long ...6. *E. palustris*

5b. Spikelets 3-5 mm long; nuts *ca* 0.5 mm long:

6a. Glumes keeled, up to 1.5 mm long; bristles glistening white ...2. *E. atropurpurea*

6b. Glumes scarcely keeled, 1.5-2 mm long; bristles reddish brown ...5. *E. geniculata*

4b. Stigmas 3; nuts trigonal:

7a. Perianth bristles 4; nuts *ca* 1.5 mm long; style-base prominent, lanceolate ...6. *E. palustris*

7b. Perianth bristles 6-7; nuts up to 1 mm long; style-base minute, ovoid:

8a. Style-base as broad as the nut; nuts cancellate ...7. *E. retroflexa*

8b. Style-base narrower than the nut; nuts smooth ...3. *E. congesta*

1. Eleocharis acutangula (Roxb.) Schult. in Roem. & Schult., Mant. 2: 91. 1824. *Scirpus acutangulus* Roxb., Fl. Ind. (Carey & Wallich ed.) 1: 216. 1820. *Eleocharis fistulosa* Schult. in Roem. & Schult., Mant. 2: 89. 1824; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 626. 1893. **Fig. 40.**

Perennials, stoloniferous, 30-80 cm tall. Stems triquetrous, concave on one side, 2-6 mm thick. Leaf sheaths loose, oblique at mouth, uppermost 7-20 cm long. Spikelets glaucous green or stramineous, 1-3.5 cm long, as thick as or slightly thicker than the stem, 8-32-flowered. Glumes ovate-oblong, 4-5.5 mm long, coriaceous, several striate. Perianth bristles 6-7, brown, very unequal. Stigmas 3, fimbriate. Nuts glossy, brownish stramineous, broadly obovoid, 1.5-2 x 1.2 mm, constricted at the apex into a short but distinct neck; surface cells transversely oblong in 15-20 vertical rows on each face; style-base brown, ovoid-conical, 0.5-1 x 0.4-0.8 mm.

Durg, Raipur. *Fl. & Fr.*: Sept. - Oct.

2. Eleocharis atropurpurea (Retz.) J. Presl & K. Presl, Reliq. Haenk. 1: 196. 1828, *excl. spec. cit.*; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 627. 1893. *Scirpus atropurpureus* Retz., Observ. Bot. 5: 14. 1789.

Annuals, 5-17 cm high. Stems almost capillary. Leaf sheaths obliquely truncate at mouth, 5-15 mm long. Spikelets ovoid-oblong, subterete, 3-5 x 2.5 mm, many-flowered. Glumes loosely imbricating, elliptic-oblong, 1-1.5 mm long, membranaceous. Perianth bristles 4-7, glistening white, slender,

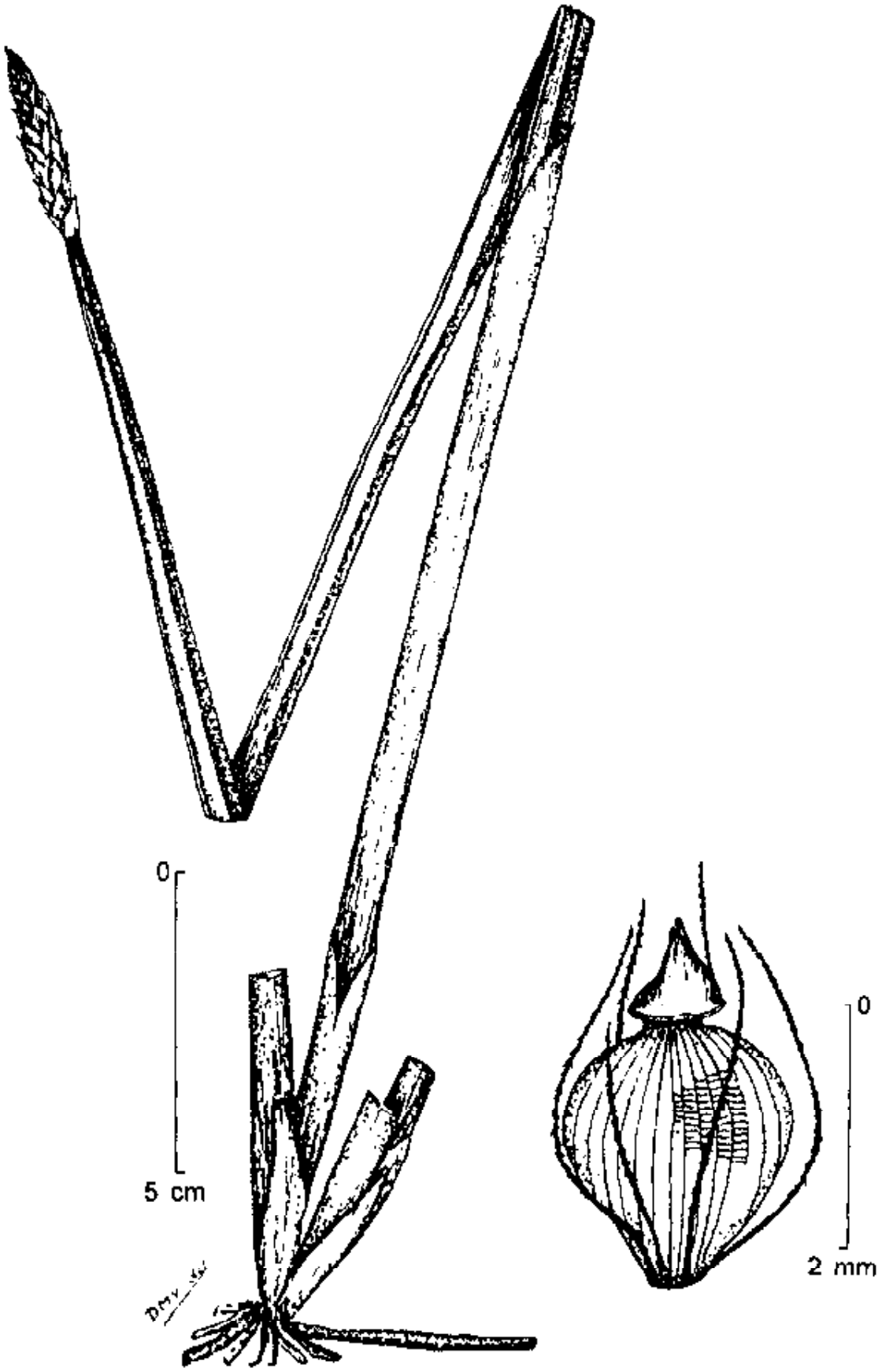

Fig. 40. Eleocharis acutangula (Roxb.) Schult.

transluscent, shorter than to equalling the nut, sometimes much reduced or absent. Stigmas 2. Nuts glossy, brownish black, obovoid, biconvex, *ca* 0.5 mm long, smooth; surface cells obscure, subquadrate; style-base like a minute button, scarcely 0.5 mm long.

Bilaspur, Gwalior, Raigarh, Raipur, Rajnandgaon, Rewa, Satna, Shivpuri, Ujjain. *Fl. & Fr.*: Aug. - Dec.

3. Eleocharis congesta D. Don, Prodr. Fl. Nepal. 41. 1825; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 630. 1893. *E. afflata* Steud., Syn. Pl. Cyp. 2: 76. 1855; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 629. 1893.

Annuals or perennials, 10-40 cm tall. Leaf sheaths tightly clasping, reddish brown, with truncate mouth and acute or mucronate tips, inner 2-5 cm long. Spikelets subcylindrical or narrowly ovoid, 3-11 x 1.5-3 mm, several to numerous-flowered, sometimes bearing 1-5 branchlets from the axils of the lower glumes each terminated by a smaller spikelet. Glumes elliptic-oblong, 1.5-3 mm long, membranaceous. Perianth bristles 6-7, whitish ferrugineous, subequal, longest exceeding the style-base. Stigmas 3, fimbriate. Nuts glossy stramineous, obovoid, compressed-trigonous, 0.7-1 mm long, constricted above into a very short neck, smooth; style-base ovoid, compressed-trigonous, *ca* 0.3 mm long.

Bilaspur, Raigarh, Sidhi, Surguja. *Fl. & Fr.*: Aug. - Nov.

4. Eleocharis dulcis (Burm. *f.*) Hensch., Vita Rumph. 186. 1833; Verma & Chandra in Rec. Bot. Surv. India 21(2): 249. 1981. *Andropogon dulce* Burm. *f.*, Fl. Ind. 219. 1768. *Eleocharis plantaginea* Roem. & Schult., Syst. Veg. 2: 150. 1817; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 625. 1893. *E. equisetina* J. Presl & K. Presl, Reliq. Haenk. 1: 195. 1828; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 626. 1893.

Perennials, stoloniferous, 0.4-1.5 m tall. Stems glaucous green, transversely septate. Leaf sheaths usually reddish, 5-20 cm long. Spikelets terete, 15-60 x 3-6 mm. Glumes stramineous, with red dots, ovate-oblong, 5-8 mm long, coriaceous, several-nerved, broadly scarious on margins. Perianth bristles 6-9, yellowish, subequal or 6 well developed and 3 small and thread like, longest as long as or longer than the nut. Stigmas usually 3, sometimes 2. Nuts glossy, yellowish brown, obovoid, biconvex, 1.5-2.7

mm long, truncate at the top, smooth; style-base pyramidal, about half as long as and about two-third as broad as the nut.

Bilaspur, Raipur, Sidhi, Ujjain. *Fl. & Fr.*: Sept. - Dec.

5. Eleocharis geniculata (L.) Roem. & Schult., Syst. Veg. 2: 150. 1817; Verma & Chandra in Rec. Bot. Surv. India 21(2): 249. 1981. *Scirpus geniculatus* L., Sp. Pl. 48. 1753. *Eleocharis capitata* R. Br., Prodr. 225. 1810; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 627. 1893.

Annuals, 5-40 cm high. Stems slender to rather rigid. Spikelets subglobose or conical ovoid, 3-5 x 3-3.5 mm, much broader than the stem. Glumes pale brown with red tinge, ovate-orbicular, acute, membranaceous, 1-nerved. Perianth bristles 4-8, reddish brown, usually longer than the nut. Stigmas 2. Nuts shining dark brown or blackish, obovoid, biconvex, scarcely half as long as the glume; style-base small, depressed conical.

Raipur, Shivpuri. *Fl. & Fr.*: Jan.

6. Eleocharis palustris (L.) R. Br., Prodr. 224. 1810; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 628. 1893. *Scirpus palustris* L., Sp. Pl. 47. 1753.

Perennials, 10-40 cm high. Rhizomes long creeping. Stems terete. Leaf sheaths reddish brown, upper one truncate or sometimes bearing a short lamina. Spikelets ovoid or subcylindrical, 7-15 x 3-5 mm, densely many-flowered. Glumes brownish, ovate-lanceolate, 3.5-4 mm long, membranaceous. Perianth bristles 4, ferrugineous, subequal, *ca* 1.5 mm long (sometimes much reduced). Stigmas 2 (rarely 3). Nuts glossy, stramineous or brownish, obovoid, biconvex, 1.2-1.7 mm long, smooth; style-base lanceolate, 1.2-1.5 mm long.

Along drains. Durg. *Fl. & Fr.*: April.

7. Eleocharis retroflexa (Poir.) Urb., Symb. Antill. 2: 165. 1900; Kern in Steenis, Fl. Males. ser. I. 7(3): 534. 1974. *Scirpus retroflexa* Poir. in Lam., Encycl. 6: 753. 1805. *Eleocharis chaetaria* Roem. & Schult., Syst. Veg. 2: 154. 1817; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 629. 1893.

Annuals, sometimes perennials, usually 3-10 (sometimes up to 25) cm high. Stems almost capillary. Leaf sheaths lax, reddish, inner 0.5-2.5 cm long, sometimes shortly laminate. Spikelets ovoid-ellipsoid, terete or subcompressed, 1.5-4 x 1.5-3 mm, 6-8-flowered, maturing only 1-4 nuts. Glumes lower subdistichous, upper spiral, ovate-oblong, 2.5-3.2 mm long, membranaceous. Perianth bristles 6 or fewer, pale brown, very unequal, longest usually equalling the nut. Stigmas 3. Nuts stramineous, obovoid, triquetrous, *ca* 1 mm long, truncate at top with acute angles slightly projecting at the shoulders, cancellate; surface cells subquadrate, in 6-10 vertical rows on each face; style-base depressed-conical, triquetrous, *ca* 0.4 mm long.

Bilaspur, Raigarh, Raipur. *Fl. & Fr.*: Sept. - Oct.

8. Eleocharis spiralis (Rottb.) Roem. & Schult., Syst. Veg. 2: 155. 1817; C.B. Clarke in Hook.*f.*, Fl. Brit. India 6: 627. 1893. *Scirpus spiralis* Rottb., Descr. Icon. Rar. Pl. 45. t. 15. f. 1. 1773.

Perennials, stoloniferous, 20-70 cm high. Stems trigonous above. Spikelets terete, cylindrical, 15-35 x 3-5 mm, about as thick as the stem. Glumes closely imbricating, stramineous, quadrate, 2.5-3 mm long, coriaceous, smooth, without a midrib, rounded-subtruncate at apex. Perianth bristles brown, much shorter than the nut. Stigmas 2-3. Nuts glossy, pale brown, broadly obovoid-suborbicular, *ca* 1.5 mm long, trabeculate due to epidermal cells being arranged in about 20 vertical rows on each face; style-base often nearly confluent with the nut.

In shallow waters. Raipur. *Fl. & Fr.*: Sept.

5. ERIOPHORUM L.

Herbs, perennial. Leaves clustered towards the base. Anthela usually much branched, sometimes much reduced; bracts foliaceous or absent. Spikelets many-flowered. Glumes spirally imbricating. Perianth bristles 6, divided nearly to the base into numerous ligulate or hair like segments elongating in fruits thus making the spikelets comose. Stamens 1-3. Styles slender, glabrous, caducous; stigmas 3 (accidentally 2 or 4). Nuts trigonous, smooth, sessile.

About 20 species; N. temperate and arctic regions while one extending to S. Africa; one in M.P.

Eriophorum comosum (Wallich) Wallich *ex* Nees in Wight, Contr. Bot. India 110. 1834; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 664. 1893. *Scirpus comosus* Wallich in Roxb., Fl. Ind. (Carey & Wallich ed.) 1: 234. 1820. **Fig. 41.**

Rhizomes short, woody. Stems 15-50 cm high, terete below, trigonous above. Leaves equalling or exceeding the stem, 1.5-4 mm broad; sheaths castaneous, glossy, ultimately fibrous. Anthela very variable in development, usually decompound or supracompound, 4-25 cm long; bracts many, foliaceous, glossy castaneous at base, up to 15 cm long. Spikelets solitary or sometimes paired, reddish brown, ellipsoid, subterete, 3-7 x 1-1.5 mm, comose in fruits; rhachilla persistent. Glumes oblong-lanceolate, 2.5-3 mm long, keeled, acute or mucronulate, lowest empty. Perianth segments in fruits 7-11 mm long, white. Stamen 1. Stigmas 3. Nuts glossy, dusky black, ellipsoid, compressed-trigonous, 2.5-2.8 mm long, apiculate.

Indore. *Fl. & Fr.*: Nov.

6. FIMBRISTYLIS Vahl, *nom. cons.*

Herbs, annual or perennial. Stems 3-5-angled or compressed. Leaves mostly clustered at the base, sometimes reduced to bladeless sheaths; ligule membranaceous, a fringe of short hairs, or absent. Inflorescence anthelate, capitate or reduced to a solitary spikelet; bracts glumaceous or foliaceous. Spikelets solitary or in clusters, few to several-flowered; rhachilla usually persistent. Glumes usually all spirally arranged, sometimes all or only the lower distichous or subdistichous, acropetally falling from the elongating rhachilla, lower 1-3, rarely more, empty, upper 1-3 male or barren. Flowers bisexual. Perianth absent. Stamens 1-3. Style articulated with the ovary, dilated at the base, usually fimbriate, ultimately caducous; stigmas 2-3. Nuts lenticular or trigonal, sessile or stipitate, smooth, verruculose, tuberculate or glandular, surface reticulate or sometimes vertically trabeculate due to the transversely oblong surface cells being regularly superimposed in several vertical rows.

About 250 species; tropical and subtropical regions; 25 in M.P.

1a. Nuts linear with almost parallel sides:

2a. Leaves present; spikelets several, anthelate; glumes aristate ...9. *F. dipsacea*

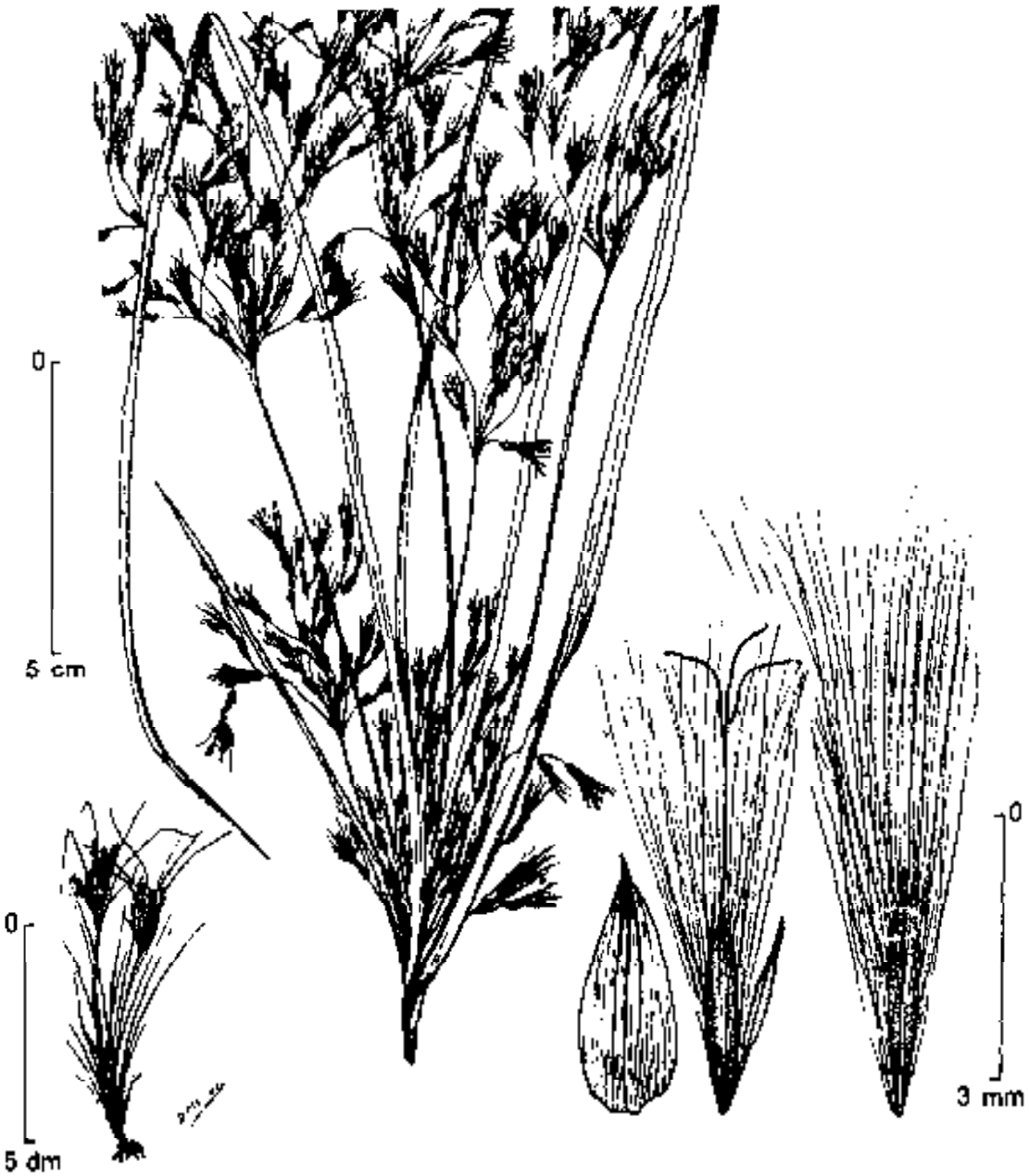

Fig. 41. Eriophorum comosum (Wallich) Wallich *ex* Nees

2b. Leaves absent; spikelet solitary, terminal; glumes obtuse ...24. *F. tetragona*

1b. Nuts obovoid or suborbicular, with not parallel sides:

3a. Stigmas 2; nuts lenticular:

4a. Stem bearing 1-3 spikelets:

5a. Nuts transversely wavy-wrinkled:

6a. Spikelets more or less nodding, 3-5 mm broad; nuts with 3-5 ridges ...18. *F. nutans*

6b. Spikelets erect, 2-3.5 mm broad; nuts with 5-8 ridges ...1. *F. acuminata*

5b. Nuts smooth or vertically trabeculate:

7a. Glumes *ca* 1 mm long; stamens 1 ...4. *F. argentea*

7b. Glumes 2.5-3 mm long; stamens 1-3:

8a. Glumes narrowly oblong, obtuse, twice or more as long as broad ...20. *F. polytrichoides*

8b. Glumes suborbicular to broadly ovate, shortly apiculate, less than twice as long as broad ...21. *F. schoenoides*

4b. Stem bearing 4-numerous spikelets:

9a. Glumes hoary at least in the upper part ...12. *F. ferruginea*

9b. Glumes entirely glabrous:

10a. Glumes aristate, the arista about as long as the main body; style-base with long pendent hairs ...22. *F. squarrosa*

10b. Glumes acute or mucronate, or if aristate, the arista about one fourth as long as the main body; style-base glabrous or with short spreading hairs:

11a. Glumes 1.2-1.5 mm long; nuts 0.5-0.7 mm long:

12a. Leaves with a ligule of fringe of short hairs; nuts trabeculate ...5. *F. bisumbellata*

12b. Leaves without a ligule; nuts not trabeculate ...2. *F. aestivalis*

11b. Glumes 2-5 mm long; nuts 0.7-1.5 mm long:

13a. Spikelets almost all in clusters of 2-6, sometimes a few solitary, linear-lanceolate, scarcely broader than their pedicels ...14. *F. hookeriana*

13b. Spikelets all solitary or sometimes only a few rather clustered, ellipsoid or ovoid-oblong, several times broader than their pedicels:

14a. Surface cells of the nut arranged in 5-10 vertical rows on each face ...8. *F. dichotoma*

14b. Surface cells of the nut arranged in 12-24 vertical rows on each face:

15a. Glumes *ca* 3.5 mm long, several-nerved; nuts with obtuse thickened edges ...25. *F. tomentosa*

15b. Glumes *ca* 2 mm long, 3-nerved; nuts without thickened edges ...3. *F. alboviridis*

3b. Stigmas 3; nuts trigonal:

16a. Glumes all spiral; spikelets throughout terete or angular:

17a. Spikelets in clusters of 2-5, or sometimes a few solitary ...11. *F. falcata*

17b. Spikelets all solitary:

18a. Cauline leaves all with well developed blades, ligulate ...7. *F. complanata*

18b. Cauline leaves, at least the upper ones, reduced to bladeless sheaths, eligulate, or leaves absent:

19a. Leaves equitant, laterally folded and compressed, the midrib thus appears to be on margins ...16. *F. littoralis*

19b. Leaves not equitant, not folded, dorso-ventrally flattened ...17. *F. miliacea*

16b. Glumes lower distichous or subdistichous, upper spiral; spikelets compressed below, terete or angular above:

20a. Inflorescence usually consisting of a solitary terminal spikelet, rarely of 2-3 spikelets; nuts 2-3 mm long, coarsely tuberculate ...19. *F. ovata*

20b. Inflorescence usually of several to numerous spikelets, rarely reduced to 1-2 spikelets; nuts *ca* 1 mm long, smooth or verruculose:

21a. Glumes densely red gland-dotted ...6. *F. cinnamometorum*

21b. Glumes not gland-dotted:

22a. Glumes hairy:

23a. Glumes *ca* 2 mm long; anthers *ca* 0.5 mm long ...15. *F. intonsa*

23b. Glumes 4-6 mm long; anthers 1.5-2 mm long ...13. *F. fusca*

22b. Glumes glabrous:

24a. Spikelets 2-4 mm broad; stamens 3 ...10. *F. eragrostis*

24b. Spikelets less than 2 mm broad; stamens 2 ...23. *F. tenera*

1. Fimbristylis acuminata Vahl, Enum. Pl. 2: 285. 1805; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 631. 1893; Kern in Steenis, Fl. Males. ser. 1.

7(3): 588. 1974. *F. setacea auct. non* Benth., 1843: C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 632. 1893, *p.p.*

Perennials, 5-30 cm high. Stems obtusely quadrangular. Leaves absent. Spikelets solitary, terminal, ovoid-oblong or lanceolate, terete, 6-12 x 2-3.5 mm. Glumes stramineous or with brown tinge, ovate-oblong, 3.5-5 x 3-5 mm, acute or mucronulate. Stamens 2-3; anthers 0.7-1.2 mm long. Style 2-3 mm long, entire or fimbriate; stigmas 2. Nuts stramineous or brownish, broadly obovoid or suborbicular, biconvex, 1.2-1.7 x 1-1.5 mm, shortly stipitate, with 5-8 brownish ridges.

Raigarh, Satna. *Fl.* & *Fr.*: Dec. Feb.

2. Fimbristylis aestivalis (Retz.) Vahl, Enum. Pl. 2: 288. 1805; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 637. 1893, *p.p.*; Kern in Steenis, Fl. Males. ser. I. 7(3): 584. 1974. *Scirpus aestivalis* Retz., Observ. Bot. 4: 12. 1786.

Annuals, 3-20 cm high. Stems ribbed. Leaves subequalling the stem, 0.5-1 mm broad, hairy or glabrous; sheaths usually densely hairy, sometimes glabrous. Anthela compound or decompound, 1-4.5 cm across; bracts filiform. Spikelets oblong-lanceolate, polygonal, 2.5-6 x 1-1.5 mm, acute. Glumes pale brown, *ca* 1.5 mm long, keeled, lower 2-4 aristate, hairy, upper mucronulate, glabrous. Stamens 1-2. Style glabrous or fimbriate upwards; stigmas 2. Nuts stramineous, obovoid, biconvex, *ca* 0.5 x 0.3 mm, shortly stipitate, smooth.

Bilaspur, Raigarh, Raipur. *Fl.* & *Fr.*: Sept. - Jan.

3. Fimbristylis albovlridis C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 638. 1893.

Annuals, 15-30 cm high. Stems compressed-trigonous. Leaves several, 1-2 mm broad; ligule a fringe of hairs. Anthela compound or decompound, lax; bracts foliaceous, spreading. Spikelets solitary, ovoid, terete, 4-11 x 2-2.5 mm. Glumes greyish green or with brown tinge, broadly ovate, 2-2.5 mm long, muticous, 3-nerved. Stamens 1-2. Style 1-1.5 mm long; stigmas 2. Nuts stramineous, obovoid, biconvex, 1-1.2 x 0.8 mm, shortly stipitate, verruculose, trabeculate due to the surface cells being arranged in 12-16 rows on each face.

Raipur. *Fl. & Fr.*: Oct.

4. Fimbristylis argentea (Rottb.) Vahl, Enum. Pl. 2: 294. 1805; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 640. 1893. *Scirpus argenteus* Rottb., Descr. Pl. Rar. 27. 1772.

Annuals. Stems caespitose, trigonous, very small or up to 20 cm high. Leaves usually many in a basal cluster, setaceous, with prominent surface cells, glabrous except for some points on the margins. Spikelets 4-20 clustered in a solitary head, linear-cylindrical, 5-10 mm long, densely flowered; bracts 2-4, overtopping the head. Glumes silvery grey or whitish, ovate-lanceolate, 1-1.3 mm long, acute, with a 3-nerved, green keel. Stamen 1. Stigmas 2. Nuts pale, obovoid, biconvex, *ca* 0.5 mm long, slightly margined, smooth or obscurely transversely wavy-lined.

Bastar (Saxena and Khotele, 1976). *Fl. & Fr.*: Dec. Jan.

5. Fimbristylis bisumbellata (Forssk.) Bubani, Dodec. 30. 1850; Rao & Verma, Cyper. N. E. India 31. 1982. *Scirpus bisumbellatus* Forssk., Fl. Aegypt.-Arab. 15. 1775. *Fimbristylis dichotoma auct. non* Vahl, 1805: C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 635. 1893.

Annuals, 10-20 cm high. Stems compressed-trigonous. Leaves usually falcate, 1.5-2.5 mm broad, sometimes pubescent beneath; sheaths hairy. Anthela compound to supradecompound, 2-6 cm across; bracts foliaceous. Spikelets solitary, polygonal, narrowly ovoid-oblong or lanceolate, 3-8 x 1-1.5 mm. Glumes yellowish brown, broadly ovate, 1.2-1.5 mm long, sharply keeled, mucronate. Stamens 1-3. Style 0.7-1.2 mm long; stigmas 2, *ca* 1 mm long. Nuts whitish stramineous, broadly obovoid, 0.6-0.7 mm long, shortly stipitate, umbonulate, smooth or verruculose, trabeculate due to the surface cells being arranged in 5-9 vertical rows on each face.

Bilaspur, Durg, Gwalior, Jabalpur, Mandla, Raigarh, Raipur, Rajnandgaon, Sagar, Satna, Shivpuri, Sidhi, Surguja, Ujjain. *Fl. & Fr.*: Aug. Jan.

6. Fimbristylis cinnamometorum (Vahl) Kunth, Enum. Pl. 2: 229. 1837; Verma & Chandra in Rec. Bot. Surv. India 21(2): 254. 1981. *Scirpus cinnamometorum* Vahl, Enum. Pl. 2: 278. 1805. *Fimbristylis cyperoides* R. Br., Prodr. 228. 1810; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 650.

1893. *F. cyperoides* var. *cinnamometorum* C.B. Clarke, Ill. Cyper. t. 44. f. 1-4. 1909.

Perennials, 20-80 cm high. Stems subterete. Leaves 0.5-1.2 mm broad. Anthela lax, decompound to supradecompound; bracts 1-2, foliaceous, the remaining setaceous. Spikelets numerous, solitary, linear-oblong, compressed, 4-6 x 0.8-1.2 mm, few-flowered. Glumes subdistichous, oblong-lanceolate, 3-3.7 x 1.3 mm, acute, hispidulous, densely red gland-dotted. Stamens 3. Styles glabrous; stigmas 3. Nuts deep brown, linear-oblong or narrowly obovoid, trigonous, 0.8-1 x 0.3-0.4 mm, shortly stipitate, smooth or sparsely tuberculate.

Bastar (Mooney, 1942).

7. Fimbristylis complanata (Retz.) Link, Hort. Berol. 1: 292. 1827; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 646. 1893. *Scirpus complanatus* Retz., Observ. Bot. 5: 14. 1789.

Annuals or perennials, 15-80 cm high. Stems strongly compressed. Leaves 3-5 mm broad, with a triangular tip; ligule a fringe of hairs. Anthela compound or supradecompound, 2-8 cm across; bracts suberect, lowest foliaceous; rays flattened. Spikelets solitary, oblong-lanceolate, polygonal, 5-7 x 2 mm. Glumes spiral, brown, ovate-oblong, 2-2.5 mm long, with 3-nerved green keel, lower mucronate. Stamens 3. Style 1-2 mm long, glabrous; stigmas 3, *ca* 1.5 mm long. Nuts whitish stramineous, broadly obovoid, trigonous, 0.7-1.2 x 0.5-1 mm, subsessile, verruculose.

Bilaspur, Sidhi. *Fl. & Fr.*: Sept. - Oct.

8. Fimbristylis dichotoma (L.) Vahl, Enum. Pl. 2: 287. 1805, *excl. var.*; Kern in Steenis, Fl. Males. ser. I. 7(3): 575. 1974. *Scirpus dichotomus* L., Sp. Pl. 50. 1753. *Fimbristylis diphylla* Vahl, Enum. Pl. 2: 289. 1805; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 636. 1893. **Fig. 42.**

Annuals or perennials, 10-80 cm high. Leaves 1.5-5 mm broad, glabrous or pubescent beneath, sometimes glaucescent; ligule a fringe of hairs. Anthela simple to supradecompound, 3-8 cm across; bracts 2-4, foliaceous. Spikelets ovoid-globose, terete, 4-11(-20) x 2-3 (-5) mm; rhachilla narrowly winged. Glumes spiral, glossy chestnut, ovate-oblong, 2-3 (-5) mm long, 3-nerved. Stamens 1-3. Stigmas 2. Nuts pale stramineous,

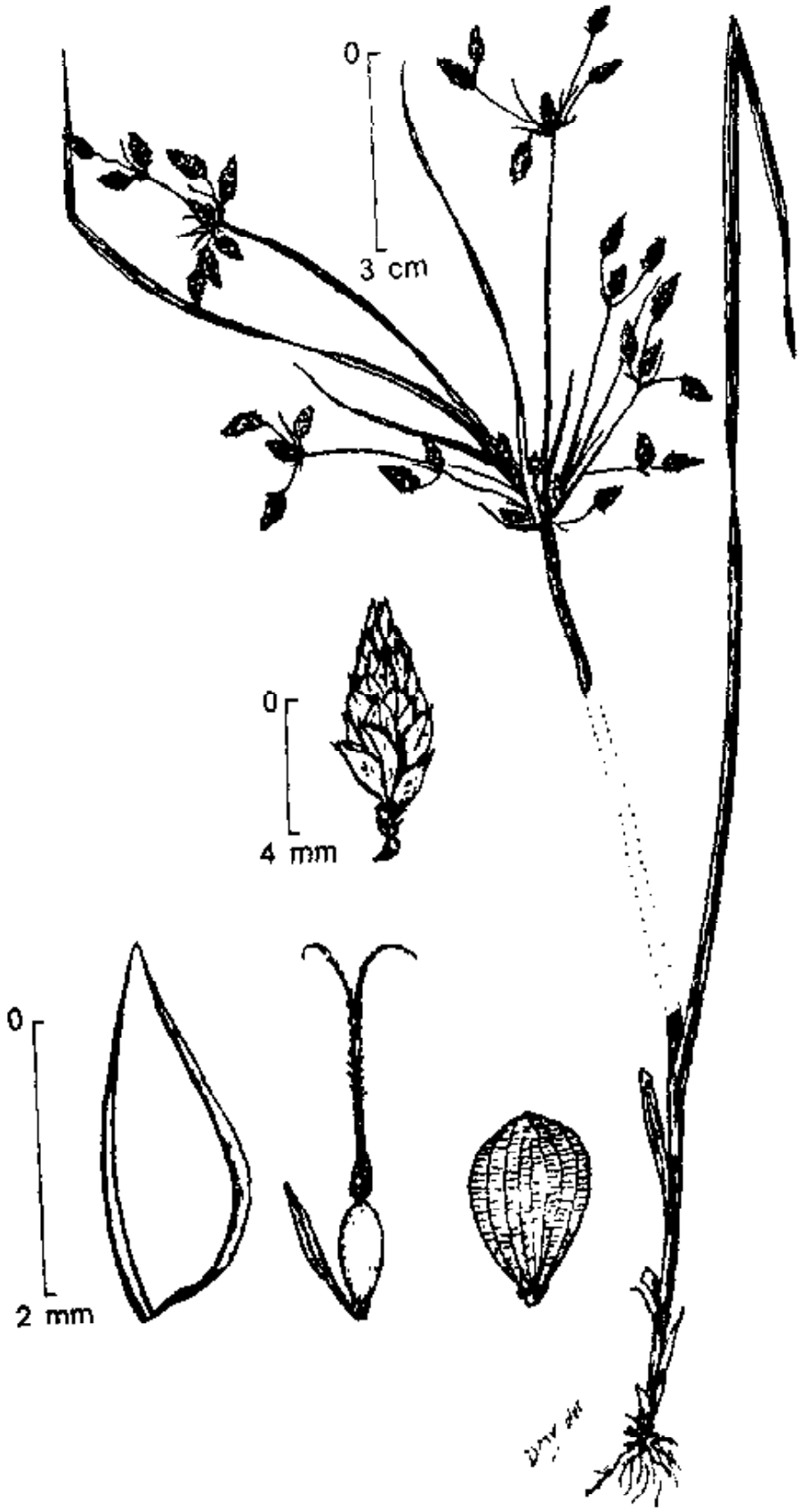

Fig. 42. Fimbristylis dichotoma (L.) Vahl

ultimately brownish, obovoid, 0.9-1.2 x 0.7-0.9 mm, shortly stipitate, smooth or rarely verruculose, trabeculate due to the surface cells being arranged in 5-10 vertical rows on each face.

Balaghat, Bastar, Bilaspur, Damoh, Durg, Hoshangabad, Indore, Narsimhapur, Raipur, Rajnandgaon, Satna, Shivpuri, Sidhi, Surguja. *Fl. & Fr.*: Throughout the year.

9. Fimbristylis dipsacea (Rottb.) C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 635. 1893. *Scirpus dipsaceus* Rottb., Descr. Icon. Rar. Pl. 56. t. 12. f. 1. 1773.

Annuals, 2-15 cm high. Leaves capillary. Anthela simple or compound, lax, 2-8 cm across, bearing few to several spikelets; bracts foliaceous. Spikelets solitary, oblong-globose, terete, 3-6.5 x 2-3 mm, squarrose. Glumes spiral, stramineous, oblong-lanceolate, *ca* 1 mm long, aristate. Stamens 1-2. Styles *ca* 0.2 mm long, smooth; stigmas 2, *ca* 0.6 mm long. Nuts brownish, linear-oblong with almost parallel sides and two rows of glands when young, biconvex, 0.5-0.7 x 0.1 mm, subsessile, faintly transversely lineolate.

Bilaspur, Rewa, Sidhi. *Fl. & Fr.*: Oct. - Dec.

10. Fimbristylis eragrostis (Nees) Hance in J. Linn. Soc. London (Bot.) 13: 132. 1873. *Abildgaardia eragrostis* Nees in Wight, Contr. Bot. India 95. 1834. *Fimbristylis nigrobrunnea* Thwaites, Enum. Pl. Zeyl. 434. 1864; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 648. 1893.

Perennials, 20-60 cm high. Stems 4-5-angled. Leaves 2-5 mm broad, with a triangular tip, subcoriaceous. Anthela simple, compound or decompound, sometimes subcapitate, bearing 2 to many spikelets; bracts small, foliaceous. Spikelets solitary or in clusters of 2-4, ellipsoid, compressed or subterete, sometimes contorted, 5-15 x 2-4 mm. Glumes lower distichous, subdistichous or spiral, upper spiral, brown, ovate, 3-5 mm long, mucronulate. Stamens 3. Stigmas 3. Nuts brownish or stramineous, obovoid, trigonous, 0.8-1 x 0.5-1 mm, shortly stipitate, verrucose.

Bastar (Sahni *et al.*, 1972). *Fl. & Fr.*: April Sept.

11. Fimbristylis falcata (Vahl) Kunth, Enum. Pl. 2: 239. 1837; Verma & Chandra in Rec. Bot. Surv. India 21(2): 255. 1981. *Scirpus falcatus* Vahl, Enum. Pl. 2: 275. 1805. *Fimbristylis junciformis* Kunth, Enum. Pl. 2: 239. 1837; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 647. 1893.

Perennials, 10-40 cm high. Rhizomes short or creeping. Stems 4-5-angled. Leaves 2-4 mm broad, obtuse. Anthela compound or decompound, 2.5-10 cm across, usually bearing 20-30, sometimes only 3-5 clusters of spikelets; bracts short, foliaceous. Spikelets usually in clusters of 2-5, sometimes a few solitary, oblong, 3-6 mm long. Glumes spiral, fuscous or castaneous, broadly ovate, 2-2.7 mm long, broadly scarious on margins. Stamens 3. Styles fimbriate; stigmas 3. Nuts pale stramineous, obovoid, trigonous, 0.8-1 x 0.8 mm, shortly stipitate, smooth or verruculose.

Bilaspur, Betul, Hoshangabad, Indore, Raipur, Rewa, Shivpuri, Sidhi. *Fl. & Fr.*: Aug. - Jan.

12. Fimbristylis ferruginea (L.) Vahl, Enum. Pl. 2: 291. 1805; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 638. 1893. *Scirpus ferrugineus* L., Sp. Pl. 50. 1753.

Perennials, 20-75 cm high. Rootstocks very short. Stem base usually with glossy hard rusty scales. Leaves almost absent, short or up to 15 cm long, 0.5-1.5 mm broad, glabrous or hairy. Anthela simple or compound, bearing few to many spikelets, sometimes reduced to a solitary spikelet; bracts sometimes very short. Spikelets solitary, ovoid, 5-10 x 3-4 mm. Glumes brown, ovate-oblong, nearly flat, 3-4 x 1.5-3 mm, apiculate, keeled upwards, usually hoary in the upper half. Stamens 2-3. Stigmas 2. Nuts white or pale yellow, obovoid or suborbicular, strongly compressed, 1-1.5 mm long, apiculate, shortly stipitate; epidermal cells in many vertical rows.

Gwalior. *Fl. & Fr.*: Oct.

13. Fimbristylis fusca (Nees) C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 649. 1893. *Abildgaardia fusca* Nees in Wight, Contr. Bot. India 95. 1834.

Perennials, 20-45 cm high. Rhizomes shortly creeping. Leaves in a basal tuft, 5-15 cm long, *ca* 1.5 mm broad. Anthela usually compound, 3-8 cm across; bracts short, foliaceous, up to 2 cm long, usually hairy.

Spikelets solitary, brown, oblong, 6-10 x 2-3 mm, more or less compressed. Glumes narrowly lanceolate, 4-6 mm long, keeled, shortly mucronate, scarious on margins, sometimes glandular above, lower 3 glumes short and empty, next 2-6 nut bearing, subdistichous, upper 3-6 male or empty, 3-or more-ranked. Stamens usually 2. Stigmas 3. Nuts pale, obovoid, trigonous, *ca* 1 mm long, verruculose.

Raipur. *Fl. & Fr.*: May.

14. Fimbristylis hookeriana Boeck. in Linnaea 37: 22. 1871; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 641. 1893.

Annuals, 5-50 cm high. Stems 1-2 mm thick, slenderly ribbed. Leaves slightly exceeding the stem, 1.5-2.5 mm broad; ligules membranaceous. Anthela compound or decompound, rarely simple in depauperated plants, 2-18 cm across, bearing 4-27 spikelets; bracts foliaceous, lowest 3-35 cm long; rays rigid, subcompressed. Spikelets usually in clusters of 2-6 with a few solitary ones, but sometimes all solitary, linear-lanceolate, 5-12 x 1.5-2 mm, on up to 10 cm long pedicels. Glumes rusty green, oblong, 3.5-5 mm long, keeled, mucronate. Stamens 2. Styles 2.7-3.3 mm long, fimbriate throughout, stigmas 2. Nuts yellowish brown, obovoid, lenticular, 1-1.3 x 0.8-1 mm, shortly stipitate, tubercled on shoulders, faintly trabeculate due to surface cells being arranged in 12-15 vertical rows.

Bastar (Dixit and Roy, 1991). *Fl. & Fr.*: Aug. - Feb.

15. Fimbristylis intonsa S.T. Blake in J. Arnold Arb. 35: 221. f. 2. 1954; Verma & Chandra in Rec. Bot. Surv. India 21(2): 256. 1981. *F. disticha* var. *kurzii* C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 651. 1893.

Annuals, tufted, slender, 5-15 cm long. Leaves setaceous. Anthela simple or subcompound, rather lax, 2-5 cm across; bracts setaceous; rays hairy. Spikelets usually solitary, strongly compressed, ovate-oblong, 5-10 x 1.5 mm, acute, several-flowered. Glumes distichous, stramineous or brown tinged, broadly ovate-oblong, *ca* 2 mm long, acute or mucronulate, densely minutely hairy. Stigmas 3. Nuts obovoid or oblong-obovoid, obtusely trigonous, *ca* 0.5 mm long, verruculose.

Surguja. *Fl. & Fr.*: Nov.

16. Fimbristylis littoralis Gaud., Voy. Uranie 413. 1826; Verma & Chandra in Rec. Bot. Surv. India 21(2): 256. 1981. *F. miliacea* Vahl, Enum. Pl. 2: 287. 1805, *excl. basion.*; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 644. 1893.

Annuals or perennials, 10-60 (-100) cm high. Stems 4-5-angled. Leaves several, equitant, more or less distichous, frequently yellowish green, laterally flattened, as long as the stem, 1-3 mm broad, finely several striate, thin on outer margin, thick on inner margin, grooved; upper leaves reduced to bladeless sheaths. Anthela compound to supradecompound; bracts short, foliaceous. Spikelets solitary, subglobose, 2-5 x 1.5-2 mm, obtuse. Glumes spiral, ovate-oblong, 1-1.5 mm long, muticous, 3-nerved. Stamens 1-2. Styles sparsely fimbriate; stigmas 3. Nuts stramineous, narrowly obovoid, trigonous, 0.6-0.7 x 0.3-0.4 mm, shortly stipitate, verruculose, transversely lineolate.

Along ponds and streams. Balaghat, Bastar, Bilaspur, Durg, Gwalior, Hoshangabad, Indore, Raigarh, Raipur, Rajnandgaon, Satna, Shivpuri, Sidhi, Surguja. *Fl. & Fr.*: Sept. - April.

17. Fimbristylis miliacea (L.) Vahl, Enum. Pl. 2: 287. 1805, *quoad basion.*; Kern in Steenis, Fl. Males. ser. I. 7(3): 552. 1974. *Scirpus miliaceus* L., Syst. Nat. ed. 10. 2: 868. 1759. *Fimbristylis quinqueangularis* Kunth, Enum. Pl. 2: 229. 1837; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 644. 1893.

Annuals or perennials, 10-90 cm high, with several flowering shoots and a few leafy shoots. Flowering stems leafless or with a solitary leaf, acutely 5-angled, 1.5-2.5 mm thick, prominently grooved. Leaves on sterile shoots several, 2-3 mm broad, with cartilaginous margins; sheaths on the flowering stems inflated, with a short acute tip. Anthela compound to supradecompound; bracts short, usually setaceous. Spikelets all or nearly all solitary, ovoid or ovoid-oblong, 2-5 x 1.2-2 mm; rhachilla winged. Glumes spiral, brown, ovate, 1-2 mm long, mucronulate, 3-5-nerved. Stamens 1-2. Stigmas 3. Nuts stramineous or pale brown, obovoid or suborbicular, trigonous, 0.4-0.8 x 0.3-0.5 mm, shortly stipitate, verruculose, faintly transversely lineolate with the surface cells being arranged in 4-6 vertical rows on each face.

Bastar, Raipur, Surguja. *Fl. & Fr.*: Sept. - Dec.

18. Fimbristylis nutans (Retz.) Vahl, Enum. Pl. 2: 285. 1805; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 632. 1893. *Scirpus nutans* Retz., Observ. Bot. 4: 12. 1786.

Perennials, 20-50 cm high. Rhizomes short, creeping. Stems terete. Leaves all reduced to leafless sheaths or the uppermost sheath bearing a short ovate lamina. Spikelets solitary, terminal, more or less obliquely placed on the stem, broadly ovoid, 8-12 x 3-5 mm. Glumes spiral, ferrugineous, broadly ovate or suborbicular, 3.5-4.5 x 3-3.5 mm, obtuse. Stamens 3. Stigmas 2. Nuts whitish, obovoid, biconvex, 1.2-1.5 x 1-1.2 mm, shortly stipitate, with 3-5 transverse ridges.

Sidhi. *Fl. & Fr.*: Oct.

19. Fimbristylis ovata (Burm. *f.*) Kern in Blumea 15: 126. 1967. *Carex ovata* Burm. *f.*, Fl. Ind. 194. 1768. *Fimbristylis monostachyos* Hassk., Pl. Jav. Rar. 61. 1848, '*monostachya*'; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 649. 1893. **Fig. 43.**

Perennials, 10-30 cm high. Stems slightly swollen at the base. Leaves 0.5-1 mm broad. Spikelets solitary (-3), terminal, compressed in the lower half, subterete in the upper half, sometimes twisted, stramineous, ovate-lanceolate, 6-17 (-30) x 3-6 mm; rhachilla winged; bracts setaceous. Glumes lower distichous, upper spiral, broadly ovate-oblong, 4.5-6 (-7.5) mm long, keeled, mucronate, 3-5-nerved. Stamens 2-3. Stigmas 3. Nuts yellowish white or brownish, obovoid, trigonous, 2-3 x 1.2-2 mm, apiculate, stipitate, tuberculate.

Balaghat, Bilaspur, Indore, Mandla, Raipur, Satna, Shivpuri, Sidhi. *Fl. & Fr.*: Aug. - May.

20. Fimbristylis polytrichoides (Retz.) R. Br., Prodr. 226. 1810; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 632. 1893. *Scirpus polytrichoides* Retz., Observ. Bot. 4: 11. 1786.

Annuals or perennials, slender, 5-30 cm high. Leaves about half as long as the stem; sheaths glabrous or puberulous. Spikelets solitary (rarely 2-3), terminal, oblong-ellipsoid, 5-8 mm long; foliaceous bracts absent but sometimes the lowest empty glume with a leaf-like, up to 25 mm long appendage resembling a bract or an extension of the stem. Glumes pale

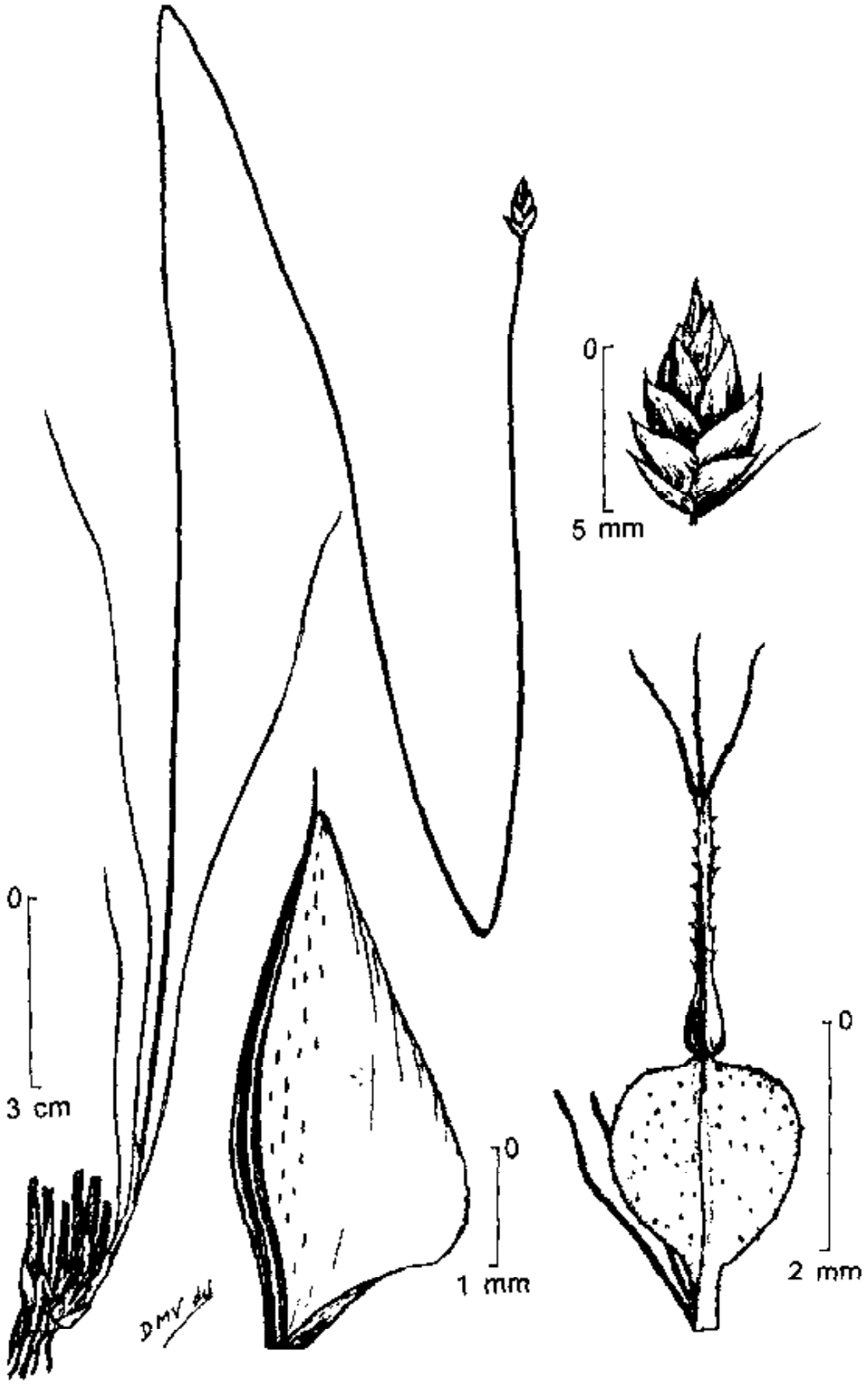

Fig. 43. Fimbristylis ovata (Burm. *f.*) Kern

brown or whitish, sometimes reddish at apex, narrowly oblong, nearly flat in flowers, navicular in fruits, *ca* 2.5 mm long, slightly keeled, obtuse. Stamens 1-3. Stigmas 2. Nuts pale or dark brown, obpyriform, biconvex, 1-1.5 mm long, subsessile, minutely papillose; papillae often whitish.

Rewa.

21. Fimbristylis schoenoides (Retz.) Vahl, Enum. Pl. 2: 286. 1805; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 634. 1893, *p.p.*; Rao & Verma, Cyper. N. E. India 30. 1982. *Scirpus schoenoides* Retz., Observ. Bot. 5: 14. 1789.

Perennials, 5-40 cm high. Leaves canaliculate, 0.5-1 mm broad, ligulate. Anthela simple, bearing 2-3 spikelets or reduced to a solitary terminal spikelet; bracts setaceous or short, foliaceous; rays sometimes curved. Spikelets broadly ovoid or ovoid-oblong, terete, 4-8 x 3-4.5 mm; rhachilla narrowly winged. Glumes spiral, glossy, stramineous or with red tinge, broadly ovate or suborbicular, 2.5-3.3 mm long, muticous or mucronulate; sides 8-10 striate. Stamens 2-3. Styles fimbriate; stigmas 2. Nuts stramineous, obovoid, biconvex, 1.2-1.7 x 0.9-1.2 mm, stipitate, umbonulate; stipe 0.2-0.4 mm long, somewhat lobed.

Along roadside drains. Balaghat, Bilaspur, Gwalior, Mandla, Raipur, Rajnandgaon, Rewa, Sagar, Satna, Sidhi, Surguja. *Fl. & Fr.*: Aug. Dec.

22. Fimbristylis squarrosa Vahl, Enum. Pl. 2: 289. 1805; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 635. 1893. *F. aestivalis* (Retz.) Vahl var. *squarrosa* Koyama in J. Fac. Sci. Univ. Tokyo III. 8: 116. 1962. **Fig. 44.**

Annuals, 5-15 cm high. Leaves 0.5-1 mm broad, glabrous or hairy; sheaths usually white ciliate, sometimes glabrous. Anthela compound, rather dense, 2-6 cm across; bracts foliaceous; rays slender, spreading. Spikelets solitary, linear-oblong, polygonal, squarrose, 3-7 x 2 mm; rhachilla narrowly winged. Glumes spiral, pale brown, ovate-oblong, 2-2.5 mm long including about 1 mm long arista, keeled, aristate, lower sometimes hairy. Stamen 1. Styles 1-1.2 mm long, with long white pendent hairs from the base covering the upper half of the nut; stigmas 2, *ca* 0.2 mm long. Nuts stramineous, obovoid, biconvex, 0.6-0.8 x 0.5 mm, shortly stipitate, smooth.

Bastar (Subramanyam and Henry, 1966). *Fl. & Fr.*: May June.

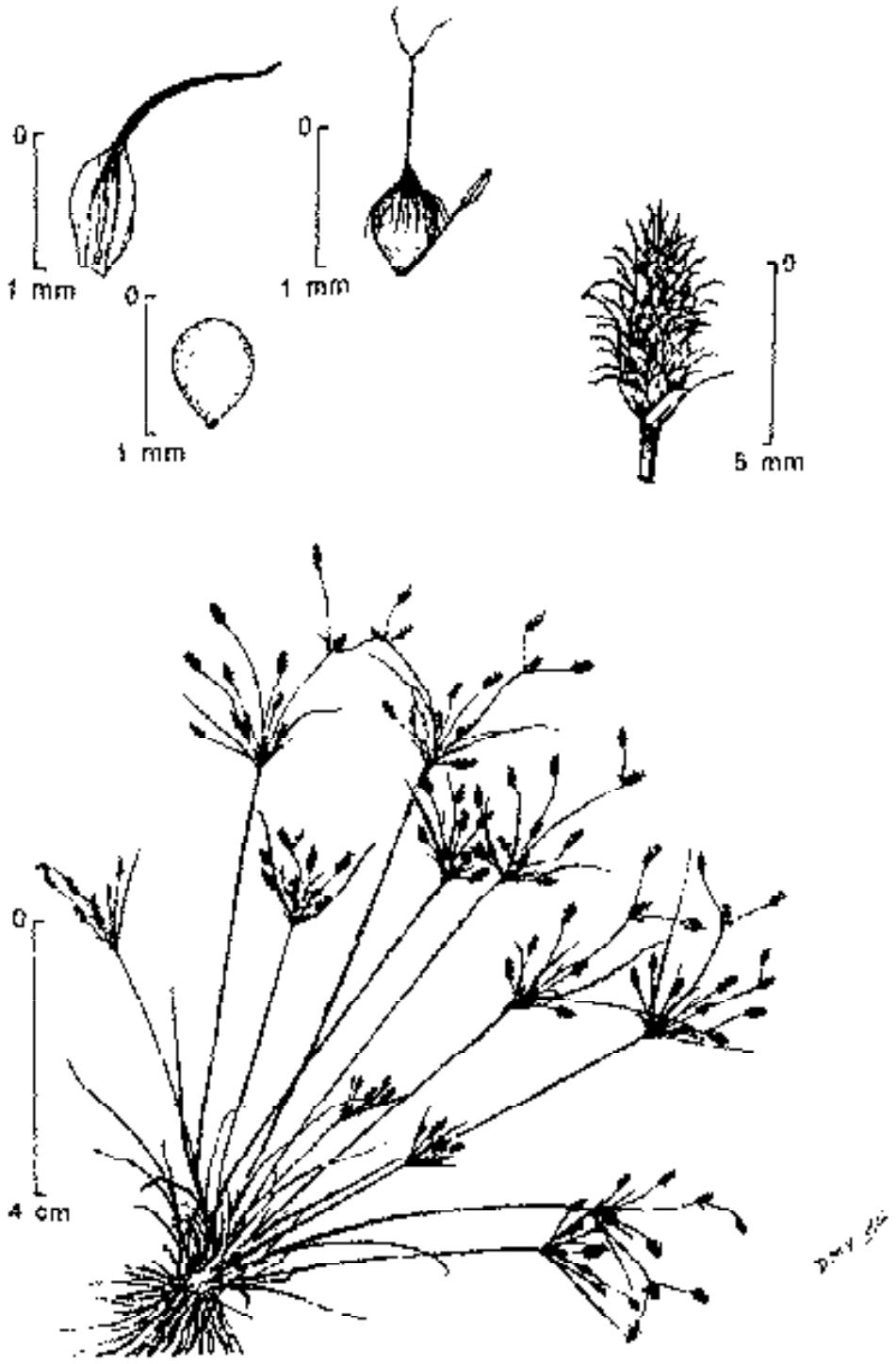

Fig. 44. Fimbristylis squarrosa Vahl

23. Fimbristylis tenera Schult. in Roem. & Schult., Mant. 2: 57. 1824; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 642. 1893; Fischer in Gamble, Fl. Madras 3: 1152. 1967 (repr. ed.). *F. monticola* Steud., Syn. Pl. Cyp. 2: 111 1855; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 642. 1893.

Annuals, tufted, slender, 10-30 cm high. Stems 4-5-angled, smooth or scabrid. Leaves almost filiform, usually shorter than the stem. Anthela simple or subcompound; bracts short, setiform; rays 2-4, up to 25 mm long, bearing 1-3 spikelets. Spikelets ellipsoid or oblong-ellipsoid, 4-6 mm long. Glumes yellowish or brown, ovate-lanceolate, 2-2.5 mm long, acute, glabrous or glandular puberulous; keel shortly excurrent and strongly incurved at the base. Nuts greyish white, globosely obovoid, *ca* 0.7 mm long, tuberculate.

Sagar. *Fl. & Fr.*: Oct. Feb.

24. Fimbristylis tetragona R. Br., Prodr. 226. 1810; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 631. 1893.

Annuals or perennials, 10-60 cm high. Stems tetragonous. Leaves absent; sheaths 2-3, pale or chestnut brown (sometimes the uppermost with a short blade). Spikelets solitary, terminal, erect, ovoid-globose, terete, 6-18 x 4-6 mm, acute. Glumes spiral, stramineous or with brown tinge, ovate-oblong, 3-5 mm long, obtuse. Stamens 1-3. Stigmas 2-3. Nuts stramineous, linear-oblong with almost parallel sides, 1.5-2 x 0.5 mm, long stipitate, trabeculate due to the surface cells being arranged in about 9 vertical rows.

Balaghat, Bilaspur, Indore, Raigarh, Raipur, Rajnandgaon, Sagar, Satna, Shivpuri, Sidhi, Surguja. *Fl. & Fr.*: Aug. - Nov.

25. Fimbristylis tomentosa Vahl, Enum. Pl. 2: 290. 1805; Kern in Steenis, Fl. Males. ser. I. 7(3): 576. 1974. *F. podocarpa* Nees in Wight, Contr. Bot. India 98. 1834, *p.p. typ.*; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 637. 1893. *F. diphylla* var. *pluristriata* C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 637. 1893. *F. dichotoma* (L.) Vahl subsp. *podocarpa* Koyama in Micronesica 1: 87. 1964.

Annuals, 15-60 cm high. Stems slender, nodding. Leaves sometimes falcate, 2-3.5 mm broad, glabrous or pubescent beneath; ligule a fringe of

hairs; sheaths hairy. Anthela compound, lax, 2-4 cm across; bracts foliaceous, villous at base. Spikelets solitary, ovoid-oblong, terete, 6-11 x 3-4 mm. Glumes spiral, pale brown, broadly ovate, 3-3.5 mm long, mucronulate, with a green midrib and several lateral nerves. Stamens 2. Styles fimbriate; stigmas 2. Nuts stramineous, suborbicular, lenticular, with thickened edges, 1-1.5 mm long, long stipitate, smooth or verruculose, trabeculate due to the surface cells being arranged in 16-24 vertical rows on each face; stipe 0.3-0.5 mm long.

Bilaspur, Surguja. *Fl. & Fr.*: Aug. - Oct.

7. **FUIRENA** Rottb.

Herbs, annual or perennial. Leaves scattered all along the stem, linear-lanceolate, sheathing at the base; ligules membranaceous. Inflorescence paniculate, usually consisting of a terminal and one or more lateral partial panicles, sometimes much reduced. Spikelets clustered, many-flowered; rhachilla persistent. Glumes spiral, hairy, lower 1-2 empty. Flowers bisexual, upper few tabescent. Perianth 2-seriate; outer 3 (sepals) bristle-like, sometimes reduced or absent; inner 3 (petals) scale-like or absent (sometimes all 6 bristle-like or much reduced). Stamens 2-3. Style continuous with the ovary, not or scarcely thickened at the base, glabrous, caducous; stigmas 3. Nuts obovoid, trigonous, usually beaked, shortly stipitate, falling off along with the perianth scales.

About 30 species; tropical and subtropical regions; 5 in M.P.

1a. Inner perianth linear or absent:

2a. Nuts white, smooth ...2. *F. pubescens*

2b. Nuts yellowish brown, longitudinally striate ...5. *F. wallichiana*

1b. Inner perianth obovate or subquadrate:

3a. Inner perianth sessile or subsessile ...4. *F. umbellata*

3b. Inner perianth distinctly clawed:

4a. Inner perianth 3-nerved, with 3 minute teeth at the top ...1. *F. ciliaris*

4b. Inner perianth 1-nerved, obtuse and spongy at the top ...3. *F. tuwensis*

1. Fuirena ciliaris (L.) Roxb., Fl. Ind. (Carey & Wallich ed.) 1: 184. 1820; Kern in Steenis, Fl. Males. ser. I. 7(3): 519. 1974. *Scirpus ciliaris* L., Mant. Pl. 182. 1771. *Fuirena glomerata* Lam., Tabl. Encycl. 1: 150. 1791; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 666. 1893.

Annuals, 10-40 cm high, densely hairy on stem, leaves and glumes. Leaves linear-lanceolate, 5-15 cm long, 3-5-nerved. Partial panicles usually more or less congested at the tip. Spikelets in clusters of 3-10, greyish green, ovoid-oblong, 5-15 mm long. Glumes 1.5-1.7 mm long, awned; awns hairy, usually recurved. Perianth bristly, of variable length, sometimes absent; perianth scales brown, subquadrate, as long as the nut, clawed, 3-dentate at apex, cordate or hastate at base, 3-nerved; claw *ca* 0.7 mm long; blade *ca* 1 mm long. Nuts brownish, broadly obovoid, triquetrous, 0.7-1 mm long, apiculate, smooth or faintly transversely lineolate.

Bastar, Bilaspur, Durg, Raigarh, Raipur, Shivpuri, Surguja. *Fl. & Fr.*: Oct. May.

2. Fuirena pubescens Kunth, Enum. Pl. 2: 182. 1837; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 665. 1893.

Perennials, 30-50 cm high. Rhizomes short, creeping. Stems triquetrous, glabrous except at the top. Leaves 5-20 x 0.6 cm, glabrous or hairy. Spikelets in a terminal cluster of 1-5, sometimes axillary clusters also added, ovate-oblong, *ca* 1 cm long. Glumes lurid black or glaucescent. Perianth absent or rudimentary, linear. Stigmas 3. Nuts white, oblong-obovoid, apiculate, smooth or scaberulous.

Madhya Pradesh, *s.l.* (Tiwari and Maheshwari, 1964).

3. Fuirena tuwensis M.B. Deshpande & G.L. Shah in Bull. Bot. Surv. India 10: 239. 1969; Verma & Chandra in Rec. Bot. Surv. India 21 (2): 259. 1981.

Perennials, rhizomatous, 15-60 cm high. Stems glabrous or puberulous. Leaves linear-lanceolate, 3-21 x 0.3-0.7 cm, hairy beneath and on margins, 3-5-nerved; sheaths hairy. Inflorescence of subpaniculate, axillary and terminal clusters of spikelets. Spikelets oblong, 6-15 mm long. Glumes with brown spots, obovate, 2-3 mm long, 3-nerved, mucronate, pubescent on back; margins ciliate in upper half; mucro hispidulous. Perianth bristles 3, retrorsely scabrid, shorter than the scales; perianth scales 3, battledore-

shaped, *ca* 1.5 mm long, clawed, rounded at apex, subhastate at base. Stamens 3. Stigmas 3. Nuts oblong-obovoid, trigonous, *ca* 1.5 mm long, apiculate, smooth.

Shivpuri. *Fl. & Fr.*: Oct.

4. Fuirena umbellata Rottb., Descr. Icon. Rar. Pl. 70. t. 19. f. 3. 1773; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 666. 1893. **Fig. 45.**

Perennials, up to 70 (-150) cm tall, more or less hairy on stem, leaves and glumes. Stems swollen at base. Leaves 8-15 (-26) x 0.5-1.2 (-2.5) cm. Partial panicles several in lower leaf axils, upper somewhat congested. Spikelets in clusters of 5-13, ovoid-oblong, 4-10 x 2-3 mm. Glumes obovate-oblong, 2-2.5 mm long, 3-nerved, awned; awns *ca* 1 mm long, ultimately recurved. Perianth bristles absent or very short; perianth scales brown, subquadrate, *ca* 1.2 mm long, mucronate, subsessile or very shortly clawed, 3-nerved. Nuts glossy, stramineous or fuscous on maturity, obovoid, triquetrous, 1-1.2 mm long, beaked, stipitate.

Sidhi. *Fl. & Fr.*: Sept. - Oct.

5. Fuirena wallichiana Kunth, Enum. Pl. 2: 182. 1837; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 665. 1893.

Perennials, 30-50 cm high. Rhizomes creeping. Stems triquetrous, more or less hairy at the top. Leaves linear-lanceolate, 5-20 x 0.4-0.7 cm, with a strong midrib. Spikelets in terminal, corymbose clusters, oblong, terete, 6-8 mm long. Glumes green with red streaks, broadly oblong, 3-3.5 mm long, rounded at apex, pubescent and ciliate; mucro *ca* 1 mm long. Perianth bristles reddish brown, shorter than the nut; perianth scales absent. Stigmas 3. Nuts pale yellow, turbinate, trigonous, *ca* 1.2 mm long, apiculate, longitudinally ribbed.

Guna, West Nimar (Tiwari and Maheshwari, 1964).

8. LIPOCARPHA R. Br., *nom. cons.*

Herbs, annual or perennial, tufted. Leaves several, clustered at the base. Inflorescence terminal, capitate of a few to several spikelets subtended by a few foliaceous bracts. Spikelets terete, obtuse, sessile, compactly numerous flowered; rhachilla persistent, marked with lozenge-

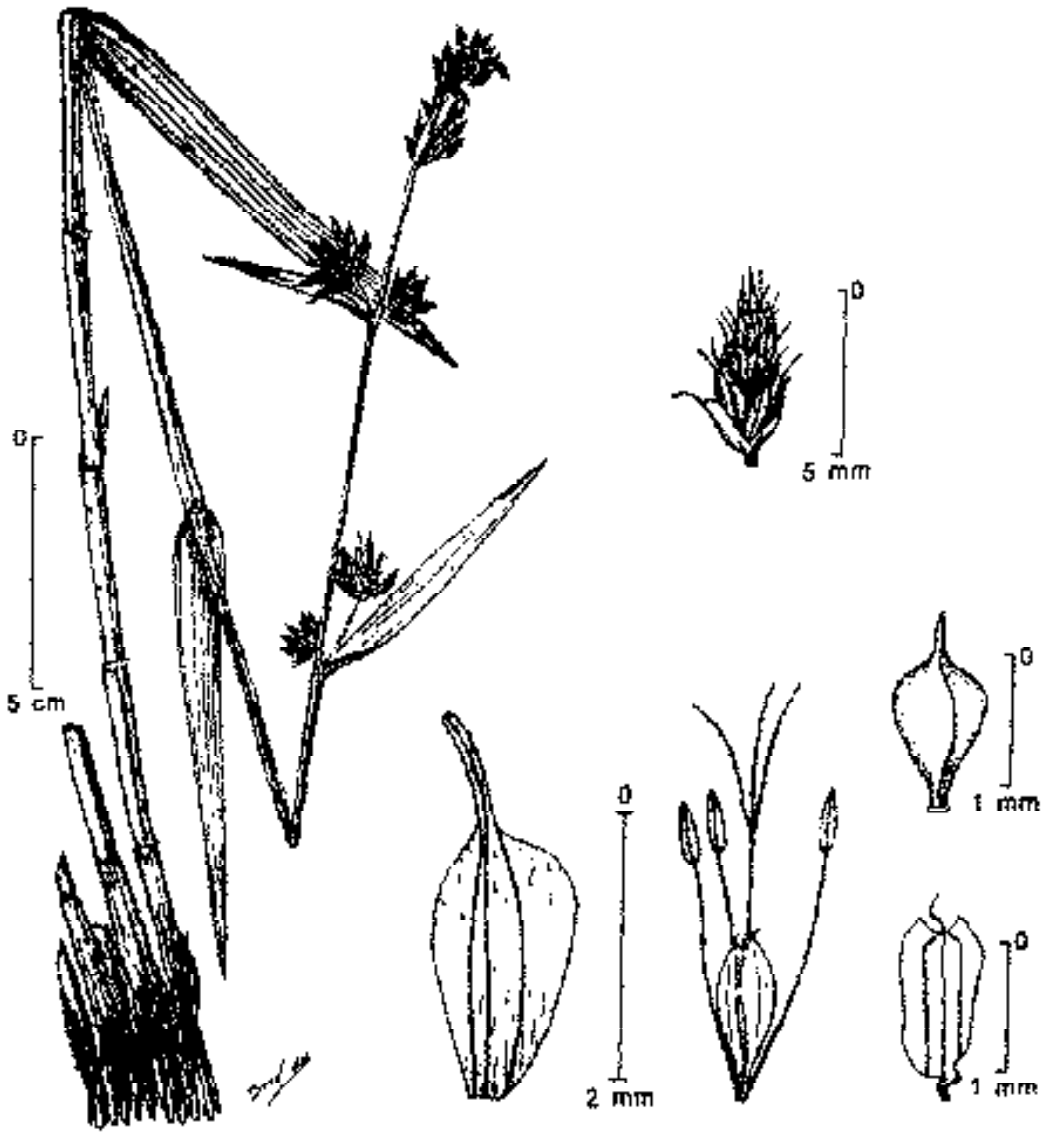

Fig. 45. Fuirena umbellata Rottb.

shaped scars. Glumes spirally densely imbricate, membranaceous, acropetally caducous, lower 1-2 empty. Flowers bisexual, uppermost tabescent. Perianth scales 2, clasping the nut, elliptic or ovate-oblong, hyaline, the posterior scale embracing the anterior one. Style continuous with the ovary, short, caducous; stigmas 3. Nuts oblong or oblong-obovoid, plano-convex, smooth, reticulate, enveloped by the perianth scales; epidermal cells isodiametric.

About 15 species; mainly tropical regions; 2 in M.P.

1a. Capitula glistening greyish white; style about half or more as long as the nut; nuts about half to two-third the length of the glumes ...1. *L. chinensis*

1b. Capitula reddish brown; style less than half as long as nut; nuts about as long as the glumes ...2. *L. sphacelata*

1. Lipocarpha chinensis (Osbeck) Kern in Blumea, Suppl. 4: 167. 1958; Verma & Chandra in Rec. Bot. Surv. India 21(2): 260. 1981. *Scirpus chinensis* Osbeck, Dagb. Ostind. Resa 220. 1757. *Lipocarpha argentea* Nees in Linnaea 9: 287. 1834; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 667. 1893. *Cyperus lipocarpha* Koyama in Bot. Mag. Tokyo 73: 438. 1960. **Fig. 46.**

Annuals or perennials, 10-65 cm tall. Stems rigid, greyish. Leaves flat or involute, one-third to half as long as the stem, 2-5 mm broad; sheaths reddish brown. Inflorescence 8-23 mm across; bracts horizontally spreading or reflexed. Spikelets 3-7 (-10) in a terminal head, glistening greyish white, ovoid or oblong-ovoid, 5-12 x 3-5 mm. Glumes stramineous, usually with purple streaks, spathulate, concave, 1.8-2.7 mm long, with a short erect or incurved tip. Perianth scales oblong, 1.5-2 mm long. Stigmas shorter than to equalling the style. Nuts stramineous or fuscous on maturity, narrowly obovoid-oblong, sometimes slightly curved, 1-1.3 mm long, apiculate.

Bilaspur, Hoshangabad, Raigarh, Raipur, Rajnandgaon, Satna, Sidhi, Surguja. *Fl. & Fr.*: Aug. Dec.

2. Lipocarpha sphacelata (Vahl) Kunth, Enum. Pl. 2: 267. 1837; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 667. 1893. *Hypaelyptum sphacelatum* Vahl, Enum. Pl. 2: 283. 1805.

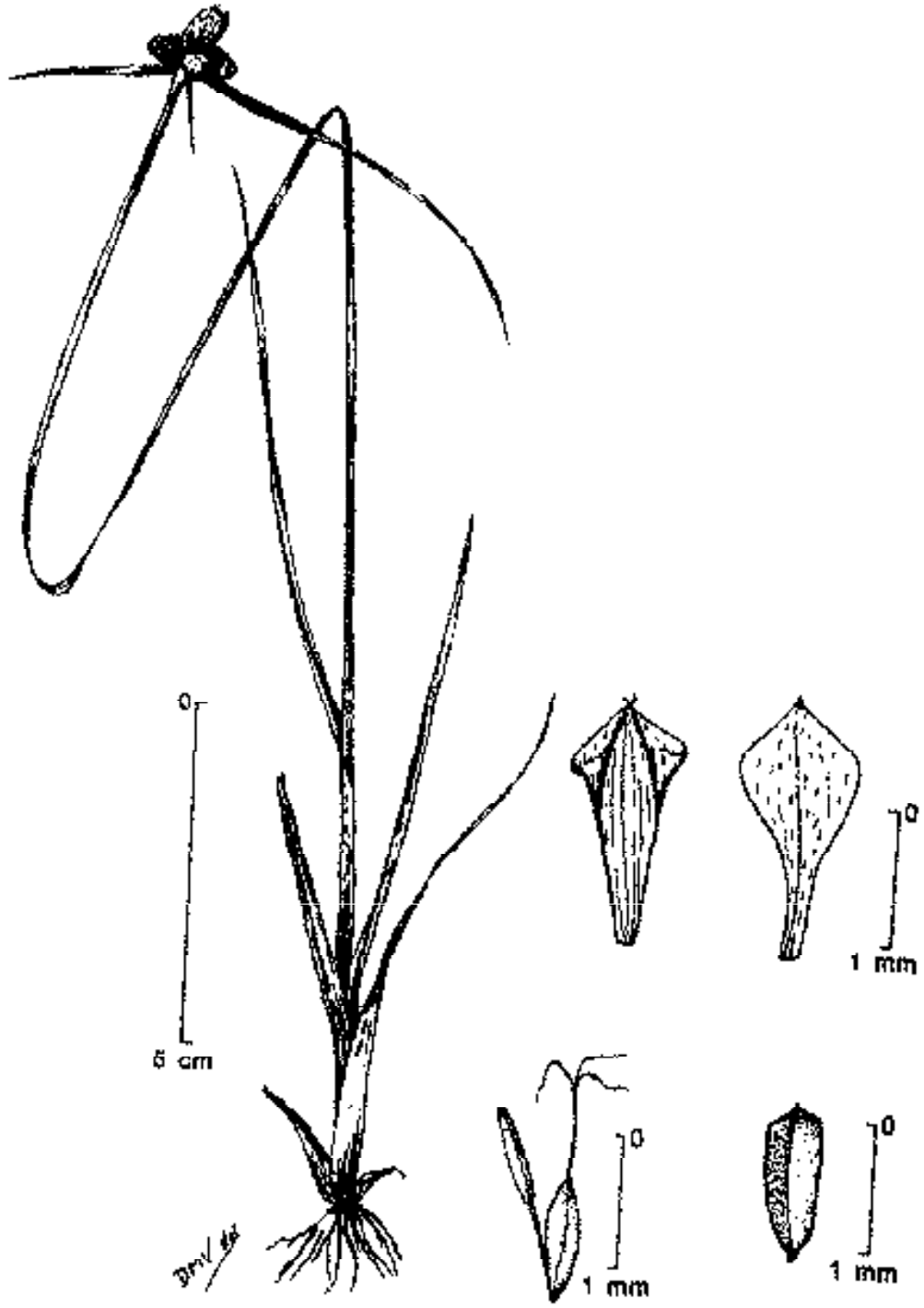

Fig. 46. Lipocarpha chinensis (Osbeck) Kern

Perennials, 10-40 cm tall. Leaves flaccid, one-third to half as long as the stem, 2-3.5 mm broad; sheaths brownish. Inflorescence 7-15 mm across; bracts 1-3, foliaceous, spreading or reflexed. Spikelets (1-) 3-8, reddish brown, ovoid, 3.5-8 x 3-3.5 mm. Glumes uniformly reddish brown at the tip, reddish brown striolate below, obovate, 1.5-1.8 mm long, cuspidate. Perianth scales ovate-oblong, 1.3-1.5 mm long. Style divided almost to the base; stigmas 3, *ca* 0.3 mm long. Nuts castaneous, oblong, triquetrous, 1.2-1.5 x 0.5 mm, apiculate, stipitate.

Balaghat, Raigarh. *Fl. & Fr.*: Sept. Nov.

9. RHYNCHOSPORA Vahl, *orth. et nom. cons.*

Herbs, annual or perennial, erect, usually tufted. Leaves more or less clustered at the base or scattered all along the stem; sheath-mouth sometimes with a scarious appendage opposite the blade. Inflorescence a solitary, terminal head or a raceme, or a panicle of corymbiform anthelas; lower bracts foliaceous. Spikelets solitary or clustered, few-flowered. Glumes 5-8, spiral or subdistichous, lower 3-4 empty and shorter than the upper fertile ones. Flowers bisexual or unisexual. Perianth bristles in bisexual and female flowers usually 3-6, sometimes more or absent, in male flowers usually fewer or absent. Stamens 1-3; anthers linear, sometimes destitute of pollen at base. Style articulated with the ovary, almost indistinctly to deeply 2-fid at tip, dilated at base to varying extent and persisting as a beak on the nut. Nuts oblong-obovoid or subglobose, lenticular, sessile or shortly stipitate, smooth, rugulose or wavy-wrinkled.

About 250 species; mainly neotropical; 4 in M.P.

1a. Inflorescence paniculate, consisting of a solitary or more corymbiform anthelas ...3. *R. rugosa*

1b. Inflorescence capitate, consisting of a solitary terminal hemispherical head:

2a. Perianth bristles shorter or longer than the nut or absent; nuts laterally compressed with one of its edges towards the axis of the spikelet, about as broad as long or narrower ...2. *R. rubra*

2b. Perianth bristles, at least some, always longer than the nut; nuts dorsiventrally compressed with one of its faces towards the axis of the spikelet, always narrower than long:

3a. Perianth bristles all scabrid in the upper part only, the three inner ones plumose at the base; nut beak with a median groove on each side ...1. *R. longisetis*

3b. Perianth bristles all scabrid throughout, none plumose anywhere; nut beak not grooved ...4. *R. wightiana*

1. Rhynchospora longisetis R. Br., Prodr. 230. 1810; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 669. 1893; Verma & Chandra in Bull. Bot. Surv. India 22: 134. 1980.

Annuals, tufted, 10-40 cm tall. Leaves 2-4 mm broad, scaberulous at tip. Inflorescence a solitary, terminal head, 2-2.5 cm across; bracts spreading or reflexed, dilated and ciliate at the base, lowest up to 9 cm long. Spikelets fulvous-ferrugineous, linear-lanceolate, 10-14 mm long, 2-flowered, lower female, upper male. Glumes 6-7, subdistichous, keeled. Perianth bristles 5-6, all antrorsely scabrous, 3-4 (-5) of these plumose at base, subequal, exceeding the nut beak, one much shorter. Style shallowly 2-fid. Nuts brown, oblong, compressed, 3-4 mm long, bristly on the shoulders; beak oblong-conical, 2-3 mm long, with a median groove on each side.

Balaghat, Raigarh, Surguja. *Fl.* & *Fr.*: Oct. - Jan.

2. Rhynchospora rubra (Lour.) Makino in Bot. Mag. Tokyo 17: 180. 1903; Verma & Chandra in Bull. Bot. Surv. India 22: 132. 1980. *Schoenus ruber* Lour., Fl. Cochinch. 1: 41. 1790. *Rhynchospora wallichiana* Kunth, Enum. Pl. 2: 289. 1837; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 668. 1893. **Fig. 47.**

Perennials, tufted, 15-70 cm tall. Leaves 1.5-3 mm broad, strongly keeled. Inflorescence a solitary, terminal head, 7-20 mm across; bracts dilated and ciliate at base. Spikelets reddish brown to blackish, lanceolate, 5-7 mm long, 2-4-flowered, lower flower bisexual or female, upper male.

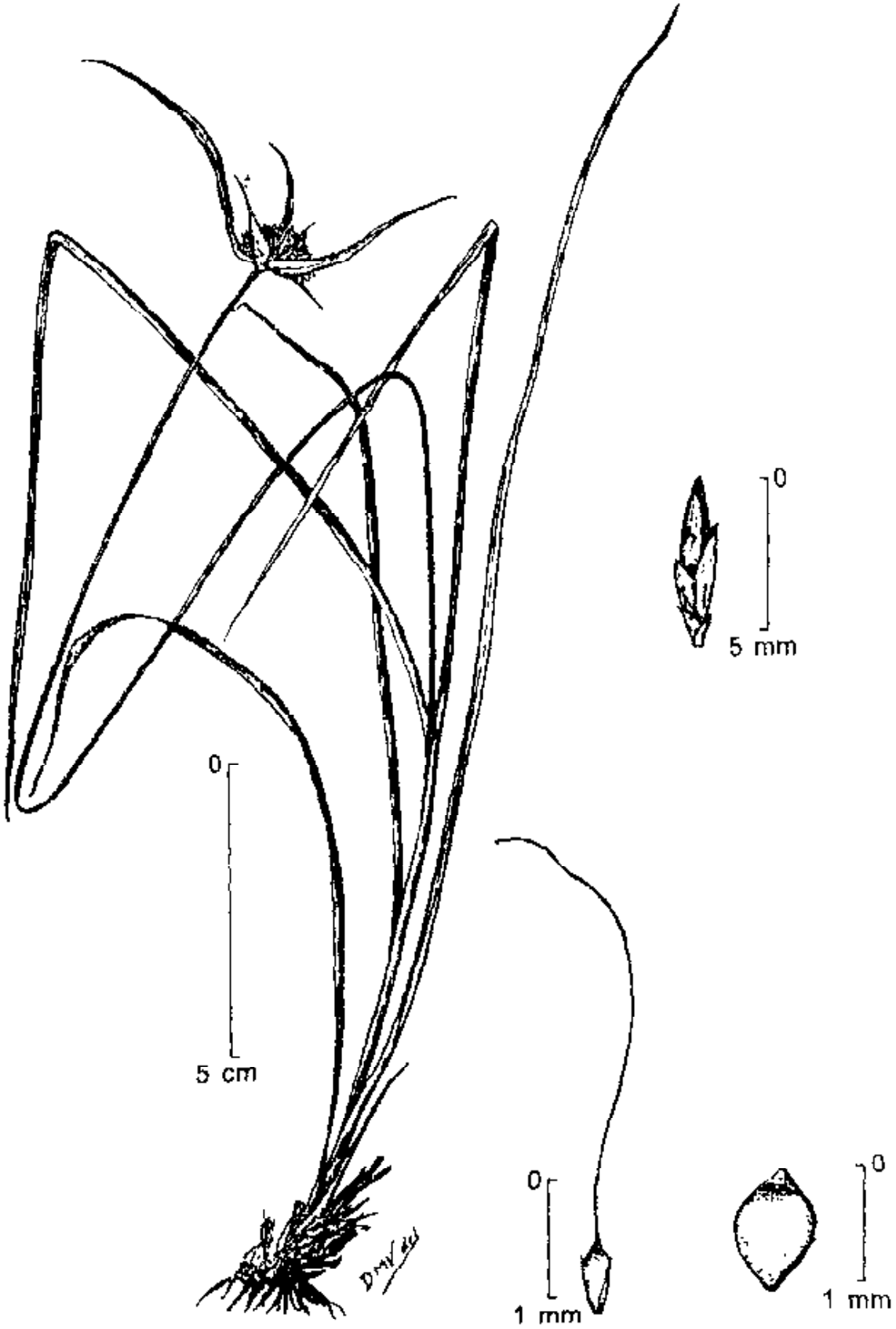

Fig. 47. Rhynchospora rubra (Lour.) Makino

Glumes 5-7, subdistichous, mucronate. Perianth bristles 0-3 (-6), if present, usually much shorter than the nut, sometimes longer. Style scarcely 2-fid. Nuts blackish brown, obovoid, turgidly biconvex, 1.5-2 mm long, usually equally broad, sometimes narrower, truncate, hairy on shoulders; beak pale greenish or stramineous, pyramidal, *ca* 0.5 mm long, puncticulate.

Bastar. *Fl. & Fr.*: Oct.

3. Rhynchospora rugosa (Vahl) Gale in Rhodora 46: 275. 1944; Verma & Chandra in Bull. Bot. Surv. India 22: 128. 1980. *Schoenus rugosus* Vahl, Eclog. Amer. 2: 5. 1798. *Rhynchospora glauca* Vahl, Enum. Pl. 2: 233. 1805, *nom. illegit.*; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 671. 1893, incl. var. *chinensis* C.B. Clarke, *l.c.* 672. 1893.

Perennials, tufted, 20-80 cm tall. Stems trigonous with several basal and a few distant cauline leaves. Leaves canaliculate, 1-4 mm broad. Inflorescence paniculate, narrow, 18-35 cm long, consisting of 3-4 (-6) corymbiform anthelas, lateral peduncles often long exserted, ascending. Spikelets solitary or in clusters, ferrugineous, ovate-lanceolate, 3-6 mm long, 2-4-flowered. Glumes 5-8, spiral, mucronate, nut bearing glume 3-5 mm long. Flowers bisexual, upper one (s) male or tabescent. Perianth bristles 5-6, brown, unequal, shorter than the nut or sometimes subequalling the nut beak, antrorsely scabrous. Style deeply 2-fid. Nuts pale brown to blackish, obovoid, biconvex, about three-fourth to as broad as long, 1.5-2 x 1-2 mm, sessile, faintly to prominently wavy-wrinkled; beak greyish stramineous, conical, 1-2 mm long.

Hoshangabad. *Fl. & Fr.*: Dec.

4. Rhynchospora wightiana (Nees) Steud., Syn. Pl. Cyp. 2: 148. 1855; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 669. 1893; Verma & Chandra in Bull. Bot. Surv. India 22: 134. 1980. *Haplostylis wightiana* Nees, Nova Acta Leop. 19. Suppl. 1: 101. 1843.

Annuals, 10-30 cm tall. Stems compressed below, trigonous above. Leaves flat or conduplicate, much shorter than the stem, 1-2 mm broad. Inflorescence a terminal, subglobose head, 15-20 mm across; bracts dilated and ciliate at base. Spikelets ferrugineous, linear-lanceolate, 6-8 mm long, 2-flowered, lower flower female, upper male. Glumes 6-7, subdistichous, acute, nut bearing glume 4-5 mm long. Perianth bristles 6, much exceeding

the nut beak, 5-7 mm long, one sometimes shorter, antrorsely scabrous. Style scarcely 2-fid. Nuts blackish with greyish margins, obovate-oblong, compressed, 2-2.5 mm long, tuberculate; beak stramineous, compressed-triangular, 0.5-1 mm long, scabrous.

Madhya Pradesh.

10. SCIRPUS L.

Herbs, annual or perennial. Rhizomes, when present, short or creeping. Stems terete or angled. Leaves clustered at the base or upwards on the stem, sometimes reduced to bladeless sheaths. Inflorescence terminal or pseudolateral, capitate or anthelate; bracts various. Spikelets solitary or clustered, terete or polygonal, few to many-flowered; rhachilla persistent, wingless. Glumes all spiral (or sometimes lower subdistichous), acropetally caducous, lower 1-3 empty. Flowers bisexual, upper few usually tabescent. Perianth of usually 1-8 bristles, rarely scale like or absent; bristles brown, usually retrorsely scabrid, sometimes plumose. Stamens 1-3. Styles uniformly slender, continuous with the ovary, deciduous, smooth or rarely fimbriate; stigmas 2-3. Nuts obovoid, oblong or ellipsoid, lenticular or trigonous, sessile or subsessile, smooth or rugulose.

About 150 species; cosmopolitan; 14 in M.P.

1a. Perianth present:

2a. Perianth of ligulate-spathulate scales ...8. *S. litoralis*

2b. Perianth of bristles:

3a. Inflorescence apparently pseudolateral due to the solitary stem-like bract appearing as though a continuation of the stem:

4a. Stems sharply triquetrous ...11. *S. mucronatus*

4b. Stems terete ...5. *S. juncoides*

3b. Inflorescence distinctly terminal with three to several glumaceous or foliaceous bracts:

5a. Leaves present or absent; bracts glumaceous ...6. *S. lacustris*

5b. Leaves always present; bracts foliaceous:

6a. Glumes aristate, main body 4-7 mm long:

7a. Plants up to 1 m high, slender ...9. *S. maritimus*

7b. Plants more than 1m high, stout ...14. *S. tuberosus*

6b. Glumes mucronate, main body 1-2 mm long ...3. *S. grossus*

1b. Perianth absent:

8a. Inflorescence a distinctly terminal head of 5-15 spikelets with spreading foliaceous bracts ...10. *S. microcephalus*

8b. Inflorescence a pseudolateral head or anthela of few to many spikelets with a solitary erect stem like bract appearing as though a continuation of the stem:

9a. Spikelets strongly squarrose by the recurved mucros of the glumes, the mucro about as long as or longer than the main body ...13. *S. squarrosus*

9b. Spikelets not squarrose, the mucro much smaller or glumes obtuse or acute:

10a. Bracts longer than the stem, the inflorescence thus apparently appearing to be nearer to the base of the stem ...1. *S. articulatus*

10b. Bracts shorter than the stem, the inflorescence thus apparently appearing to be nearer to the top of the stem:

11a. Stems bearing only 1-2 spikelets; stigmas 2 ...4. *S. isolepis*

11b. Stems usually bearing severalspikelets; stigmas 3:

12a. Stout perennials; inflorescence corymbose ...2. *S. brachyceras*

12b. Usually slender annuals; inflorescence capitate or of more or less clustered spikelets:

13a. Glumes mucronate ...7. *S. lateriflorus*

13b. Glumes obtuse ...12. *S. roylei*

1. Scirpus articulatus L., Sp. Pl. 47. 1753; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 656. 1893. **Fig. 48.**

Annuals or perennials. Stems terete, spongy, 5-15 (-35) cm long, 4-8 mm thick, transversely septate. Leaves absent; sheaths 1-3, laxly enveloping the stem, stramineous to brownish, sometimes bearing a short lamina. Inflorescence capitate, pseudolateral, 1-3 cm across, bearing 15-60 spikelets; bracts solitary, erect, stem like, 20-50 (-100) cm long, transversely septate. Spikelets ovoid-oblong, terete, 8-17 x 4-6 mm, subacute. Glumes rufous, broadly ovate or suborbicular, 3-5 mm long, acute or mucronulate. Perianth absent. Stamens 3. Stigmas 3. Nuts brown or ultimately black, obovoid, triquetrous, 1.7-2 mm long, apiculate, sessile, transversely wavy-wrinkled.

Bastar, Bilaspur, Durg, Morena, Raigarh, Raipur, Rajnandgaon, Rewa, Sagar, Satna. *Fl. & Fr.*: Oct. -Dec.

2. Scirpus brachyceras Hochst. *ex* A. Rich., Tent. Fl. Abyss. 2: 296. 1841; Hooper in Fl. W. Trop. Africa 3: 311. 1972. *S. corymbosus* Heyne *ex* Roth, Nov. Sp. Pl. 28. 1821; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 657. 1893, *non* L., 1760, *nec* Forssk., 1775. *Schoenoplectus corymbosus* (Roth *ex* Roem. & Schult.) Raynal in J.B. Lebrum *et al.*, Cat. Niger Plants 343. 1976; Hooper in Saldanha & Nicolson, Fl. Hassan Dist. 697. 1976. *Isolepis corymbosus* Roth *ex* Roem. & Schult., Syst. Veg. 2: 110. 1817.

Perennials, 0.5-2 m high. Rhizomes 5-10 cm long, creeping. Stems stout, terete, approximate. Leaves reduced to sheaths with a very oblique cuspidate mouth. Anthela simple or compound; rays 3-10, bearing clusters of spikelets at the tips. Spikelets in clusters of 3 to many, pale or rusty brown, ellipsoid, 5-8 mm long. Glumes ovate, 3.5-4.5 mm long, mucronate, strongly keeled. Perianth absent. Stigmas 3. Nuts yellow, obovoid, trigonous, *ca* 2 mm long, narrowed at apex, smooth.

Sagar.

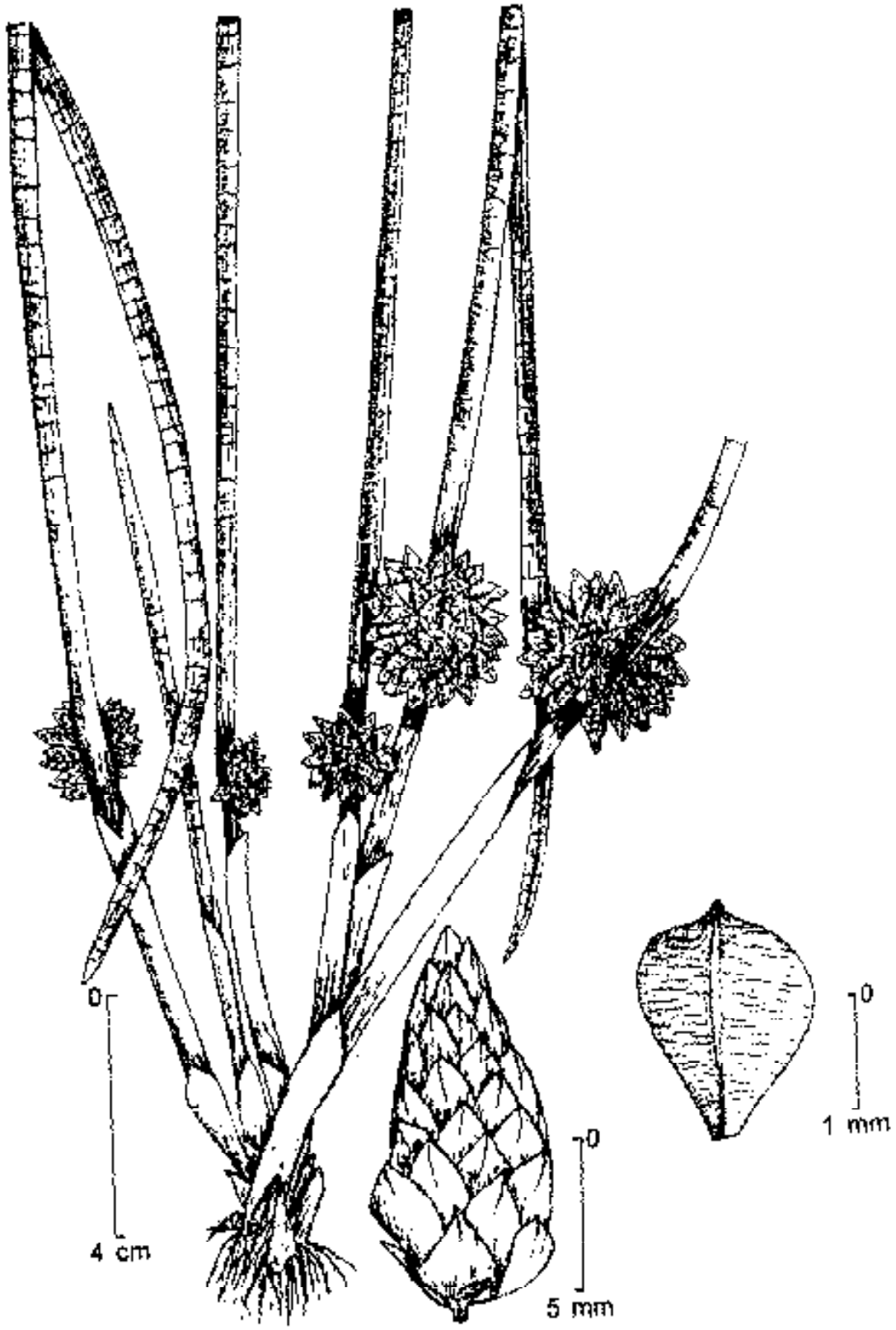

Fig. 48. Scirpus articulatus L.

3. Scirpus grossus L. *f.*, Suppl. Pl. 104. 1782; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 659. 1893.

Perennials, 1-2 m high. Rhizomes frequently emitting long stolons ending in small black tubers. Stems triquetrous below, almost 3-winged above. Leaves few, clustered at the base, 7-30 mm broad; sheaths long, spongy. Anthela dense, compound to supradecompound; bracts few to several, foliaceous, lowest 40-100 cm long. Spikelets solitary, ovoid-oblong, subterete, 4-10 x 2.7-3.5 mm. Glumes brown, ovate, 2-3 mm long, keeled, mucronate. Perianth bristles 3-6, unequal, plumose when young, sparsely retrorsely scabrid on maturity, longest subequalling the nut. Stamens 3. Styles swollen at the base; stigmas 3. Nuts brown, oblong-obovoid, trigonous, 1.2-1.7 mm long, apiculate, sessile, smooth.

Bastar (Subramanyam and Henry, 1966), Raipur, Sagar (Tiwari and Maheshwari, 1964). *Fl. & Fr.*: Sept. Dec.

4. Scirpus isolepis (Nees) Boeck. in Linnaea 36: 499. 1870; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 663. 1893. *Hemicarpha isolepis* Nees in Edinb. New Phil. J. 17: 263. 1834.

Annuals, tufted, slender, 3-15 cm high. Stems capillary. Leaves few, filiform, 5-20 mm long. Spikelets solitary, terminal, almost at right angle to the stem, oblong, 1-2 cm long, 20-40-flowered; bracts erect, as though a continuation of the stem, 5-30 mm long. Glumes reddish brown, obovate-rhomboid, *ca* 0.7 mm long, muticous or sometimes mucronulate. Perianth of 1-2 hyaline, obovate scales, as long as the nut. Stamen 1. Styles shortly 2-fid. Nuts blackish brown, narrowly oblong-obovoid, biconvex, *ca* 0.5 mm long, minutely muricate.

Not common. Jabalpur. *Fl. & Fr.*: Dec.

5. Scirpus juncoides Roxb., Fl. Ind. (Carey & Wallich ed.) 1: 218. 1820; Kern in Steenis, Fl. Males. ser. I. 7(3): 512. 1974. *S. erectus auct. non* Poir., 1829: C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 656. 1893. *Schoenoplectus juncoides* (Roxb.) Palla in Bot. Jahrb. Syst. 10: 299. 1888.

Perennials, sometimes annuals, 10-80 cm high. Rhizomes when present, short, woody. Stems terete, 2-3 mm thick, slenderly striate. Leaves absent;

sheaths 2-3, sometimes bearing a short lamina. Inflorescence pseudolateral, capitate, usually with 2-4 (-8) spikelets, sometimes reduced to a solitary spikelet; bracts solitary, erect, stem like, 2-16 cm long, with a callous tip. Spikelets ovoid-oblong, terete, 7-25 x 3-5.5 mm. Glumes stramineous or brownish, broadly ovate or suborbicular, 3-4 mm long, mucronate, broadly scarious on margins. Perianth bristles 5-6, unequal, retrorsely scabrid, longest shorter than to equalling the nut. Stamens 2-3. Stigmas 2 in lower flowers, 3 in upper flowers. Nuts black, broadly obovoid, plano-convex with a faint dorsal ridge, 1.7-2.2 mm long, apiculate, sessile, smooth or faintly transversely wavy-wrinkled.

Bilaspur. Durg, Satna, Sidhi, Surguja. *Fl. & Fr.*: Aug. Nov.

6. Scirpus lacustris L., Sp. Pl. 48. 1753; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 658. 1893. **Fig. 49.**

Perennials, 0.5-1.5 m high. Rhizomes shortly creeping. Stems terete or trigonous above, 8-15 mm thick. Leaves usually absent, sometimes up to 60 cm long. Anthela usually compound or decompound, sometimes much reduced; bracts glumaceous; rays more or less flattened. Spikelets solitary or in clusters of 2-4, ovoid-oblong, terete, 8-12 x 3-5 mm. Glumes rufous, ovate, 3.5-5 mm long, mucronate, notched at the tip, puberulous. Perianth bristles 5-6, retrorsely scabrid, longest equalling or exceeding the nut, (sometimes much reduced or even absent). Stamens 3. Stigmas 2-3. Nuts black, obovoid, 2-2.3 mm long, beaked, sessile, smooth; beak *ca* 0.5 mm long.

Hoshangabad, Shivpuri. *Fl. & Fr.*: Dec. Feb.

7. Scirpus lateriflorus J.F. Gmelin, Syst. Nat. 1: 127. 1791; Kern in Steenis, Fl. Males. ser. I. 7 (3): 514. 1974. *S. supinus* L. var. *uninodis* C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 656. 1893, *non Isolepis uninodis* Del., 1812. *Schoenoplectus lateriflorus* (J.F. Gmelin) Lye in Bot. Not. 124: 290. 1971.

Annuals, 10-20 cm high. Stems slender, subterete, with a node above the base. Leaves absent; sheaths 2-3, uppermost sometimes bearing a short lamina. Inflorescence pseudolateral, capitate, bearing 2-3 spikelets or sometimes reduced to a solitary spikelet or sometimes anthelate with 2-3 rays bearing 6-8 spikelets; bracts solitary, erect, stem like, 4-15 cm

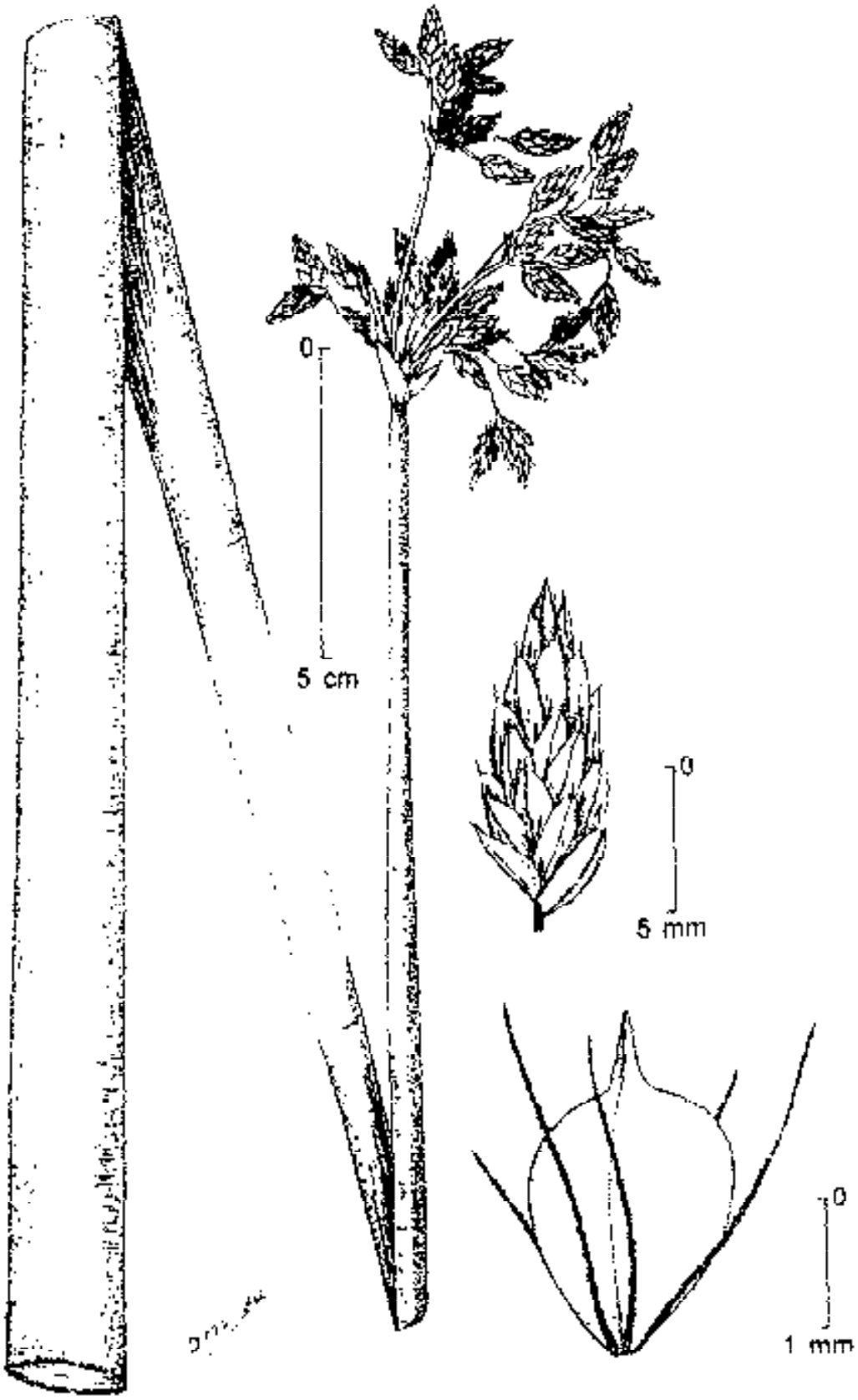

Fig. 49. Scirpus lacustris L.

long, sometimes another small bract also present. Spikelets ovoid-oblong, subterete, 5-8 x 2.5-3 mm. Glumes with brown-purplish dots, ovate, 2-2.5 mm long, mucronate. Perianth absent. Stamens 3. Nuts yellowish or ultimately blackish, broadly obovoid, trigonous, 1.2-1.5 mm long, sessile, transversely wavy-wrinkled, rugulose.

Bastar, Bilaspur, Durg, Raigarh, Raipur, Rajnandgaon, Rewa, Sagar, Satna, Shivpuri, Sidhi, Surguja. *Fl. & Fr.*: Throughout the year.

8. Scirpus litoralis Schrad., Fl. Germ. 1: 142. t. 5. f. 7. 1806; C.B. Clarke in Hook.*f.*, Fl. Brit. India 6: 659. 1893.

Perennials, 0.6-2 m high. Rootstocks very short, sometimes bearing slender stolons. Stems stout, terete below, trigonous above. Leaves long or short, or reduced to bladeless sheaths. Anthela lateral, compound or decompound, with suberect branches, up to 10 cm across; bracts erect, as though a continuation of the stem, 2-15 cm long. Spikelets mostly solitary, oblong-cylindrical, 10-18 mm long. Glumes red-brown, elliptic-oblong, *ca* 3 mm long, notched, cuspidate, with scarious margins. Perianth of 2-7, red-brown, bristle like or scale like, plumose segments, longer than the nut. Stamens 2-3. Stigmas 2. Nuts dark brown, bi- or plano-convex, *ca* 2 mm long, apiculate, smooth.

Sagar. *Fl. & Fr.*: Dec. - April.

9. Scirpus maritimus L., Sp. Pl. 51. 1753; C.B. Clarke in Hook.*f.*, Fl. Brit. India 6: 658. 1893, *p.p.*; Beetle in Amer. J. Bot. 29: 84. 1942; Kern in Steenis, Fl. Males. ser. I. 7 (3): 499. 1974; Rao & Verma, Cyper. N. E. India 44. 1982.

Perennials, 0.3-1 m high. Rhizomes creeping, tuberous. Leaves equalling the stem, 4-8 mm broad, subcoriaceous, long sheathing. Anthela terminal, usually simple or compound bearing many spikelets, sometimes almost capitate bearing few spikelets or rarely reduced to a solitary spikelet; bracts one to several foliaceous, lowest 7-30 cm long. Spikelets solitary or in clusters of 3-8, ovoid-oblong, 10-15 x 4-7 mm. Glumes rather laxly imbricating, ovate, 5-7 mm long, awned, glabrous or pubescent. Perianth bristles 3-6, unequal, retrorsely scabrous, longest shorter or equalling the nut. Stamens 3. Stigmas 2-3 (sometimes the numbers differing in flowers of the same spikelet). Nuts brown to greyish black, narrowly obovoid, compressed or trigonous, 2.5-3.5 mm long, beaked, sessile.

1a. Spikelets *ca* 2 x 1 cm; stigmas 2; nuts lenticular, dark brown ...9.1. var. *affinis*

1b. Spikelets up to 1.5 x 0.7 cm; stigmas 2-3; nuts compressed or trigonous, brown to greyish black ...9.2. var. *maritimus*

9.1. var. **affinis** (Roth) C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 659. 1893. *S. affinis* Roth, Nov. Pl. Sp. 30. 1821. *S. strobilinus* Roxb., Fl. Ind. (Carey & Wallich ed.) 1: 222. 1820; Beetle in Amer. J. Bot. 29: 84. 1942.

East Nimar (Duthie 8450; c.f. C.B. Clarke in J. Linn. Soc. London (Bot.) 34: 80. 1898). *Fl. & Fr.*: March - April.

Probably not distinct. Needs further study.

9.2. var. **maritimus**

Raipur, Rewa, Satna. *Fl. & Fr.*: May - June.

10. Scirpus microcephalus (Steud.) Dandy in F.W. Andrews, Fl. Pl. Sudan 3: 366. 1956. *Kyllinga microcephala* Steud. in Flora 25: 597. 1842. *Isolepis kyllingioides* A. Rich. in Tent. Fl. Abyss. 2: 502. 1851. *Scirpus kyllingioides* (A. Rich.) Boeck. in Linnaea 36: 733. 1870; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 662. 1893. *Kyllingiella microcephala* (Steud.) R. Haines & K. Lye in Bot. Not. 131(1): 175-177. 1978; Verma & Chandra in Rec. Bot. Surv. India 21 (2): 260. 1981.

Perennials, 10-25 cm high, sometimes bearing long slender stolons. Stems slender, thickened at base. Leaves *ca* 1 mm broad. Inflorescence a solitary terminal, 6-8 mm broad head bearing 5-15 spikelets; bracts foliaceous, up to 10 cm long. Spikelets ovate-lanceolate, many-flowered. Glumes stramineous, sometimes with purple dots, oblong-lanceolate, keeled, 3-5-nerved. Perianth absent. Stamens 2 (-3). Stigmas 3. Nuts brown or blackish, obovoid-oblong, trigonous or subcompressed, minutely apiculate, puncticulate.

Raipur. *Fl. & Fr.*: Oct.

11. Scirpus mucronatus L., Sp. Pl. 50. 1753; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 657. 1893. *Schoenoplectus mucronatus* (L.) Palla, Verh. K. K. Zool.-Bot. Ges. Wien. 38; Sitzb. 49. 1888; Hooper in Saldanha & Nicolson, Fl. Hassan Dist. 699. 1976.

Perennials, 0.5-1.5 m high. Rhizomes short or creeping. Stems triquetrous to almost 3-winged, up to 7 mm thick. Leaves absent; sheaths 1-3, purplish black, cuspidate. Inflorescence pseudolateral, capitate (sometimes also with some slender branches bearing one or more spikelets); capitula 1-2.5 cm across; bracts solitary, stem like, 1-5 cm (sometimes up to 17 cm) long, erect or ultimately spreading out. Spikelets 2-18, ovoid-oblong, subterete, 8-20 x 3.5-4.5 mm. Glumes pale or deep brown, ovate to broadly ovate, 3.2-4.5 mm long, mucronulate, striate, sometimes ciliolate on margins. Perianth bristles 5-6 (-8), unequal, retrorsely scabrid, longest subequalling the nut. Stamens 1-3. Stigmas 3 (or sometimes 2). Nuts chestnut brown to blackish, broadly obovoid, plano-convex with a faint dorsal ridge, 1.7-2.2 mm long, apiculate, sessile, smooth (or rugulose); surface cells isodiametric.

Bilaspur, Raigarh, Shivpuri, Sidhi. *Fl. & Fr.*: Aug. - Dec.

12. Scirpus roylei (Nees) Parker in Duthie, Fl. Gangetic Plain 3: 361. 1929. *Isolepis roylei* Nees in Wight, Contr. Bot. India 107. 1834. *Scirpus quinquefarius* Buch.-Ham. *ex* Boeck. in Linnaea 36: 701. 1870; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 657. 1893.

Annuals. Stems terete, 8-15 cm high, sometimes septate. Leaves absent; sheaths 2-3, loosely enveloping the stem. Inflorescence pseudolateral, capitate, 8-12 mm across; bracts solitary, stem like, erect, about as long as the stem. Spikelets oblong-lanceolate, terete, 6-12 mm long. Glumes laxly imbricating, brown, oblong-lanceolate, *ca* 3.5 mm long, membranaceous, striate. Perianth absent. Stamens 3. Stigmas 3. Nuts blackish, narrowly obovoid, trigonous, *ca* 1.3 mm long, sessile, transversely wavy-wrinkled.

Morena, Satna. *Fl. & Fr.*: Sept. Oct.

13. Scirpus squarrosus L., Mant. Pl. 181. 1771; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 663. 1893. *Rikliella squarrosa* Raynal in Adansonia ser. 2. 13: 154. 1973.

Annuals, 3-30 cm high. Stems filiform. Leaves 0.5-1 mm broad. Inflorescence capitate, pseudolateral, usually bearing 2-4, sometimes 1-10 spikelets; bracts 2-3, one stem like, erect or flexuous, 1.5-5 cm long, others small, spreading. Spikelets oblong, 3-7 mm long, squarrose. Glumes brown, obovate-rhomboid, aristate, 1-1.2 mm long including *ca* 0.7 mm long decurved arista. Perianth absent. Stamens 1 (-2). Style obscure; stigmas 3, *ca* 0.2 mm long. Nuts brownish, narrowly obovoid, trigonous, *ca* 0.5 mm long, apiculate, sessile, smooth.

Balaghat, Bastar, Bilaspur, Hoshangabad, Indore, Jabalpur, Raigarh, Raipur, Rajnandgaon, Satna, Shivpuri, Sidhi. *Fl. & Fr.*: Oct. - May.

14. Scirpus tuberosus Desf., Fl. Atlant. 1: 50. 1798; Beetle in Amer. J. Bot. 29: 84. 1942; Maheshwari, Fl. Delhi 363. 1963; Verma and Chandra in Rec. Bot. Surv. India 21 (2): 266. 1981.

Perennials. Stems stout, 1.2-1.8 m high. Leaves well developed, flat, 2-12 mm broad, revolute on drying. Inflorescence terminal, highly variable in development, evolute and anthelate, or almost contracted into a capitula (or sometimes reduced to a solitary spikelet); bracts foliaceous. Spikelets ovoid-oblong, 1-2 cm long. Glumes spiral, ovate-oblong, main body 4-7 mm long, aristate, 1-nerved. Perianth bristles retrorsely scabrous. Stigmas 2 or 3. Nuts obovoid, 2.5-4 mm long.

Gwalior, Raipur, Rewa, Satna, Shivpuri, Ujjain. *Fl. & Fr.*: Feb. - June.

11. SCLERIA Bergius

Herbs, annual or perennial, erect or scrambling. Leaves linear; sheaths sometimes winged, its mouth opposite the leaf-blade, truncate or produced into a contraligule. Inflorescence spicate, capitate or paniculate. Spikelets bisexual or unisexual, lower 3-4 glumes empty. Flowers unisexual. Perianth absent. Stamens 2-3. Style continuous with the ovary, caducous, the base sometimes persistent; stigmas 3. Nuts sometimes bluish or discoloured, globose or ovoid, with a crustaceous generally glistening white pericarp, smooth or variously sculptured, borne on a gynophore which is dilated above into a hypogynous disk adhering to the ripe nut.

About 220 species; mainly pantropical; 12 in M.P.

1a. Annuals; inflorescence spiciform; spikelets in clusters of 2-5; bracts glumaceous or foliaceous:

2a. Cluster of spikelets subtended by a foliaceous bract; female glume tridentate ...3. *S. caricina*

2b. Cluster of spikelets subtended by a glumaceous bract; female glumes acute ...8. *S. pergracilis*

1b. Annuals or perennials; inflorescence paniculate at least in the lower parts; bracts foliaceous:

3a. Glumes with long spreading hairs ...9. *S. rugosa*

3b. Glumes glabrous or minutely appressed pubescent:

4a. Partial panicles very loose, its primary axis bearing only a few branches with widely spaced cluster of spikelets; nuts trigonous with three basal ferrugineous depressions; disk reduced to a narrow band ...6. *S. lithosperma*

4b. Inflorescence, nut and disk characters not combined as above:

5a. Partial panicles corymbosely branched; disk obsolete ...4. *S. corymbosa*

5b. Partial panicles racemosely branched; disk well developed or reduced to a narrow band:

6a. Annuals; terminal partial panicle pseudolateral due to erect posture of the uppermost bract, laterals on often recurved peduncles ...9. *S. rugosa*

6b. Perennials or annuals; inflorescence of a distinctly terminal partial panicle and with or without spreading lateral partial panicles, never recurved:

7a. Disk reduced to a narrow band; nuts slightly laterally compressed, obtuse ...1. *S. annularis*

7b. Disk well developed, 3-lobed; nuts terete or trigonous, usually apiculate:

8a. Disk lobes subquadrate or hemispherical, rounded or truncate at the top:

9a. Annuals; disk lobes subquadrate; nuts obtuse ...12. *S. tessellata*

9b. Perennials; disk lobes hemispherical; nuts apiculate ...11. *S. terrestris*

8b. Disk lobes lanceolate or ovate-oblong, with subacute, acute or acuminate tip, sometimes notched:

10a. Nuts smooth or faintly reticulate ...5. *S. levis*

10b. Nuts with prominent pits more or less in vertical rows:

11a. Nuts globose, cancellate with almost square pits, ferrugineous hairy on the walls between the pits; beak capillary, mostly purplish black, rarely white ...2. *S. biflora*

11b. Nut and beak characters not combined as above:

12a. Disk lobes lanceolate, acuminate, with reddish brown striations ...10. *S. stocksiana*

12b. Disk lobes ovate-oblong, acute or subacute, without reddish brown striations ...7. *S. parvula*

1. Scleria annularis Nees *ex* Steud., Syn. Pl. Cyp. 2: 176. 1855, *excl. descr.*; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 687. 1894; Verma & Chandra in Bull. Bot. Surv. India 32: 78. (1990) 1992.

Annuals, usually tufted, 30-90 cm tall. Stems triquetrous, scabrous. Leaves 3-6 cm broad, scabrid on margins; sheaths narrowly winged, often ciliate; contraligule ovate. Inflorescence paniculate; lateral partial panicles

solitary or 2-nate; peduncles 1-3 cm long, hairy, 2-winged towards its dilated top. Spikelets bisexual and male, 3-4 mm long. Glumes stramineous, brown striolate, acute or mucronate. Stamens 2-3. Hypogonium short, triangular. Nuts glistening white, oblong, trigonous, slightly laterally compressed, 2.3-2.5 x 2 mm, apiculate, smooth, glabrous or pubescent.

Bastar, Betul, Bilaspur, Sagar. *Fl. & Fr.*: Oct. Nov.

2. Scleria biflora Roxb., Fl. Ind. 3: 573. 1832; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 687. 1894; Verma & Chandra in Bull. Bot. Surv. India 32: 76. (1990) 1992.

Annuals, tufted, slender, 15-50 cm tall. Leaves 2-6 mm broad; sheaths narrowly winged; contraligule ciliate. Inflorescence paniculate, lateral partial panicles solitary or 2-nate. Spikelets all unisexual or male and bisexual, 3-4.5 mm long. Glumes brown, ovate-lanceolate, mucronate. Stamens 2-3; anthers reddish setose at tips. Disk deeply 3-lobed; lobes ferrugineous, lanceolate, about half as long as the nut. Nuts white or sometimes discoloured, usually ferrugineous, globose, terete, 2-2.5 mm across, cancellate, pubescent on the ridges; beak (persistent style-base) purplish black, rarely white, acicular.

Balaghat. *Fl. & Fr.*: Sept. Oct.

3. Scleria caricina (R. Br.) Benth., Fl. Austral. 7: 426. 1878; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 688. 1894; Kern in Blumea 11: 208. 1961. *Diplacrum caricinum* R. Br., Prodr. 241. 1810; Blake in J. Arnold Arb. 35: 233. 1954. **Fig. 50.**

Annuals, tufted, 5-10 (-25) cm high. Leaves 1-4 (-5) x 0.1-0.15 (-0.3) cm, acute; sheaths slightly widening above. Inflorescence of 7-12 (-20) axillary clusters of spikelets; clusters 2-3 mm long with a terminal female and a few lateral male spikelets. Male spikelets shortly pedunculate, 1.5-2 mm long; female spikelets 2.5-3 mm long. Glumes 2, subopposite, connivent and falling with the nut, ovate-oblong, several nerved, 3-lobed at tip. Stamen 1. Nuts white or sometimes discoloured, ovoid-globular, subterete, 0.7-1 mm long, apiculate, ribbed, the vertical ribs more prominent than the transverse ones, glabrous or hispidulous; hypogynous disk reduced to a narrow 3-angled band.

Balaghat. *Fl. & Fr.*: Oct.

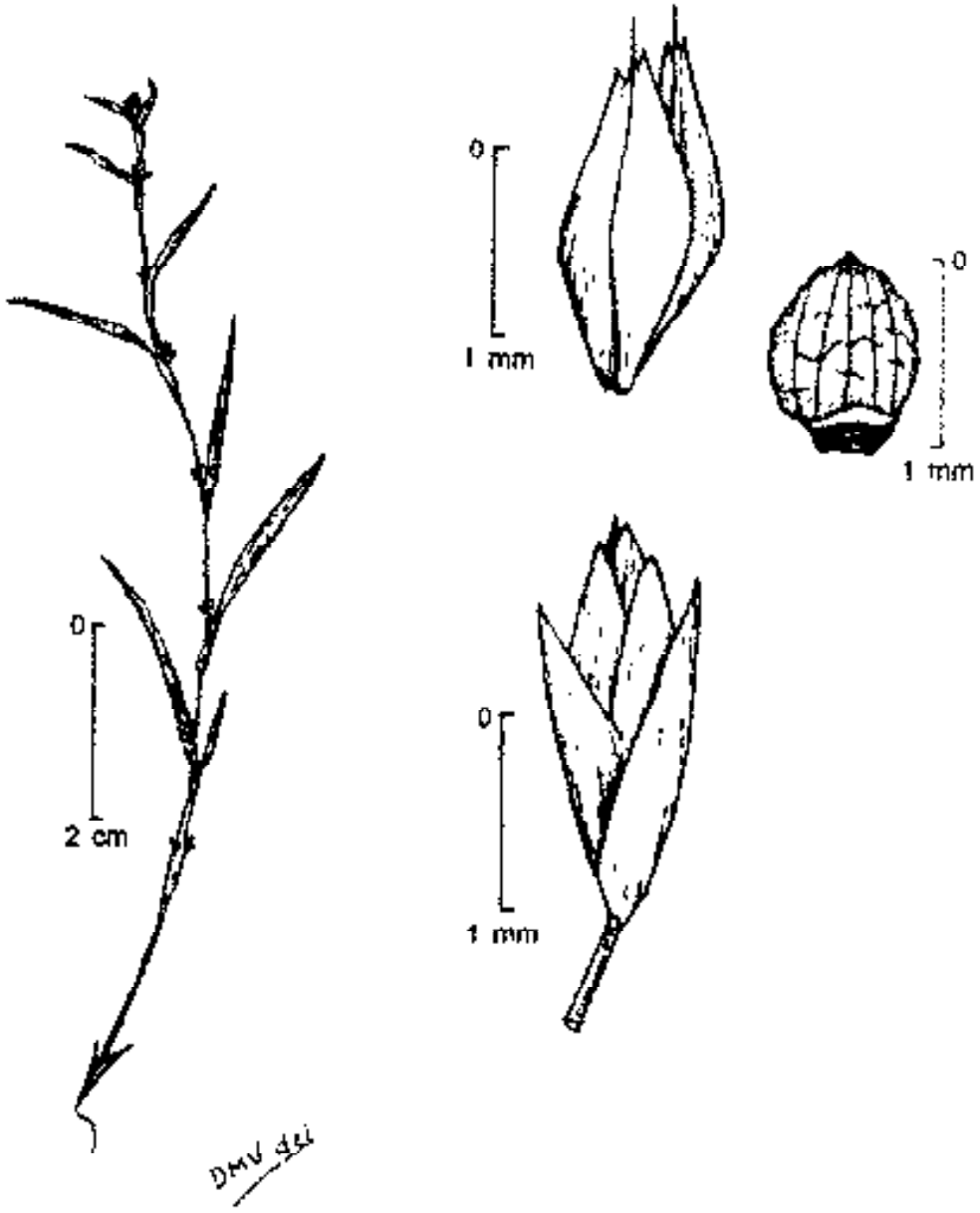

Fig. 50. Scleria caricina (R. Br.) Benth.

4. Scleria corymbosa Roxb., Fl. Ind. 3: 574. 1832; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 686. 1894; Verma & Chandra in Bull. Bot. Surv. India 32: 63. (1990) 1992. *S. ridleyi* C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 686. 1894.

Perennials, stout, up to 2.5 m tall. Leaves 7-25 mm broad; contraligule ovate, brown scarious on margins. Inflorescence paniculate; partial panicles 1-3 together, densely corymbosely branched; peduncles stout, up to 10 cm long. Spikelets bisexual and male, 4-5 mm long. Glumes stramineous, ovate-lanceolate, acute or mucronulate. Stamens 3. Disk a narrow reddish brown triangular band. Nuts glistening white or discoloured, ovoid, obtusely trigonous, 3-4 x 2-2.5 mm.

Sagar (Naithani and Raizada, 1977). *Fl. & Fr.*: Dec.

5. Scleria levis Retz., Observ. Bot. 4: 13. 1786, *non* C.B. Clarke, 1894; Verma & Chandra in Bull. Bot. Surv. India 32: 63. (1990) 1992. *S. hebecarpa* Nees in Wight, Contr. Bot. India 117. 1834; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 689. 1894, *incl.* var. *pubescens* (Steud.) C.B. Clarke.

Perennials, up to 1 m tall. Leaves 4-8 mm broad, glabrous or hairy; sheaths triquetrous or broadly winged; contraligule rounded, with a scarious triangular appendage. Inflorescence paniculate; lateral partial panicles 1-2 only, sometimes almost spike-like. Spikelets unisexual, 3-6 mm long. Glumes stramineous brown, acute or mucronulate. Stamens 3; anther tips setose. Disk deeply 3-lobed; lobes thin, brown, lanceolate, 1-1.5 mm long, acute or notched. Nuts glossy white, ovoid-globose, subterete, 2-2.5 mm long, apiculate, smooth or faintly transversely rugulose, hairy or glabrescent.

Balaghat, Bastar, Bilaspur, Hoshangabad, Raipur, Sidhi, Surguja. *Fl. & Fr.*: Oct. Feb.

Rhizomes are reportedly used for digestive disorders.

6. Scleria lithosperma (L.) Sw., Prodr. 18. 1788; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 685. 1894; Verma & Chandra in Bull. Bot. Surv. India 32: 61. (1990) 1992. *Scirpus lithospermus* L., Sp. Pl. 51. 1753. *Scleria lithosperma* var. *multispiculata* Govindarajalu in Proc. Ind. Acad. Sci. Sect. B. 71: 221. 1970. **Fig. 51.**

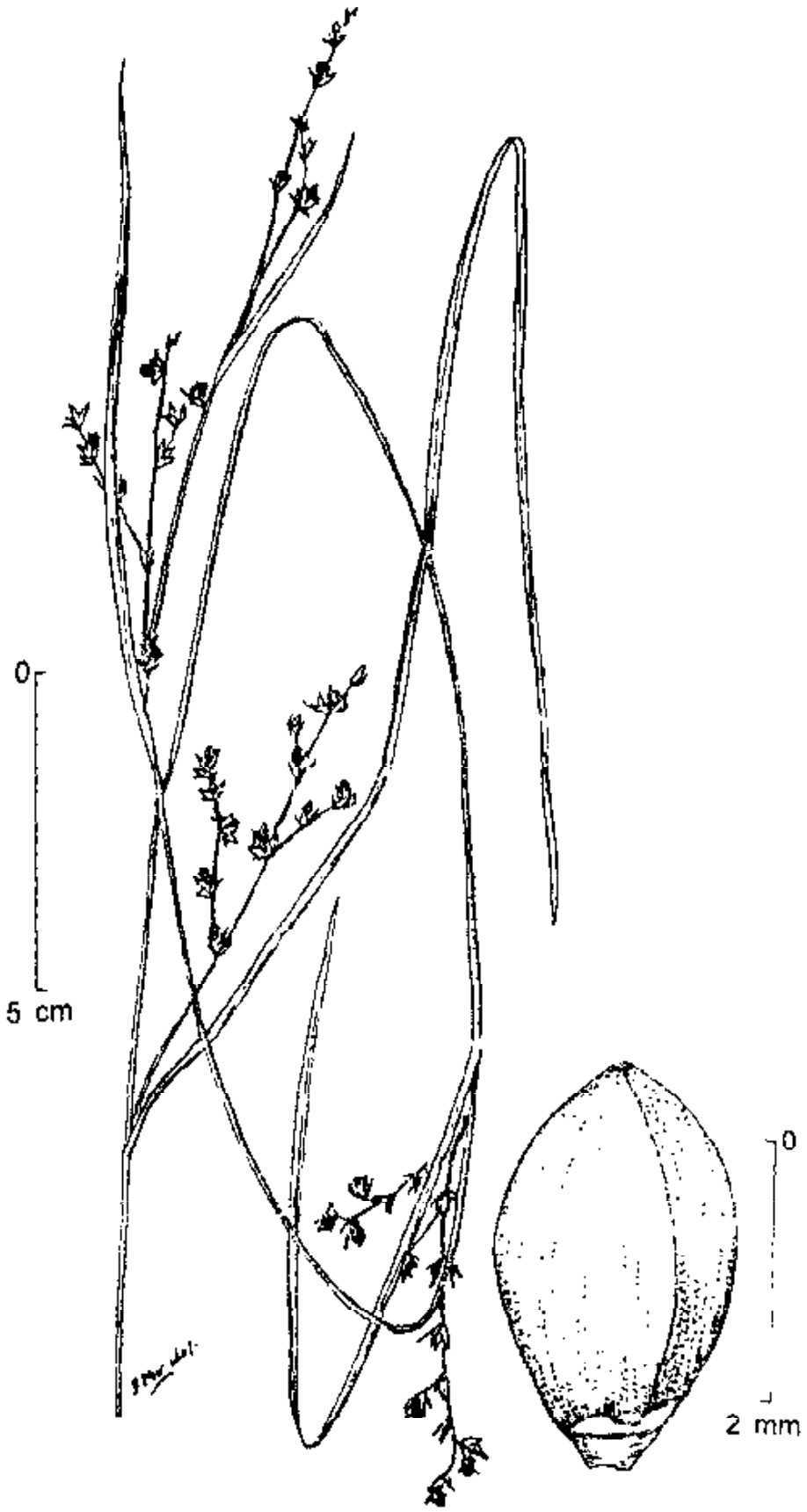

Fig. 51. Scleria lithosperma (L.) Sw.

Perennials, slender, up to 1 m tall. Leaves all scattered or sometimes a few aggregated, 1-5 mm broad, glabrous or hairy: sheaths frequently hairy. Inflorescence very laxly paniculate; lateral partial panicles 2-3, its branches almost spiciform, usually in clusters of 2-7, sometimes solitary, bisexual and male, 2-7 mm long. Glumes brown, mucronulate. Stamens 1-2. Disk reduced to a narrow brown glandular band. Nuts white or sometimes discoloured, ovoid-oblong, trigonous, 2-3 x 1.5-2 mm, umbonulate, smooth, with 3 prominent pits at base which are rugulose by minutely glandular ferrugineous ridges.

1a. Nut surface rugulose by nonglandular ridges ...6.1. var. *linearis*

1b. Nut surface rugulose by minutely glandular ridges ...6.2. var. *lithosperma*

6.1. var. **linearis** Benth., Fl. Austral. 7: 430. 1878; Verma & Chandra in Bull. Bot. Surv. India 32: 63. (1990) 1992. *Scleria lithosperma* var. *roxburghii* C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 686. 1894.

Hoshangabad.

6.2. var. **lithosperma**

Raipur, Sagar. *Fl. & Fr.*: Throughout the year.

7. Scleria parvula Steud., Syn. Pl. Cyp. 2: 174. 1855; Rao & Verma, Cyper. N. E. India 57. 1982; Verma & Chandra in Bull. Bot. Surv. India 32: 76. (1990) 1992. *S. tessellata auct. non* Willd., 1805; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 686. 1894, *p.p.*

Annuals, tufted, slender, up to 1 m tall. Leaves 2-5 mm broad, sparsely hairy; sheaths sometimes narrowly winged; contraligule ciliate. Inflorescence paniculate; partial panicles 2-4 together; peduncles often curved. Spikelets unisexual, 4-5.5 mm long. Glumes brown, ovate-lanceolate, acute or mucronulate. Stamens 2-3; anthers with reddish ciliolate tip. Disk rather thick, deeply 3-lobed; lobes ovate-oblong, acute or subacute. Nuts glossy white or discoloured and brownish, obovoid, subterete, 2.2-2.5 x 1.5-2 mm, shortly beaked, tessellate lacunose, glabrous or brown pubescent on the transverse ridges.

Indore. *Fl. & Fr.*: Sept. Oct.

8. Scleria pergracilis (Nees) Kunth, Enum. Pl. 2: 354. 1837; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 685. 1894; Verma & Chandra in Bull. Bot. Surv. India 32: 61. (1990) 1992. *Hypoporum pergracile* Nees in Edinb. New Phil. J. 17: 267. 1834.

Annuals, tufted, slender, 20-60 cm tall. Leaves 0.5-2 mm broad; sheaths glabrous or hairy, its mouth truncate or with a small membranaceous contraligule. Inflorescence spiciform, unbranched or rarely with 1-2 short branches, 4-15 cm long, with 5-22 glomerules of spikelets or a smooth or hispidulous rhachis; bracts glumaceous. Spikelets 2-5 in each glomerule, bisexual, 2.5-3.5 mm long. Glumes brown with red streaks, oblong-obovate, 2.5-3 mm long, acute, with a green midrib. Stamens 2. Hypogonium stipe-like, triquetrous, *ca* 0.5 mm long. Nuts greyish white, broadly obovoid, subterete, 1.2-1.8 mm long, apiculate, lacunose or rugulose, tuberculate, especially towards the top.

Balaghat, Bastar, Bilaspur, Raipur. *Fl. & Fr.*: Aug. - Oct.

9. Scleria rugosa R. Br., Prodr. 240. 1810; Rao & Verma, Cyper. N. E. India 58. 1982; Verma & Chandra in Bull. Bot. Surv. India 32: 78. (1990) 1992. *S. flaccida* C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 688. 1894, *non* Steud., 1855. *S. zeylanica auct. non* Poir., 1806: C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 687. 1894, *excl. syn. S. thawaitesiana* Boeck.

Annuals, copiously hairy or almost glabrous, 5-40 cm tall. Leaves 1.5-3.5 mm broad, obtuse; sheaths winged or wingless; contraligule ciliate. Inflorescence paniculate, terminal partial panicle pseudolateral due to erect posture of the subtending bracts, lateral partial panicles solitary or 2-nate; peduncles winged, up to 3 cm long, sometimes curved. Spikelets unisexual, 3-4 mm long. Glumes greenish stramineous, acute-mucronulate, usually long ciliate. Stamens solitary. Disk thick, shallowly 3-lobed; lobes hemispherical, broadly rounded at the top. Nuts glossy greyish white, broadly ovoid or globose, terete, 1.3-1.8 mm across, apiculate, smooth, rugulose or lacunose.

Balaghat. *Fl. & Fr.*: Sept. Oct.

10. Scleria stocksiana Boeck. in Linnaea 38: 474. 1874; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 687. 1894; Verma & Chandra in Bull. Bot. Surv. India 32: 76. (1990) 1992.

Annuals or perennials, tufted, 20-70 cm tall. Stems smooth or scabrid. Leaves 3-6 mm broad, glabrous or puberulous, scabrid on margins and midrib; sheaths narrowly winged or wingless; contraligule ovate-oblong, *ca* 2 mm long, membranous on margins. Inflorescence paniculate; lateral partial panicles 2-nate, 1-3 cm long, one subsessile, the other shortly peduncled. Spikelets bisexual and male, in clusters of 2-3. Glumes stramineous, brown striolate, ovate-lanceolate, acute-mucronate. Disk deeply 3-lobed; lobes thin, stramineous or white, red-brown striolate, appressed, lanceolate, *ca* 0.8 mm long, acute, with recurved margins. Nuts greyish white, ellipsoid-oblong or globose, terete or faintly trigonous, 3-3.7 x 1.8-2.5 mm, umbonulate, cancellate, glabrous.

Balaghat, Hoshangabad. *Fl. & Fr.*: Oct.

11. Scleria terrestris (L.) Fass. in Rhodora 26: 159. 1924, incl. var. *latior* (C.B. Clarke) Fass. & var. *decolorans* (C.B. Clarke) Fass.; Kern in Steenis, Fl. Males. ser. I. 7(3): 733. 1974; Rao & Verma, Cyper. N. E. India 60. 1982; Verma & Chandra in Bull. Bot. Surv. India 32: 68. (1990) 1992. *Zizania terrestris* L., Sp. Pl. 991. 1753. *Scleria radula* Hance in Ann. Sci. Nat. Bot. 18: 232. 1862; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 691. 1894. *S. elata* Thwaites, Enum. Pl. Zeyl. 353. 1864; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 690. 1894 incl. var. *latior* C.B. Clarke and var. *decolorans* C.B. Clarke. *S. melanostoma* Nees *ex* Boeck. in Linnaea 38: 514. 1874; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 692. 1894. *S. rinkiana* Boeck., Cyper. Nov. 2: 30. 1890; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 694. 1894. *S. chinensis* var. *biauriculata* C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 690. 1894. **Fig. 52.**

Perennials, erect or scrambling, 1-4 m tall. Rhizomes creeping. Leaves 0.4-4 cm broad; sheaths wingless or broadly winged, glabrous or villous; contraligule with a brown scarious margin. Inflorescence paniculate; partial panicles solitary or 2-nate, branches divaricate or ascending. Spikelets unisexual, 3-5 mm long. Glumes pale or dark brown, acute-mucronulate, usually hairy. Stamens 2-3; anthers with a setulose reddish tip. Disk 3-lobed; lobes thick, stramineous, purplish striolate, hemispherical, rounded at the top. Nuts usually white, sometimes purplish black, ovoid or subglobose, terete or trigonous, 2.2-3 x 2-2.8 mm, apiculate, deciduously hairy, cancellate (or sometimes smooth).

Bastar, Bilaspur, Raigarh. *Fl. & Fr.*: Oct. March.

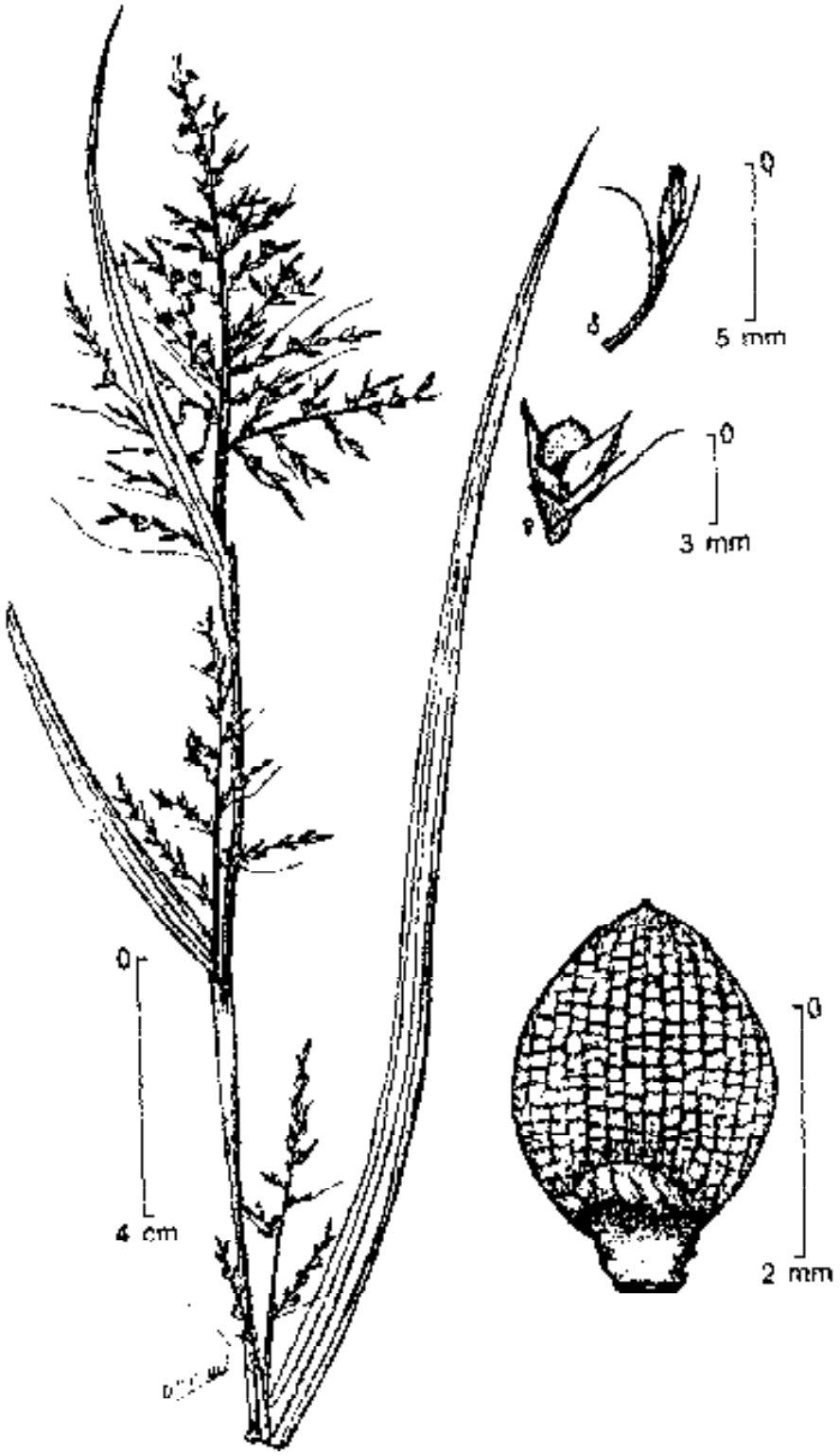

Fig. 52. Scleria terrestris (L.) Fass.

12. Scleria tessellata Willd., Sp. Pl. 4: 315. 1805; C.B. Clarke in Hook. *f.*, Fl. Brit. India 6: 686. 1894, *p.p.*; Verma & Chandra in Bull. Bot. Surv. India 32: 75. (1990) 1992. **Fig. 53.**

Annuals, tufted, 20-60 cm tall. Leaves 2-6 mm broad; sheaths narrowly to broadly winged, pubescent; contraligule rounded, hairy. Inflorescence paniculate, usually copious; partial panicles solitary or 2-nate; peduncles sparsely hairy. Spikelets unisexual, 5-6 mm long. Glumes stramineous, brown striolate, ovate-lanceolate, acute, with a green midrib. Stamens 3. Disk thick, white or cream-coloured, deeply 3-lobed; lobes somewhat rectangular with a broad truncate top and slightly narrow base. Nuts white or frequently discoloured brown, ellipsoid, terete, 2.7-3 x 2-2.2 mm, umbonulate, lacunose-tessellate, pitted at the base, glabrous or puberulous.

Guna, Hoshangabad, Indore. *Fl. & Fr.*: Nov. - Jan.

164. POACEAE

(G.P. Roy)

About 737 genera and 7950 species; cosmopolitan; 103 genera and 264 species in M.P.

1a. Plants tall, perennial; culms woody; leaf blades flat, lanceolate to ovate; ligules scarious; lodicules usually 3; stamens 6:

2a. Spikelets not in globose heads; palea keeled, ciliate or scabrid; pericarp thin, adnate to the grain, adhering to hilum only:

3a. Spikelets many-flowered; palea scabrid; filaments free ...11. *Bambusa*

3b. Spikelets 1-3-flowered; palea hairy; filaments coherent ...46. *Gigantochloa*

2b. Spikelets in globose heads; palea neither keeled nor ciliate; pericarp crustaceous or fleshy, separable from the grain:

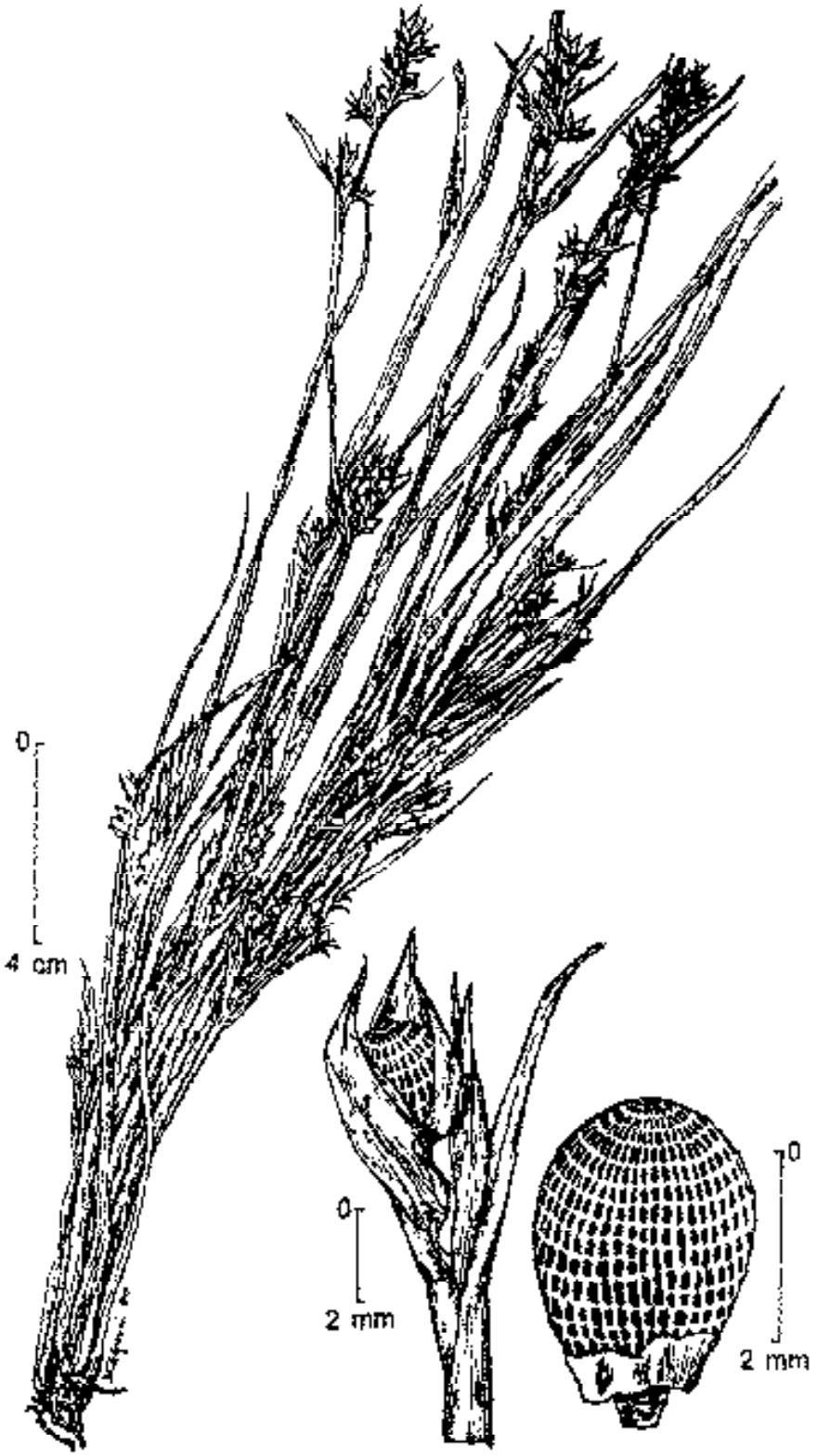

Fig. 53. Scleria tessellata Willd.

4a. Two-three central florets bisexual; lodicules absent; fruits crustaceous ...26. *Dendrocalamus*

4b. One central floret bisexual; lodicules present; fruits fleshy ...87. *Schizostachyum*

1b. Plants small, annual or perennial; culms herbaceous; leaf blades flat or filiform, usually linear to lanceolate; ligules ciliate or membranous; lodicules 2 or absent; stamens 1-3 (6 in *Hygroryza* and *Oryza*):

5a. Spikelets unisexual, male and female conspicuously dissimilar:

6a. Female spikelets completely enclosed in a metamorphosed leaf sheath, forming spherical or cylindrical bead like structure ...20. *Coix*

6b. Female spikelets not enclosed in a false involucre as above:

7a. Male and female spikelets in separate inflorescences; female spikelets in longitudinal rows on a very thick axis; male spikelets in a large terminal panicle ...103. *Zea*

7b. Male and female spikelets in same inflorescences; female spikelet single at base; upper one male ...16. *Chionachne*

5b. Spikelets perfect, with one perfect floret, if unisexual then male and female spikelets similar, with or without reduced florets, occasionally 2 or more perfect florets:

8a. Spikelets in pairs, one sessile, other pedicellate, rarely solitary and all alike; first glume large and firm, clasping or enclosing the florets:

9a. Joints of the rhachis and pedicel narrow, slender, if thickened then spikelets 1-flowered and awned:

10a. Pairs of spikelets alike and with perfect florets (rarely in threes or the pedicellate reduced):

11a. Spikelets arranged in panicle or compound racemes along a central axis:

12a. Rhachis persistent or tardily breaking up:

13a. Panicles narrow, contracted; glumes very delicate; callus hairs twice or more longer than glumes ...52. *Imperata*

13b. Panicles broader; glumes indurated; callus hairs very short ...64. *Narenga*

12b. Rhachis disarticulating:

14a. Spikelets awned; upper lemma clefted ...92. *Spodiopogon*

14b. Spikelets awnless; upper lemma not clefted ...84. *Saccharum*

11b. Spikelets arranged in single or several racemes, digitate or on very short axis:

15a. Spikelets paired, one sessile, other pedicellate, or both pedicellate:

16a. Racemes digitate, paired or scattered; upper glume awnless or shortly (up to 1.5 mm long) awned:

17a. Leaf blades mostly lanceolate; lower glume deeply furrowed, rarely villous ...62. *Microstegium*

17b. Leaf blades linear; lower glume neither furrowed nor grooved, usually villous:

18a. Spikelets 2-flowered; lower glume 2-3-toothed ...44. *Eulaliopsis*

18b. Spikelets 1-flowered; lower glume not 2-3-toothed:

19a. Perennials; rhachis fragile; lower glume dorsally flattened or shallowly concave between keels; upper lemma rarely stipiform ...43. *Eulalia*

19b. Annuals; rhachis persistent; lower glume dorsally convex; upper lemma stipiform ...79. *Pseudopogonatherum*

16b. Racemes solitary; upper glume with 10-14 mm long awn ...76. *Pogonatherum*

15b. Spikelets solitary, 2-flowered, sessile; pedicellate spikelet reduced to pedicel only ...5. *Apocopis*

10b. Pairs of spikelets dissimilar; sessile bisexual; pedicellate male or sterile:

20a. Racemes paired, digitate, scattered or in panicle:

21a. Racemes espatheate:

22a. Leaves linear; upper lemma of sessile spikelet awned from tip or sinus:

23a. Racemes arranged in panicle or in whorls on main axis:

24a. Pedicel without a transfucent line; upper lemma awned from sinus:

25a. Spikelets dorsally compressed; lower glume flattened on back:

26a. Racemes few-noded ...91. *Sorghum*

26b. Racemes many-noded ...81. *Pseudosorghum*

25b. Spikelets laterally compressed or terete; lower glume rounded on back:

27a. Racemes with many pairs of spikelets ...102. *Vetiveria*

27b. Racemes with 1 sessile and 2 pedicellate spikelets ...18. *Chrysopogon*

24b. Pedicel with a median translucent line; upper lemma awned from tip:

28a. Racemes solitary; lower glume of sessile spikelets pitted ...41. *Eremopogon*

28b. Racemes 1-4; lower glume of sessile spikelets not pitted:

29a. Spikelets arranged in false panicle terminating capillary branches ...14. *Capillipedium*

29b. Spikelets arranged in false racemes along the central axis but not at the tips of capillary branches ...78. *Pseudanthistiria*

23b. Racemes digitate, subdigitate or scattered:

30a. Sessile spikelets of all pairs bisexual, awned; lower glume of sessile spikelet narrow and not closely imbricating ...12. *Bothriochloa*

30b. Sessile spikelets of lowest 1-3 pairs male or neuter, awnless; lower glume of sessile spikelet broad and closely imbricating ...28. *Dichanthium*

22b. Leaves lanceolate-ovate; upper lemma of sessile spikelets with basal awn ...7. *Arthraxon*

21b. Racemes spatheate:

31a. Plants aromatic; racemes paired in compound panicle; one pair of spikelet in each raceme homogamous...22. *Cymbopogon*

31b. Plants not aromatic; racemes 2-nate or digitate; all spikelets heterogamous ...3. *Andropogon*

20b. Racemes solitary:

32a. Racemes of several pairs of evenly placed spikelets, without an involucre:

33a. Rhachis tough; column of awn hairy ...49. *Heteropogon*

33b. Rhachis fragile; column of awn glabrous:

34a. Pedicellate spikelets much larger than sessile; upper glume awned; joints and pedicels bucciniform ...29. *Diectomis*

34b. Pedicellate spikelets small, often reduced; upper glume awnless; joints and pedicels clavate, 2- toothed ...86. *Schizachyrium*

32b. Racemes of a few pairs of spikelets, the lower pairs male or neuter, forming a false involucre around others:

35a. Involucral spikelets persistent, shortly pedicellate or sessile; callus of fertile spikelets pointed ...96. *Themeda*

35b. Involucral spikelets deciduous, with long pedicels; callus of fertile spikelets truncate or obtuse ...55. *Iseilema*

9b. Joints of the rhachis and pedicel swollen, 3-angled, rounded or flattened:

36a. Inflorescence a spike like raceme; spikelets solitary, almost sessile ...31. *Dimeria*

36b. Inflorescence otherwise; spikelets paired, one sessile, other pedicellate (rarely reduced to pedicel):

37a. Sessile spikelet with a male and bisexual floret; upper lemma usually awned:

38a. Racemes many-noded, not enclosed in a spathe like sheath:

39a. Racemes solitary; lower glume of sessile spikelet without nodules or furrows ...89. *Sehima*

39b. Racemes 2 to many; lower glume of sessile spikelet with nodules or transverse furrows:

40a. Pedicellate spikelets developed; lower glume coriaceous below, transversely wrinkled, with nodules on margins ...54. *Ischaemum*

40b. Pedicellate spikelet reduced to a curved pedicel; lower glume coriaceous, convex, covered with transverse ridges ...95. *Thelepogon*

38b. Racemes 1-noded, reduced to 3 heteromorphous spikelets, enclosed in a cymbiform spathe ...4. *Apluda*

37b. Sessile spikelet with a bisexual floret only or occasionally with a male floret below; upper lemma usually awnless:

41a. Sessile spikelets spherical; lower glume pitted all over; pedicellate spikelet reduced ...47. *Hackelochloa*

41b. Sessile spikelets not spherical; lower glume not pitted; pedicellate spikelet well developed or absent:

42a. Spikelets similar:

43a. Racemes dorsally compressed; rhachis very tough; joints fused with pedicel ...48. *Hemarthria*

43b. Racemes cylindrical; rhachis fragile; joints and pedicels free ...63. *Mnesithea*

42b. Spikelets dissimilar:

44a. Sessile spikelet strongly dorsally compressed, sunk in a cavity of joint; pedicel fused with joint; lower glume winged ...60. *Manisuris*

44b. Sessile spikelet, pedicel and lower glume not as above:

45a. Racemes covered with shaggy hairs; all sessile spikelets on one side of rhachis ...36. *Elyonurus*

45b. Racemes mostly glabrous; spikelets not as above:

46a. Spikelets paired, one sessile, the other pedicellate ...83. *Rottboellia*

46b. Spikelets solitary and sessile, the pedicellate suppressed ...65. *Ophiuros*

8b. Spikelets solitary or paired, if paired then first glume not larger and firmer than lemma of fertile floret, not clasping or enclosing second glume:

47a. Reduced floret (male or female) always below the perfect one:

48a. Reduced floret 1, its lemma similar to second glume; disarticulation below the glume or glumes:

49a. Spikelets in involucres of bristles or subtended by solitary bristle, and falling with or without bristles at maturity:

50a. Upper lemma smooth; bristles disarticulate with spikelets:

51a. Bristles many, modified or spine like branchlets:

52a. Involucre of free, naked or plumose bristles ...72. *Pennisetum*

52b. Involucres or bristles fused together at least at the base ...15. *Cenchrus*

51b. Bristle solitary, formed by prolongation of the branch beyond the terminal spikelet ...80. *Pseudoraphis*

50b. Upper lemma transversely rugose; bristles persistent ...90. *Setaria*

49b. Spikelets not in involucre or subtended by bristles:

53a. Spikelets finely awned or mucronate from notched tip of upper glume and lower lemma; upper lemma rigidly membranous ...82. *Rhynchelytrum*

53b. Spikelets awnless, if awned, then subsessile in false, secund, variously arranged spikes and awns from the tips of glume and lemma (*Eriochloa, Oplismenus*); upper lemma crustaceous, rarely chartaceous:

54a. Inflorescence an open or contracted panicle, sometimes spike like panicles:

55a. Spikelets arranged in open or contracted panicle; upper glume not inflated:

56a. Spikelets distinctly gibbous, laterally much compressed ...24. *Cyrtococcum*

56b. Spikelets not or slightly gibbous, not much compressed ...69. *Panicum*

55b. Spikelets arranged in cylindrical spike like panicles; upper glume inflated ...85. *Sacciolepis*

54b. Inflorescence one-sided spikes or spike like racemes, digitate or scattered, rarely solitary:

57a. Lemma of the upper floret thinly cartilaginous, usually with flat margins:

58a. Spikelets awnless ...30. *Digitaria*

58b. Spikelets awned ...2. *Alloteropsis*

57b. Lemma of the upper floret crustaceous or coriaceous, with inrolled margins:

59a. Lower glume and lowest internode of the rhachilla forming a swollen callus at the base of the spikelet ...42. *Eriochloa*

59b. Lower glume and lowest internode of rhachilla not forming a swollen callus at the base of the spikelet:

60a. Spikelets adaxial; lower glume turned towards the rhachis, back of upper lemma turned away from it ...13. *Brachiaria*

60b. Spikelets abaxial; lower glume (if present) turned away from the rhachis, back of upper lemma facing it:

61a. Spikelets plano-convex; lower glume usually absent ...71. *Paspalum*

61b. Spikelets otherwise; lower glume developed, sometimes minute:

62a. Glumes acuminate or awned; upper lemma not mucronate:

63a. Leaf blades linear; ligules absent; racemes dense ...34. *Echinochloa*

63b. Leaf blades lanceolate to ovate; ligules present; racemes loose ...66. *Oplismenus*

62b. Glumes awnless, if acuminate the upper lemma mucronate:

64a. Upper lemma acute, not mucronat ...70. *Paspalidium*

64b. Upper lemma obtuse, mucronate or very shortly awned ...101. *Urochloa*

48b. Reduced floret 1-2, its lemma dissimilar to second glume; disarticulation above the glumes:

65a. Glumes absent or rudimentary:

66a. Plants floating; leaf blades ovate-oblong or ovate-lanceolate; glumes absent ...51. *Hygroryza*

66b. Plants not floating; leaf blades linear; glumes present:

67a. Annuals; spikelets 7-10 mm long; cultivated ...68. *Oryza*

67b. Perennials; spikelets less than 6 mm long; wild ...57. *Leersia*

65b. Glumes present, at least the second well developed:

68a. Spikelets 3-flowered, strongly compressed, lower 2 represented by empty lemmas ...74. *Phalaris*

68b. Spikelets 1 or 2-flowered, not compressed:

69a. Spikelets 2-flowered, lower male or barren, upper bisexual:

70a. Lower floret empty, without palea; rhachilla produced beyond the upper floret; glumes up to half the length of spikelet ...97. *Thysanolaena*

70b. Lower floret male or neuter, with a palea; rhachilla disarticulate below upper floret and not produced beyond it; upper glume equalling the spikelet:

71a. Glumes equal, obtuse or mucronate; upper lemma awnless:

72a. Glumes finally deciduous; upper lemma indurated ...53. *Isachne*

72b. Glumes persistent; upper lemma membranous ...19. *Coelachne*

71b. Glumes unequal, lower acute, upper acuminate; upper lemma awned:

73a. Lemma of the upper floret glabrous, scaberulous or scabrid, minutely 2-lobed ...8. *Arundinella*

73b. Lemma of the upper floret bearded dorsally, deeply 2-fid ...56. *Jansenella*

69b. Spikelets with one perfect floret, usually reduced floret absent:

74a. Spikelets 3-awned; lemmas indurated, rigid at maturity ...6. *Aristida*

74b. Spikelets not as above; lemmas hyaline or membranous:

75a. Glumes awned; lemmas 3-5-nerved; caryopsis with an adhering pericarp ...77. *Polypogon*

75b. Glumes awnless; lemmas 1-3-nerved; caryopsis with free pericarp:

76a. Culms prostrate; inflorescence spicate, subtended by an inflated sheath ...21. *Crypsis*

76b. Culms erect; inflorescence a spreading panicle, not subtended by inflated sheath ...93. *Sporobolus*

47b. Reduced florets absent, if present always above perfect one:

77a. Inflorescence a panicle or open raceme, primary branches spreading or contracted but not spicate:

78a. Plants 1.5-3 m tall, with stout rhizomes forming colonies:

79a. Lemmas villous; rhachilla glabrous ...9. *Arundo*

79b. Lemmas glabrous; rhachilla villous ...75. *Phragmites*

78b. Plants less than 1.5 m long, not rhizomatous:

80a. Lemmas awnless ...40. *Eragrostis*

80b. Lemmas awned:

81a. Lemmas with 9 subequal, plumose awns from the tip ...38. *Enneapogon*

81b. Lemmas with a single, glabrous awn:

82a. Spikelets pendulous ...10. *Avena*

82b. Spikelets erect:

83a. Spikelets 5-12-flowered; lower glume absent; lemma-awn straight ...59. *Lolium*

83b. Spikelets 1-flowered; lower glume present; lemma-awn geniculate ...45. *Garnotia*

77b. Inflorescence a spike or spicate raceme, or with 2 to several spicate primary branches:

84a. Inflorescence of 1 to several, unilateral, spicate primary branches:

85a. Spikelets deciduous in bur like clusters (2-5); glumes with hooked spines ...98. *Tragus*

85b. Spikelets not in deciduous bur like clusters; glumes without hooked spines:

86a. Spikelets with 2 or more perfect florets:

87a. Inflorescence branches paired, verticillate or clustered at culm apex:

88a. Rhachis projecting in a sharp point ...25. *Dactyloctenium*

88b. Rhachis ending in a spikelet:

89a. Glumes and lemmas awnless, tips not toothed ...35. *Eleusine*

89b. Glumes or lemmas awned, if awnless then the tip of lemma toothed:

90a. Lemma 2-toothed at tip, with a mucro from the sinus ...1. *Acrachne*

90b. Lemma tip entire, 2-3-awned ...17. *Chloris*

87b. Inflorescence branches distributed along the culm axis:

91a. Glumes awned or aristate-acuminate:

92a. Inflorescence cylindrical, interrupted, spiciform panicle ...37. *Elytrophorus*

92b. Inflorescence not as above:

93a. Spikelets pedicellate; lower lemma awned; callus densely hairy ...94. *Tetrapogon*

93b. Spikelets sessile; lower lemma awnless; callus not hairy ...32. *Dinebra*

91b. Glumes awnless, obtuse or acute:

94a. Culms with extensive rhizomes; emerging leaf piercing as needle; inflorescence a loose or contracted panicle ...27. *Desmostachya*

94b. Culms without rhizomes; emerging leaf soft; inflorescence of spikes or racemes:

95a. Racemes with a few, terete spikelets; lemmas rounded on back ...33. *Diplachne*

95b. Racemes with many, secund, laterally compressed spikelets; lemmas keeled ...58. *Leptochloa*

86b. Spikelets with 1 perfect floret:

96a. Inflorescence of solitary raceme; spikelets awnd ...73. *Perotis*

96b. Inflorescence of 2-6 digitate spikes; spikelets awnless ...23. *Cynodon*

84b. Inflorescence a terminal, bilateral spike or spicate raceme:

97a. Spikelets solitary at each node of the inflorescence axis:

98a. Spikelets awnless, arranged in 2 rows on a long, terminal, slender axis ...39. *Eragrostiella*

98b. Spikelets awned, not in 2 rows:

99a. Spikelets 8-36-flowered; lemmas bearded ...99. *Tripogon*

99b. Spikelets 2-6-flowered; lemmas glabrous:

100a. Fertile lemma shorter than glumes, minutely 2-toothed; awns 2-3 cm long ...88. *Schoenefeldia*

100b. Fertile lemma longer than glumes, entire; awns more than 3 cm long ...100. *Triticum*

97b. Spikelets 2-3 at each node of the inflorescence axis:

101a. Inflorescence flexuous and interrupted; spikelets 2-3-flowered, ciliate ...61. *Melanocenchris*

101b. Inflorescence compact; spikelets 1-flowered, glabrous:

102a. Spikelets embedded in thick tough rhachis; glumes lateral ...67. *Oropetium*

102b. Spikelets not embedded in the rhachis; glumes standing in front of the spikelet ...50. *Hordeum*

1. ACRACHNE Wight & Arnott *ex* Chiov.

Annuals. Inflorescence open, composed of several spikes. Spikelets many-flowered, with serrate outline, subsessile. Glumes 1-nerved, keeled, falling before lemmas. Lemmas disarticulate from below upwards. Paleas persistent. Caryopsis ornamental, deeply sulcate on the hilar side; pericarp free.

A monotypic genus; Ethiopia, tropical Asia and Australia.

Acrachne racemosa (Heyne *ex* Roem. & Schult.) Ohwi in Bull. Tokyo Sci. Mus. no. 18: 1. 1947; Bor, Grass. Burm. Ceyl. Ind. Pak. 487. 1960. *Eleusine racemosa* Heyne *ex* Roem. & Schult., Syst. Veg. 2: 583. 1817. *E. verticillata* Roxb., Fl. Ind. (Carey & Wallich ed.) 1: 346. 1820; Hook.*f*., Fl. Brit. India 7: 295. 1896.

Annuals, tufted. Culms 30-80 cm tall, erect or geniculately ascending. Leaves 7-20 cm long, flat, acuminate at apex, glabrous; sheaths appressed; ligules hairy. Spikes scattered or whorled; spikelets 4-5 mm long, many-flowered (8-12). Glumes ovate, small, finely acuminate. Lemmas broadly ovate, 3-4 mm long, 3-nerved, keel excurrent, lateral nerves ending in small teeth. Anthers *ca* 0.5 mm long. Caryopsis *ca* 4 mm long, rugose; pericarp caducous.

In moist open places. Throughout the state. *Fl. & Fr.*: Aug. Nov.

2. ALLOTEROPSIS K. Presl

Annuals or perennials. Leaves convolute to lanceolate; ligules membranous or hairy. Inflorescence of untidy racemes in whorls, digitate or on a short central axis; rhachis triquetrous, bearing paired or fascicled spikelets. Spikelets ovate to elliptic, dorsally compressed. Glumes unequal; lower glume shorter than the spikelet, acute to acuminate; upper glume equalling the spikelet and ciliate on margins. Lower floret male. Lemma resembling the upper glume but eciliate. Palea short, deeply 2-fid. Upper lemma chartaceous, acuminate to a short awn; margins covering only the edges of the acute palea. Caryopsis ellipsoid-oblong.

About 5 species; tropical regions of Old World; one in M.P.

Alloteropsis cimicina (L.) Stapf in Prain, Fl. Trop. Afr. 9: 487. 1919; Bor, Grass. Burm. Ceyl. Ind. Pak. 276. 1960. *Milium cimicinum* L., Mant. Pl. 184. 1771. *Axonopus cimicinus* P. Beauv., Ess. Agrostogr. 12. 1812; Hook. *f.*, Fl. Brit. India 7: 64. 1896. **Fig. 54.**

Annuals. Culms 30-60 cm long, erect or decumbent, tufted; nodes hairy. Leaves ovate-lanceolate, deeply cordate at base, hirsute with long white hairs, rarely glabrescent; ligules obsolete. Inflorescence of 3-8, subverticillate spikes; rhachis filiform, scaberulous. Spikelets solitary or clustered, dorsally compressed, 2.5-3 mm long, shining, shortly pedicellate. Lower glume acuminate; upper glume mucronate or shortly awned. Lower lemma *ca* 3 mm long; upper lemma 2.5-2.8 mm long, aristate. Anthers 3, purple, *ca* 1 mm long. Caryopsis ovoid, compressed, 1-1.25 mm long.

Common in moist places. Balaghat, Damoh, Hoshangabad, Indore, Rajnandgaon, Rewa, Sidhi. *Fl.* & *Fr.* : Rainy season.

3. ANDROPOGON L.

Annuals or perennials. Leaf blades linear, flat or folded; ligules membranous. Inflorescence of racemes; racemes numerous aggregate on an exserted peduncle, or single, in pairs, or sometimes in threes or fours, the common peduncle usually enclosed by a spathe like sheath, the sheaths often numerous, the whole forming a compound inflorescence, usually narrow, but sometimes in dense subcorymbose masses. Spikelets in pairs at each node or an articulate rhachis, one sessile and perfect, the other

Fig. 54. Alloteropsis cimicina (L.) Stapf

pedicellate and either staminate, neuter or reduced to the pedicel; rhachis and pedicels of the sterile spikelets often villous, sometimes conspicuously so. Glumes of fertile spikelet coriaceous, narrow; lower glume rounded, flat or concave on the back, the median nerve weak or wanting; upper glume laterally compressed. Sterile lemma shorter than the glumes, empty, hyaline; fertile lemma hyaline, narrow, entire or 2-fid, usually bearing a bent and twisted awn from the apex or from between the lobes. Palea hyaline, small or wanting. Pedicellate spikelets awnless, sometimes staminate and about as large as the sessile spikelet, sometimes consisting of 1 or 2 reduced glumes, sometimes wanting, only the pedicel present.

About 100 species; tropical and subtropical regions; one in M.P.

Andropogon pumilus Roxb., Fl. Ind. (Carey & Wallich ed.) 1: 277. 1820; Hook. *f.*, Fl. Brit. India 7: 170. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 93. 1960. *A. pachyarthrus* Hack. in A. DC., Monogr. Phan. 6: 449. 1889.

Annuals. Culms 10-50 cm long, suberect, geniculate. Leaves linear, acuminate at apex, glabrous; sheaths keeled, glabrous; ligules short, membranous, truncate. Inflorescence of 1-2 cm long racemes, enclosed by spathes; joints *ca* 2.5 mm long, often red on the back, ciliate on margins, cup-shaped at apex, 2-3-toothed. Sessile spikelets *ca* 5 mm long; callus glabrous. Lower glume linear, *ca* 5 mm long, membranous, keeled, awn *ca* 0.8 mm long; upper glume lanceolate, narrow, of same length, hyaline. Lower lemma lanceolate, *ca* 3 mm long, hyaline; upper lemma linear, *ca* 2.5 mm long, hyaline, cleft at apex, awned from sinus; awn *ca* 1.6 mm long, geniculate, lower half brown, upper white. Anthers 3, yellow, *ca* 2 mm long. Pedicellate spikelets awnless; pedicels *ca* 3 mm long, with ciliate margins.

Not common. Indore. *Fl. & Fr.*: Aug. -Dec.

4. APLUDA L.

Perennials. Leaf blades linear, narrowed to a slender, often petiole like base; ligules membranous. Inflorescence a solitary raceme, tightly embraced by a spatheole, these numerous and crowded into a false panicle; racemes comprising of 1 sessile and 2 pedicellate spikelets; pedicels flat and broad, forming together with its lower glumes, a sort of triangular box

round the sessile spikelet. Sessile spikelets 2-flowered, falling entire, laterally compressed: callus bulbous, obtuse. Lower glume coriaceous, convex across the back, 2-keeled and narrowly winged towards the tip, 2-dentate; upper glume cymbiform, awnless. Lower floret male. Lemma hyaline. Palea well developed. Upper floret bisexual. Lemma 2-lobed, with a glabrous awn from the sinus or entire and awnless. Pedicellate spikelets awnless, unequal, one male and bisexual, other much smaller and neuter.

A monotypic genus; S. Asia and Australia.

Apluda mutica L., Sp. Pl. 82. 1753; Bor, Grass. Burm. Ceyl. Ind. Pak. 93. 1960. *A. varia* Hack. subsp. *mutica* Hack. in A. DC., Monogr. Phan. 6: 196. 1889; Hook. *f.*, Fl. Brit. India 7: 150. 1896.

Perennials. Culms 0.5-1 m tall, leafy. Leaf blades linear-lanceolate, acuminate at apex, glabrous, upper leaves spathiform; sheaths short, tight, glabrous; ligules membranous. Inflorescence of several racemes each enclosed in spathe together forming a leafy panicle. Spikelets in groups of 3, one sessile, bisexual, second imperfect, reduced at the base and a terminal male or neuter, rarely bisexual. Sessile spikelets 4-5 mm long. Lower glume 11-13-nerved; upper glume cymbiform, 7-nerved, 2-tipped. Lower lemma 4-5 mm long, folded, hyaline, 3-nerved, awned or awnless. Anthers 3, yellow, *ca* 1 mm long. Upper lemma 3-nerved, notched, awned (8-10 mm), bent. Second spikelet male. Anthers 3, yellow, *ca* 2.2 mm long. Terminal spikelet pedicellate, similar to sessile but upper lemma not notched, neuter or male; pedicels *ca* 3 mm long. Caryopsis oblong, with large embryo.

Common. Balaghat, Bastar, Betul, Bilaspur, Damoh, Gwalior, Hoshangabad, Indore, Raigarh, Raipur, Rewa, Satna, Sidhi. *Fl. & Fr.*: Sept. - Nov.

5. **APOCOPIS** Nees

Annuals or perennials. Inflorescence a pair of racemes terminating culm. Spikelets dorsally compressed, imbricate, 2-flowered, sessile, accompanied by a pedicel without spikelet; rhachis slender. Glumes subequal, chartaceous; lower glume flat, broad, truncate and emarginate at apex, narrowed below; upper glume narrower, membranous, 2-keeled. Lower floret male or barren. Lemma hyaline with a palea of equal size.

Upper floret bisexual. Lemma linear, entire or 2-fid, awned. Palea hyaline. Lodicules absent. Stamens 2-3. Styles 2, free; stigmas plumose.

About 11 species; Indo-Malesia and China; one in M.P.

Apocopis vaginata Hack. in Oest. Bot. Z. 41. 8. 1891; Bor, Grass. Burm. Ceyl. Ind. Pak. 96. 1960. *A. wightii* Nees *ex* Steud. var. *vaginata* Hook. *f.*, Fl. Brit. India 7: 143. 1896.

Annuals. Culms 10-18 cm tall, erect, tufted. Leaf blades with glandular based hairs; sheaths spathaceous, glabrous; ligules membranous. Inflorescence of paired racemes enclosed in the upper sheaths; callus short, bearded with brown hairs. Sessile spikelets 4-5.5 mm long, hairy, awned. Lower glume hairy on the back, lower half reddish, upper brownish white, 5-7-nerved. Lower lemma 2.5-3 mm long, 2-dentate; awn 1.7-2 cm long. Anthers 3, yellow, *ca* 1 mm long. Caryopsis fusiform, *ca* 1 mm long.

Bilaspur, Sidhi, Surguja. *Fl. & Fr.*: Sept. - Dec.

6. ARISTIDA L.

Annuals or perennials, densely tufted, usually without a rootstock. Leaf blades linear, usually in a basal tuft, but in annual species mainly on culms. Panicles effuse, contracted or spike like. Spikelets 1-flowered. Glumes long, scarious. Lemma cylindrical or laterally compressed, indurated, glabrous or scabrid, rarely sparsely hairy, convolute or involute on margins, produced into a 3-branched awn (rarely the lateral branches obsolete); awns with or without a column, articulated or not, the branches glabrous or scabrid; callus well developed, obtuse, 2-fid or acuminate. Palea usually less than half of lemma.

About 260 species; tropical and subtropical regions; 7 in M.P.

1a. Articulation between lemma and base of the column present; lower glume *ca* 20 mm long ...5. *A. funiculata*

1b. Articulation between lemma and base of the column absent; lower glume less than 20 mm long:

2a. Lateral awns reduced, of different texture to central awn; lemma *ca* 4 mm long, passing into twisted column ...6. *A. reducta*

2b. Lateral awns well developed, of similar texture to central awn; lemma otherwise:

3a. Plants usually 5-10 cm tall; lower glume 2-2.5 mm long; upper glume 3-3.5 mm long; lemma *ca* 1.5 mm long ...2. *A. cumingiana*

3b. Plants and other parts much longer:

4a. Panicles contracted:

5a. Awns of glumes 3-5 mm long ...7. *A. setacea*

5b. Awns of glumes up to 2 mm long:

6a. Lower glume less than two-third of upper; lemma shorter than upper glume ...4. *A. depressa*

6b. Lower glume more than two-third of upper; lemma longer than upper glume ...1. *A. adscensionis*

4b. Panicles effuse ...3. *A. cyanantha*

1. Aristida adscensionis L., Sp. Pl. 82. 1753; Hook. *f.*, Fl. Brit. India 7: 224. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 407. 1960.

Annuals or perennials. Culms 20-60 cm tall, erect or decumbent, tufted. Leaves 10-30 cm long, usually glabrous; ligule a fringe membrane. Inflorescence a contracted panicle; branches filiform. Spikelets 6-9 mm long, straw-coloured or with purple tinge. Lower glume 5-8 mm long, acute, membranous; upper glume 6-9 mm long, 2-dentate at apex. Lemma linear, laterally compressed, *ca* 8 mm long, scabrid along keel; callus *ca* 0.5 mm long, pointed, hairy at base; awn 3-fid, not articulated, central one up to 15 mm long, lateral branches slightly shorter. Anthers 3, yellowish purple, *ca* 1.7 mm long. Caryopsis cylindrical, equalling lemma.

Balaghat, Bilaspur, Damoh, Durg, Gwalior, Indore, Raipur, Rewa, Sidhi. *Fl. & Fr.*: Aug.-March.

2. Aristida cumingiana Trin. & Rupr., Sp. Gram. Stipac. 141. 1842; Hook. *f.*, Fl. Brit. India 7: 224. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 409. 1960.

Annuals. Culms 15-40 cm tall, slender. Leaves basal, filiform, small; sheaths loose, glabrous; ligules very minute, membranous. Inflorescence a narrow, loosely branched panicle; rhachis and pedicels scabrid. Spikelets 2-2.5 mm long, without articulation, 3-awned, central awn *ca* 5 mm long, lateral awns 3-3.5 mm long, green or purple. Lower glume 2-2.5 mm long; upper glume 3-3.5 mm long, pointed; callus very minute with small, white hairs. Lemma linear, laterally compressed, *ca* 1.5 mm long. Anthers 3, yellowish to light pink, 0.6-0.8 mm long. Caryopsis deep pink to brownish, cylindrical, *ca* 2 mm long.

Bilaspur, Raigarh. *Fl. & Fr.*: Sept. Nov.

3. Aristida cyanantha Nees *ex* Steud., Syn. Pl. Glumac. 1: 141. 1854; Hook. *f.*, Fl. Brit. India 7: 225. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 409. 1960.

Perennials. Culms up to 1.5 m tall, erect, stout. Leaves convolute, glaucous, glabrous; sheaths smooth; ligules membranous. Inflorescence an effuse panicle with flexuous branches, scaberulous. Spikelets 8-13 mm long excluding awn, usually deep purple. Lower glume 6-9 mm long, smooth; awn 1-1.5 mm long; upper glume 10-12 mm long, fimbriately dentate; awn 2-3 mm long. Lemma 8-12 mm long, with densely hairy callus (*ca* 1 mm long), without articulation between lemma and awns. Anthers 3, yellow, with purple tinge, *ca* 5 mm long. Caryopsis terete, 8-10 mm long.

Rare. In stony beds of dried streams. Indore. *Fl. & Fr.*: Sept. Feb.

4. Aristida depressa Retz., Observ. Bot. 4: 22. 1786; Bor, Grass. Burm. Ceyl. Ind. Pak. 409. 1960.

Annuals. Culms 0.3-1.2 m tall. Leaves 5-30 cm long, glabrous; sheaths keeled; ligules hairy. Inflorescence a contracted panicle; branches short, glabrous. Spikelets pale or purple. Lower glume 3-5 mm long, awned; upper glume 7-9 mm long, scabrid on keel; callus 0.5-0.7 mm long, bearded. Lemma 7-11 mm long, scabrid on keels, 3-awned; central awn 20-23 mm long, lateral awns little shorter. Anthers 3, yellow, *ca* 2 mm long. Caryopsis brown, 6-9 mm long.

Bilaspur, Gwalior, Hoshangabad, Sidhi. *Fl. & Fr.*: July Dec.

5. Aristida funiculata Trin. & Rupr., Sp. Gram. Stipac. 159. 1842; Hook. *f.*, Fl. Brit. India 7: 226. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 410. 1960.

Annuals. Culms 20-70 cm tall, erect or slightly decumbent at base, slender. Leaves convolute, sparsely hairy on upper surface; sheaths keeled; ligules hairy. Inflorescence a narrow panicle; branches capillary, usually with long white hairs in the axil. Spikelets straw-coloured, 17-27 mm long. Lower and upper glumes similar and equalling the spikelet. Lemma *ca* 4 mm long, smooth, awned; articulated column 2-4.5 cm long with 3 capillary branches; central awn 3-6 cm long, lateral awns slightly shorter. Anthers 3, light yellow, 0.7-0.8 mm long. Caryopsis black, cylindrical, 3-4 mm long.

Ratlam, Satna, Sidhi. *Fl. & Fr.*: Aug. - Dec.

6. Aristida redacta Stapf in Kew Bull. 1892: 85. 1892; Hook. *f.*, Fl. Brit. India 7: 227. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 412. 1960.

Annuals. Culms 20-80 cm tall, stout. Leaves convolute, glabrous, with long hairs at base; sheaths keeled; ligules hairy. Inflorescence an effuse panicle; branches 2-nate, capillary. Spikelets straw-coloured or purplish, 4-6 mm long. Lower glume *ca* 3 mm long, membranous; upper glume *ca* 5 mm long, similar to lower; callus bearded. Lemma 4-5 mm long, with distinct articulation; awns very unequal. Anthers 3, brownish yellow, *ca* 1 mm long. Caryopsis black, cylindrical, 2-3 mm long.

Endemic to India. Damoh, Indore, Raigarh. *Fl. & Fr.*: Aug. Dec.

7. Aristida setacea Retz., Observ. Bot. 4: 22. 1786; Hook. *f.*, Fl. Brit. India 7: 225. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 412. 1960.

Perennials. Culms 0.75-1.2 m tall, tufted, robust. Leaves inrolled, filiform, scaberulous; ligule a rim of stiff hairs. Inflorescence a contracted panicle; branches ascending, scabrid. Spikelets 1-flowered. Lower glume *ca* 1.25 cm long with *ca* 3 mm long awn; upper glume *ca* 1.7 cm long with *ca* 3.5 mm long awn. Lemma *ca* 1.1 cm long, convolute around palea, column indistinct; awns 3, central awn *ca* 3.3 cm long, lateral awns *ca* 2.8 cm long; callus *ca* 1.5 mm long, sharp with white silky hairs. Palea nerveless. Anthers 3, yellow, 2.5-3 mm long. Caryopsis brown, cylindrical, *ca* 1.5 cm long.

Bilaspur, Durg, Raigarh, Raipur, Seoni, Surguja. *Fl. & Fr.*: Nov. Feb.

7. ARTHRAXON P. Beauv.

Annuals or perennials. Culms slender, often trailing. Leaf blades usually lanceolate, broad, cordate and amplexicaul at base; ligules membranous. Inflorescence of slender, subdigitate racemes; internodes filiform to linear. Sessile spikelets laterally compressed; callus truncate. Lower glume chartaceous to coriaceous, rounded or flat on the back, with or without lateral keels, often scabrid or muricate. Lower floret reduced to a hyaline lemma. Upper floret with hyaline, subentire lemma bearing a glabrous, geniculate awn on the back. Palea minute or absent. Pedicellate spikelets variable, from as large as the sessile to quite suppressed. Caryopsis terete.

About 50 species; tropical regions of Old World, introduced in New World; 6 in M.P. (Welzen in Blumea 27: 255-300. 1981 has reduced the number of species to seven).

1a. Stamens 2:

2a. Pedicellate spikelets developed at least in upper part of racemes; caryopsis cylindrical, *ca* 0.8 mm long ...4. *A. lancifolius*

2b. Pedicellate spikelets not developed; caryopsis linear, 1.5-2 mm long:

3a. Pedicel reduced to a minute glabrous point; joints sparsely ciliate, 1.5-2 mm long; upper glume puberulous at apex ...6. *A. quartinianus*

3b. Pedicel ½ ¾th of sessile spikelet; joints subglabrous, 3-5 mm long; upper glume hispid or muriculate at apex ...3. *A. hispidus*

1b. Stamens 3:

4a. Pedicellate spikelets absent ...1. *A. castratus*

4b. Pedicellate spikelets well developed:

5a. Leaves with tubercle-based hairs on margins; ligules lacerate; lower glume markedly echinulate on keels and intermediate nerves ...2. *A. echinatus*

5b. Leaves glabrous; ligules membranous; lower glume echinulate only on keels or smooth ...5. *A. prionodes*

1. Arthraxon castratus (Griff.) Narayanaswami *ex* Bor, Fl. Assam 5: 376. 1940 & Grass. Burm. Ceyl. Ind. Pak. 99. 1960; van Welzen in Blumea 27: 263. 1981. *Andropogon castratus* Griff., Notul. 3: 89. 1851.

Annuals. Culms up to 50 cm tall. Leaves 2-7 x 0.5-1 cm; ligule hairy; sheaths glabrous or with bulbous-based hairs. Inflorescence of 1-5 racemes. Sessile spikelets 5-7.2 mm long. Lower glume 3.3-6.8 mm long, rounded on the back, 5-13-nerved; upper glume 4-7 mm long, 3-9-nerved, with membranous margins. Lower lemma faintly 1-nerved; upper lemma 3-nerved. Anthers 3, 2-2.8 mm long. Caryopsis *ca* 2 mm long.

Madhya Pradesh (van Welzen, 1981).

2. Arthraxon echinatus (Nees) Hochst. in Flora 39: 188. 1856; Bor, Grass. Burm. Ceyl. Ind. Pak. 99. 1960; Jain in J. Ind. Bot. Soc. 51: 173. 1972. *Bathratherum echinatum* Nees in Edinb. New Phil. J. 18: 181. 1835. *Arthraxon spathaceus* Hook. *f.*, Fl. Brit. India 7: 145. 1896.

Annuals. Culms 20-50 cm tall, tufted; nodes glabrous. Leaves ovate-lanceolate, sparsely hairy, with tubercle-based hairs on margins; sheaths terete, with few scattered hairs; ligules lacerate. Inflorescence of 1-5 racemes (usually solitary). Spikelets 2-nate. Pedicellate spikelets well developed; joints *ca* 3.5 mm long; callus glabrous. Sessile spikelets lanceolate, 5.5-6 mm long, awned. Lower glume 5-5.5 mm long, 5-nerved, 2-keeled; upper glume cymbiform, equalling the lower, 3-nerved, ciliolate on margins. Lower lemma empty, nerveless; upper lemma 3-3.5 mm long, with cleft at apex, awn 10-12 mm long from sinus. Palea absent. Anthers 3, yellow, *ca* 2 mm long. Caryopsis linear.

Rare. Rewa. *Fl. & Fr.*: July Dec.

3. Arthraxon hispidus (Thunb.) Makino in Bot. Mag. Tokyo 26: 214. 1912; Bor, Grass. Burm. Ceyl. Ind. Pak. 99. 1960; Jain in J. Ind. Bot. Soc. 51: 173. 1972. *Phalaris hispida* Thunb., Fl. Jap. 44. 1784. *Arthraxon ciliaris* P. Beauv., Ess. Agrostogr. 111: 152. t. 11. f. 6. 1812; Hook. *f.*, Fl. Brit. India 7: 145. 1896.

Annuals. Culms 30-40 cm tall, densely tufted, leafy. Leaves ovate-lanceolate, sparsely hairy; sheaths glabrous, striate, ciliate on margins;

ligules lacerate. Inflorescence of several spikes; joints of the rhachis *ca* 2.5 mm long, ciliate, curved. Spikelets solitary, *ca* 3 mm long. Lower glume *ca* 3 mm long, convex on back, scabrid; upper glume similar to lower. Lower floret empty. Lemma usually absent. Upper floret bisexual. Lemma *ca* 2 mm long; awns up to 9 mm long from the base of lemma. Anthers 2, purple, *ca* 0.75 mm long. Caryopsis linear, terete, *ca* 2 mm long.

Rare. Mandla. *Fl. & Fr.*: Sept. Dec.

4. Arthraxon lancifolius (Trin.) Hochst. in Flora 39: 188. 1856; Bor, Grass. Burm. Ceyl. Ind. Pak. 100. 1960; Jain in J. Ind. Bot. Soc. 51: 176. 1972. *Andropogon lancifolius* Trin. in Mem. Acad. Sci. Pétersb. ser. 6, 2: 271. 1832. *Arthraxon microphyllus* Hochst. in Flora 39: 188. 1856; Hook. *f.*, Fl. Brit. India 7: 147. 1896.

Annuals. Culms 10-40 cm tall. Leaves ovate-lanceolate, cordate at base, usually glabrous, rarely sparsely hairy; sheaths glabrous; ligules membranous. Inflorescence of 2 to many racemes; rhachilla hairy. Sessile spikelets 2.75-3.5 mm long, awned. Glumes subequal. Lower lemma empty, epaleate; upper lemma 1-1.5 mm long, with cleft at apex, awns 5-8 mm long, epaleate. Anthers 2, yellow, *ca* 0.5 mm long. Caryopsis light brown, cylindrical, *ca* 0.8 mm long.

Common on old walls, eroded hills and in wastelands during rainy season. Throughout the state. *Fl. & Fr.*: July - Nov.

5. Arthraxon prionodes (Steud.) Dandy in Andrews, Fl. Pl. Sudan 3: 399. 1956; Bor, Grass. Burm. Ceyl. Ind. Pak. 101. 1960; Jain in J. Ind. Bot. Soc. 51: 179. 1972. *Andropogon prionodes* Steud., Syn. Pl. Glumac. 1: 383. 1854.

Perennials. Culms 40-100 cm tall, leafy, rooting at lower nodes. Leaves lanceolate, cordate at base, glabrous; ligules membranous. Inflorescence of 1 to several racemes. Sessile spikelets 5.5-6 mm long, awned from the sinus of upper lemma; awns 9-11 mm long. Palea absent. Anthers 3, yellow, *ca* 2 mm long. Caryopsis light brown, fusiform, *ca* 2 mm long.

Balaghat, Bastar, Indore, Rajnandgaon, Rewa, Shivpuri. *Fl. & Fr.*: Aug. Dec.

6. Arthraxon quartinianus (A. Rich.) Nash in N. Amer. Fl. 17: 99. 1912; Bor, Grass. Burm. Ceyl. Ind. Pak. 102. 1960; Jain in J. Ind. Bot. Soc. 51: 179. 1972. *Alectoridia quartiniana* A. Rich., Tent. Fl. Abyss. 2: 448. t. 99. 1851.

Annuals. Culms 20-50 cm tall, often rooting from nodes. Leaves lanceolate, cordate at base, with tubercle-based hairs on upper surface; ligules membranous. Inflorescence of 1-3 racemes. Sessile spikelets 3-3.5 mm long, awned. Lower glume *ca* 3.5 mm long, acute or 2-dentate; upper glume *ca* 3.5 mm long. Lower lemma empty, epaleate. Anthers 2-3, 0.6-0.7 mm long. Caryopsis linear, *ca* 1.5 mm long.

Balaghat, Damoh. *Fl. & Fr.*: Sept. Nov.

Notes : Reported by Bor (1960) as confined to peninsular India.

8. ARUNDINELLA Raddi

Annuals or perennials. Culms erect, tough. Leaf blades linear, flat or rolled, rigid, rarely flaccid and lanceolate; ligule a short scarious rim, usually ciliate along the edge. Inflorescence an oblong panicle, open or contracted. Spikelets shortly pedicellate in pairs, more or less appressed to the primary branches, 2-flowered, disarticulating between the florets. Lower floret male or barren. Glumes membranous to chartaceous, 3-5-nerved; lower glume acute or mucronate; upper glume as long as the spikelet and often more or less caudate. Lower lemma ovate-elliptic, 3-7-nerved, with a hyaline palea; upper lemma entire, emarginate or shortly 2-lobed, thinly coriaceous, 1-7-nerved, scaberulous all over, with (rarely without) a straight or geniculate, persistent awn, sometimes the lateral lobes also slenderly awned; callus short, rounded. Palea wingless, with or without door like flaps in front. Anthers 3. Caryopsis oblong, glabrous.

About 47 species; subtropical regions; 5 in M.P.

1a. Spikelets less than 5 mm long; upper lemma with single awn or awnless; central awn less than 8 mm long:

2a. Upper lemma awnless or mucronate, base naked ...1. *A. bengalensis*

2b. Upper lemma with a geniculate awn, lemma base not naked:

3a. Panicles compact; spikelets 2.5-3 mm long; upper lemma more than 1 mm long:

4a. Glumes densely covered with tubercle-based bristles; lower glume longer than the lemma ...2. *A. ciliata*

4b. Glumes without tubercle-based bristles; lower glume shorter or equal to lemma ...3. *A. holcoides*

3b. Panicles effuse; spikelets up to 2 mm long; upper lemma *ca* 1 mm long ...4. *A. pumila*

1b. Spikelets more than 5 mm long; upper lemma with 2 setae on each side of awn; central awn more than 8 mm long ...5. *A. setosa*

1. Arundinella bengalensis (Spreng.) Druce in Rep. Bot. Exchng. Club, Brit. Isles 605. 1916; Bor, Grass. Burm. Ceyl. Ind. Pak. 421. 1960. *Panicum bengalense* Spreng., Syst. Veg. 1: 311. 1825. *P. strictum* Roxb., Fl. Ind. (Carey & Wallich ed.) 1: 306. 1820. *Arundinella wallichii* Nees *ex* Steud., Syn. Pl. Glumac. 1: 114. 1854; Hook. *f.*, Fl. Brit. India 7: 75. 1896.

Perennials. Culms 50-100 cm tall, erect, stout, glabrous. Leaves lanceolate, acuminate at apex, glabrous to villous, scabrid on margins; sheaths loose, hairy; ligule a tuft of stiff hairs in the throat. Inflorescence an elongated panicle; branches stout; rhachis angled, scabrid. Spikelets 3-4-seriate, ovoid, secund. Lower glume *ca* 2.5 mm long, 3-nerved, scabrid; upper glume *ca* 3 mm long, 5-nerved, often hairy on nerves. Lower floret male. Upper floret bisexual. Lemma ovate, *ca* 2 mm long, 3-nerved; awns *ca* 1.5 mm long; callus shortly bearded. Anthers 3, yellow, *ca* 1.5 mm long.

Rare. Bastar. *Fl. & Fr.*: Oct. Feb.

2. Arundinella ciliata (Roxb.) Nees *ex* Miq. in Verh. Konink. Nederl. Inst. 3. pt. 4: 30. 1851; Bor, Grass. Burm. Ceyl. Ind. Pak. 421. 1960. *Holcus ciliatus* Roxb., Fl. Ind. (Carey & Wallich ed.) 1: 321. 1820. *Arundinella agrostoides auct. non* Trin., 1836: Hook. *f.*, Fl. Brit. India 7: 71. 1896.

Annuals. Culms 15-50 cm tall, slender, villous or glabrous. Leaves broad, flat, glabrous or with soft hairs; sheaths hairy; ligules hairy. Inflorescence a contracted panicle; branches suberect. Spikelets broadly lanceolate, 2.5-3 mm long, lower half bristly. Lower glume acuminate, 3-nerved; upper glume equal to spikelet, 5-nerved, cuspidate. Lemma *ca* 2.5 mm long, coriaceous, 3-nerved. Upper floret female, 1-1.5 mm long; awns 3-4 mm long. Anthers 3, yellow, 1-1.5 mm long.

Rare. Bastar. *Fl. & Fr.*: Sept. Nov.

Notes : Bor (1960) has reported as endemic to Madras.

3. Arundinella holcoides (Kunth) Trin. in Bull. Acad. Sci. Pétersb. 1: 71. 1836; Bor, Grass. Burm. Ceyl. Ind. Pak. 422. 1960. *Brandtia holcoides* Kunth, Revis. Gramin. 2: 511. 1831. *Arundinella agrostoides* Trin., Sp. Gram. 3: t. 265. 1836; Hook. *f.*, Fl. Brit. India 7: 71. 1896.

Annuals. Culms 20-50 cm tall. Leaves narrow, flat, with long, soft hairs; sheaths hairy; ligule a ridge of hairs. Inflorescence a contracted panicle; branches fascicled. Spikelets ovoid or lanceolate, 2.5-3 mm long, lower half bristly; pedicels 3-4 mm long. Lower glume 3-nerved; upper glume 5-nerved. Lower lemma ovate-lanceolate, *ca* 3 mm long, coriaceous, paleate, 3-nerved; upper lemma 1.5-2 mm long, usually female; awns *ca* 5 mm long, lower half twisted. Anthers 3, purplish, *ca* 0.5 mm long. Caryopsis brown, dorsally compressed, 1-1.2 mm long; awns persistent.

Rare. Bastar. *Fl. & Fr.*: Rainy season.

Notes : Bor (1960) has reported its distribution from Myanmar to Philippines.

4. Arundinella pumila (Hochst. *ex* A. Rich.) Steud., Syn. Pl. Glumac. 1: 144. 1854; Bor, Grass. Burm. Ceyl. Ind. Pak. 423. 1960. *Acratherum pumilum* Hochst. *ex* A. Rich., Tent. Fl. Abyss. 2: 414. t. 100. 1851. *Arundinella tenella* Nees *ex* Steud., Syn. Pl. Glumac. 1: 115. 1854; Hook. *f.*, Fl. Brit. India 7: 71. 1896.

Annuals. Culms 15-40 cm tall, erect, leafy; nodes glabrous. Leaves lanceolate, flat, glabrous; sheaths compressed, glabrous; ligules hairy. Panicles effuse, large, branched. Spikelets light green, 1.5-2 mm long.

Lower glume *ca* 1.5 mm long, 3-nerved; upper glume 1.5-1.8 mm long, 5-nerved. Lower lemma empty, *ca* 1.5 mm long; upper lemma *ca* 1 mm long, chartaceous; awns 3-4 mm long. Anthers 3, very small. Caryopsis ellipsoid, less than 0.5 mm long.

Balaghat, Bastar, Bilaspur, Hoshangabad, Raigarh, Sidhi, Surguja. *Fl. & Fr.*: Aug. Nov.

5. Arundinella setosa Trin., Gram. Panic. 63. 1826: Hook. *f.*, Fl. Brit. India 7: 70. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 424. 1960. *A. capillaris* Hook. *f.*, Fl. Brit. India 7: 74. 1896.

Perennials. Culms 40-100 cm tall, from tuberous rhizomes, with woolly bases of leaf sheaths. Leaves narrow, glabrous or hairy, setose hairy on the margin near the sheath throat; ligules hairy, minute. Inflorescence a large, flexuous panicle; branches capillary, scaberulous, naked below. Spikelets 5-6 mm long, 2-flowered. Lower glume 3.8-4.2 mm long; upper glume similar, 5-6 mm long. Lower lemma empty; upper lemma *ca* 2 mm long, coriaceous, brownish scabrid with age; callus hairy, 2-dentate at apex; apical setae *ca* 2 mm long; central awn 9-10 mm long, kneed, twisted. Anthers 3, *ca* 1.6 mm long. Caryopsis dark brown, *ca* 1.5 mm long.

Bastar, Bilaspur, Damoh, Indore, Raigarh, Sidhi, Surguja. *Fl. & Fr.*: Sept. Jan.

Notes : A polymorphic species, needs detailed study.

9. ARUNDO L.

Perennials, rhizomatous. Culms very tall. Leaf blades broad and flat; ligule a short, scarious membrane. Panicles large, dense, profusely branched, silky hairy, glabrous at the base of the lower branches. Spikelets few-flowered, all florets fertile or the upper more or less reduced; rhachilla glabrous. Glumes 3-5 nerved. Lemma 5-9-nerved, 2-fid, with a short awn in the sinus, with 3 nerves, percurrent or excurrent, the rest short, covered all over the back below the middle with long soft hairs. Palea 2-keeled, densely ciliate on the keels. Stamens 3.

About 3 species; Mediterranean region; one in M.P.

Arundo donax L., Sp. Pl. 81. 1753; Hook. *f.*, Fl. Brit. India 7: 302. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 413. 1960.

Perennials, robust. Culms 1.5-3 m tall, basal part woody; nodes glabrous. Leaves flat, acuminate at apex, amplexicaul at base, glabrous; ligules hairy. Panicles large; branches ascending, scaberulous. Spikelets lanceolate, 1-1.5 cm long, laterally compressed, 2-6-flowered, with awns. Glumes *ca* 1 cm long. Lower lemma 9-10 mm long, silky hairy, 3-nerved; upper lemma similar but shorter than lower. Anthers 3, *ca* 2 mm long. Caryopsis oblong, *ca* 2 mm long.

Bilaspur, Gwalior, Indore, Mandla, Rewa. *Fl.* & *Fr.*: Aug. - Nov.

10. AVENA L.

Annuals. Leaf blades flat. Inflorescence a panicle, open or rarely contracted, with large, pendulous spikelets. Spikelets 2-6-flowered (rarely more), the lower 1-3 florets bisexual, others reduced; terminal floret barren or vestigial; rhachilla disarticulating above the glumes and sometimes between the florets, or not at all in cultivated races. Glumes lanceolate to ovate or elliptic, equal or almost so, rarely very unequal, rounded on the back, scarious-membranous or herbaceous-membranous, with thin margins, 7-11-nerved. Lemma lanceolate to ovate or oblong, shorter than or equalling the glumes, rarely exserted, rounded on the back, herbaceous, becoming hardened, 5-9-nerved, with a geniculate (rarely straight) awn from the back, or awnless in some cultivated races. Palea shorter than the lemma, 2-keeled. Stamens 3. Stigmas 2.

About 15 species; temperate regions of Old World; one in M.P.

Avena sativa L., Sp. Pl. 79. 1753; Hook. *f.*, Fl. Brit. India 7: 275. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 434. 1960.

Annuals. Culms 40-80 cm tall, erect. Leaves linear, glabrous; ligules well developed, membranous. Panicles open; branches drooping. Spikelets 1-2-flowered, 2-2.5 cm long. Glumes persistent, 7-11-nerved, papery, equalling the spikelet. Lemma lanceolate, 1.5-2 cm long, 7-9-nerved, awned from the back. Palea minutely hairy on keels. Anthers 3, yellow, *ca* 3 mm long. Caryopsis *ca* 1.5 cm long, tightly enclosed by lemma and palea, hairy.

Cultivated in many districts. *Fl.* & *Fr.*: Nov. March.

11. BAMBUSA Schreb., *nom. cons.*

Arborescent, shrubby or rarely climbing bamboos, sometimes thorny. Culms arising from a thick rhizome, usually caespitose, occasionally stoloniferous; culm sheaths variable, usually broad; imperfect blade triangular, broad. Leaf blades shortly petiolate. Inflorescence usually a large, leafless, compound panicle bearing spikelets in heads on spicate branchlets, sometimes in leafy panicles or paniculate spikes. Spikelets with 1 to several fertile florets, usually subtended by 1 or more glume-like bracts in addition to the glumes. Lemma ovate-lanceolate, usually mucronate. Palea 2-keeled, the keels ciliate or not, usually entire at apex. Lodicules 3, membranous, generally obtuse, ciliate. Stamens 6. Style 1; stigmas 1-3. Caryopsis oblong or linear-oblong, acute or obtuse, furrowed on one side; pericarp thin, adherent.

About 100 species; tropical and subtropical regions of America and Asia; 4 in M.P.

1a. Lower culm nodes with short thorny branches; spikelets *ca* 2 cm long ...1. *B. arundinacea*

1b. Lower culm nodes without thorny branches; spikelets more than 2 cm long:

2a. Culm sheaths nearly glabrous; ligules white hairy; anthers penicillate ...3. *B. teres*

2b. Culm sheaths densely hairy; ligules not white hairy; anthers apiculate:

3a. Culm internodes 3-6 cm across, not shining; nodes not raised; spikelets cylindrical ...2. *B. nutans*

3b. Culm internodes 5-10 cm across, shining; nodes raised with a ring of brown hairs; spikelets flattened ...4. *B. vulgaris*

1. Bambusa arundinacea (Retz.) Willd., Sp. Pl. 2: 245. 1799; Gamble in Hook. *f.*, Fl. Brit. India 7: 395. 1896. *Bambos arundinacea* Retz., Observ. Bot. 5: 24. 1789.

Perennials. Culms 5-20 m tall, 5-10 cm in diameter, erect, branched; culm sheaths 20-30 x 10 cm, rounded in the upper part except the apiculate

tip, with dark brown hairs on the dorsal surface. Leaves linear - lanceolate, 6-12 x 1-1.5 cm, glabrous or hairy on back; auricles with bristles; ligules truncate, long ciliate. Inflorescence a branched panicle. Spikelets lanceolate, *ca* 2 cm long, 3-6-flowered; rhachilla hairy. Lemma lanceolate, *ca* 1 cm long, glabrous. Palea keels ciliate. Lodicules 3, fimbriate, *ca* 2.5 mm long. Anthers yellow, *ca* 5 mm long, obtuse. Ovary elliptic-oblong; style short; stigmas 3.

Bastar, Bilaspur, Damoh, Hoshangabad. *Fl. & Fr.*: Once in life.

2. Bambusa nutans Wallich *ex* Munro in Trans. Linn. Soc. London 26. 1868; Gamble in Hook. *f.*, Fl. Brit. India 7: 387. 1896.

Perennials. Culms solitary from a creeping rhizome, 6-12 m tall, 3-6 cm in diameter, erect, naked below; nodes not much raised, often hairy, lower nodes rooting; internodes 30-45 cm long, not shining, white ringed below the nodes, thick walled; culm sheaths 15-20 cm long, rounded at top, truncate, densely covered with black hairs on back, with a ring of soft deciduous hairs at base, recurved on margins; auricles densely bristly, bristles long curved. Leaves linear, lanceolate, 15-30 x 3-5 cm, dorsally white when dry, scabrid, with pellucid glands, 7-10-nerved; sheaths ending to smooth callus and falcate auricle, with long bristles; ligules long, obtuse, hairy. Inflorescence a stiff panicle with spiciform branches. Spikelets in bracteate fascicles, many empty or gemmiparous, 2-3. Lower glume neuter, 3-7 fertile, all ovate, 2-3 cm long, acute, mucronate, many-nerved, puberulous inside. Palea ovate, shorter, flattened; keels overlapping, long, ciliate. Lodicules 3, long fimbriate. Anther tips long apiculate or slightly penicillate. Ovary subovoid.

Rare (BSA, without locality Acc. No. 12678). *Fl. & Fr.*: Rare.

3. Bambusa teres Buch.-Ham. *ex* Munro in Trans. Linn. Soc. London 26: 95. 1868; Gamble in Hook. *f.*, Fl. Brit. India 7: 388. 1896.

Perennials. Culms 15-20 m tall, 5-10 cm in diameter, caespitose; internodes 30-40 cm long; culm sheaths 20-25 cm long and broad, rounded at top, nearly glabrous; blades triangular, 10-15 cm long, cuspidate, broad at base with wavy fringed auricles, hairy beneath; ligules narrow, white hairy. Leaves 30-35 x 4-6 cm, twisted, acuminate at apex, 10-16-nerved; pellucid glands many; sheath ending in a broad, shining callus; ligules short.

Inflorescence a large, compound panicle bearing fascicles of spikelets and chaffy bracts. Spikelets in bracteate heads, 2-4 cm long, neuter and fertile. Lower glumes empty; flowering glumes 5-6, ovate-lanceolate, many-nerved, sometimes foliaceous. Palea ovate, acute, scaberulous, 5-6-nerved between toothed keels. Anthers with narrow tips, penicillate. Lodicules subobovate, fimbriate, many-nerved.

Balaghat, Bilaspur. *Fl. & Fr.*: Rare.

4. Bambusa vulgaris Schrad. in J.C. Wendl., Coll. Pl. 2: 26. t. 47. 1810; Gamble in Hook. *f.*, Fl. Brit. India 7: 391. 1896.

Perennials, with stout rhizomes. Culms green, yellow or striped, polished, 6-15 m tall, 5-10 cm in diameter; nodes prominent with a ring of brown hairs; internodes 20-35 cm long; culm sheaths 15-25 x 17-22 cm, densely hairy on back; ligules *ca* 3 mm long, dentate or fimbriate. Leaf blades 15-25 x 2-4 cm, pale, scabrid, petiolate; auricles prominent, *ca* 1 cm long, with incurved, *ca* 7 mm long bristles; ligules shortly ciliate. Panicles large, leafy, cluster of spikelets largest at nodes; rhachis scurfy. Spikelets 2.5-3 cm long, in bracteate clusters of 3-10, with oblong, acute, 2-fid, empty glumes. Glumes 1 or 2, pointed, hairy. Lemma *ca* 1 cm long, hairy on margins. Palea equal to glume; keels white ciliate. Lodicules 3-winged, ciliate, with up to 2.5 mm long hairs. Anthers purple, 5-6 mm long, obtuse, hairy, apiculate. Ovary narrow; style up to 7 mm long; stigmas 3, short.

Bastar, Bilaspur, Surguja. *Fl. & Fr.*: Rare.

12. BOTHRIOCHLOA Kuntze

Perennials. Leaf blades flat, sometimes aromatic; ligules membranous. Inflorescence of digitate or subdigitate racemes, sometimes paniculate with a long central axis; racemes with more than 8 sessile spikelets, without homogamous spikelet pairs; internodes and pedicels linear, with a hyaline median line. Sessile spikelets dorsally compressed; callus very short, rounded. Lower glume broadly convex to slightly concave on the back, abruptly rounded on the flanks, sometimes with 1-3 circular pits, acute. Lower floret reduced to a hyaline lemma. Upper lemma often entire, with a glabrous awn. Pedicellate spikelets much like the sessile or smaller. Caryopsis oblong, slightly dorsally compressed.

About 28 species; subtropical regions; 5 in M.P.

1a. Inflorescence axis longer than the lowest raceme; sessile spikelet more than 5 mm long:

2a. Plants aromatic; sheath compressed; panicle silky; lower glume of sessile spikelet villous ...4. *B. odorata*

2b. Plants not aromatic; sheath terete; panicle not silky; lower glume of sessile spikelet not villous ...1. *B. glabra*

1b. Inflorescence axis shorter than the lower raceme; sessile spikelet up to 5 mm long:

3a. Leaves mostly cauline; lower glume of sessile spikelet not pitted ...2. *B. intermedia*

3b. Leaves mostly basal; lower glume of sessile spikelet pitted:

4a. Recemes 12-15; lower glume of sessile spikelet glabrous below the middle ...3. *B. kuntzeana*

4b. Racemes 2-8; lower glume of sessile spikelet hairy below the middle ...5. *B. pertusa*

1. Bothriochloa glabra (Roxb.) A. Camus in Ann. Soc. Linn. Lyon. 1930. n.s. 76: 164. 1931; Bor, Grass. Burm. Ceyl. Ind. Pak. 107. 1960. *Andropogon glaber* Roxb., Fl. Ind. (Carey & Wallich ed.) 1: 271 1820; Hook. *f.*, Fl. Brit. India 7: 175. 1896.

Perennials. Rhizomes short. Culms 0.75-1.5 m tall, tufted, coarse, branched. Leaves linear, glaucous, glabrous or hairy; sheaths glabrous; ligules membranous, truncate. Panicles variable, oblong, 10-23 cm long; racemes 3-7 cm long, simple or lower branched; joints densely hairy with a transluscent groove in the centre. Sessile spikelets linear, 5-5.5 mm long, awned. Lower glume 4.5-5 mm long, 5-7-nerved, pitted or not; upper glume linear or lanceolate, *ca* 5 mm long, 3-nerved. Lower lemma empty, nerveless, epaleate; upper lemma reduced to a geniculate awn, 13-15 mm long. Anthers 3, yellow, *ca* 2 mm long.

Balaghat, Hoshangabad, Sidhi. *Fl. & Fr.*: Aug. - Dec.

2. Bothriochloa intermedia (R. Br.) A. Camus in Ann. Soc. Linn. Lyon. 1930. n.s. 76: 164. 1931; Bor, Grass. Burm. Ceyl. Ind. Pak. 108.

1960. *Andropogon intermedius* R. Br., Prodr. 202. 1810; Hook. *f.*, Fl. Brit. India 7: 175. 1896.

Perennials. Culms 30-90 cm tall, tufted, with short rhizome. Leaves linear, acuminate at apex, hairy at base, scabrid on margins; sheaths glabrous; ligule a shallow membrane. Inflorescence a panicle, hairy, lower branches shorter. Spikelets in pairs, sessile and pedicellate; pedicel and rhachis joints flattened and longitudinally grooved, long ciliate. Sessile spikelets 2-3 mm long; callus short, hairy. Lower glume *ca* 3.2 mm long, 7-nerved, not pitted on back; upper glume *ca* 3.5 mm long, 3-nerved. Lower lemma neuter; upper lemma *ca* 1.2 mm long, hyaline, 1-nerved, with *ca* 1.2 cm long, scaberulous awn, keeled at centre. Anthers 2, yellow, 1.2-1.4 mm long. Pedicellate spikelets neuter. Caryopsis *ca* 1.2 mm long.

Balaghat, Bastar, Gwalior, Hoshangabad, Sidhi. *Fl. & Fr.*: Aug. - Jan.

3. Bothriochloa kuntzeana (Hack.) Henr. in Blumea 3: 456. 1940; Bor, Grass. Burm. Ceyl. Ind. Pak. 108. 1960. *Andropogon kuntzeanus* Hack. in A. DC., Monogr. Phan. 6: 478. 1889; Hook. *f.*, Fl. Brit. India 7: 175. 1896.

Perennials. Culms 0.5-1.5 m tall, erect. Leaves narrowly linear, scabrid on margins, glabrous; sheaths glabrous; ligules membranous. Inflorescence of 12-15 racemes, corymbosely fasciculate, densely ciliate. Sessile spikelets 4.5-5 mm long. Lower glume ovate-lanceolate, *ca* 4.5 mm long, pitted on back; upper glume *ca* 5 mm long. Lower lemma *ca* 4 mm long; upper lemma reduced to awn, *ca* 1.7 mm long. Anthers 3, yellow, *ca* 1.5 mm long. Caryopsis *ca* 2 mm long.

Balaghat, Damoh, Hoshangabad. *Fl. & Fr.*: Aug. Dec.

4. Bothriochloa odorata (Lisboa) A. Camus in Ann. Soc. Linn. Lyon. 1930. n.s. 76: 165. 1931; Bor, Grass. Burm. Ceyl. Ind. Pak. 109. 1960. *Andropogon odoratus* Lisboa in J. Bombay Nat. Hist. Soc. 4: 123. 1889; Hook. *f.*, Fl. Brit. India 7: 177. 1896.

Perennials. Culms 0.7-1.2 m tall, stout, branched; nodes villous. Leaves linear, up to 75 cm long, scaberulous; sheaths compressed, glabrous; ligules membranous, truncate. Inflorescence a panicle; branches filiform, fascicled. Sessile spikelets 5-6 mm long; callus densely hairy. Lower glume lanceolate, 7-nerved, rarely pitted, villous; upper glume obtuse or truncate.

keeled, ciliate. Lemma ovate or lanceolate, shorter than upper glume, nerveless; awns 15-20 mm long. Anthers 3, yellow, *ca* 2 mm long. Pedicellate spikelets equal to sessile ones. Caryopsis oblong, 3-3.5 mm long.

Rare. Mandla. *Fl. & Fr.*: Sept. Oct.

Notes : Bor (1960) has reported this species as endemic to Bombay state but the present report extends its distribution to Madhya Pradesh.

5. Bothriochloa pertusa (L.) A. Camus in Ann. Soc. Linn. Lyon. 1930. n.s. 76: 164. 1931; Bor, Grass. Burm. Ceyl. Ind. Pak. 109. 1960. *Holcus pertusus* L., Mant. Pl. 301. 1771. *Andropogon pertusus* (L.) Willd., Sp. Pl. 4: 922. 1806; Hook. *f.*, Fl. Brit. India 7: 173. 1896.

Perennials, with variable habits. Culms 30-80 cm tall, erect or ascending. Leaves linear, glabrous except at base; sheaths hardly compressed; ligules membranous, truncate. Inflorescence a subdigitate panicle, silky villous. Sessile spikelets 3-4 mm long; callus bearded. Lower glume *ca* 3.2 mm long, pitted on back, 5-7- nerved. Lower lemma *ca* 2 mm long; upper lemma narrowly linear, 10-20 mm long including stipe, awned, kneed and twisted, scaberulous. Anthers 3, yellow, 1.5-2 mm long, sometimes 2 anthers and one staminode.

Bastar, Damoh, Gwalior, Hoshangabad, Jabalpur, Raigarh, Satna, Sidhi. *Fl. & Fr.*: Throughout the year provided moisture is available.

13. BRACHIARIA (Trin.) Griseb.

Annuals or perennials. Leaf blades linear to lanceolate; ligule represented by a line of hairs. Inflorescence of racemes borne upon a common axis; rhachis triquetrous to ribbon like, bearing single or sometimes paired spikelets, with adaxial lower glume. Spikelets ovate to oblong, plump, obtuse to acute, sometimes the lowest internode elongated, then often accrescent to the sheathing base of the lower glume and forming a short stipe. Lower glume mostly shorter than the spikelet; upper glume as long as the spikelet, membranous or herbaceous. Lower floret male or sterile. Lemma resembling the upper glume; upper lemma obtuse to acute, usually muticous, coriaceous to crustaceous, its margins covering only the edges of the palea. Upper palea obtuse to subacute, its tip tucked within the lemma. Caryopsis ellipsoid, dorsally compressed.

About 90 species; subtropical regions especially Africa; 4 in M.P.

1a. Panicles linear, with erect racemes; rhachis hairy; lower glume not well developed, scale like ...2. *B. eruciformis*

1b. Panicles various; rhachis glabrous or finely pubescent; lower glume well developed:

2a. Spikelets 1.5-2 mm long, secund; pedicels with bulbous-based bristles ...4. *B. reptans*

2b. Spikelets 3-4 mm long, not secund; pedicels without bristles:

3a. Rhachis flat, ribbon like, glabrous or sparsely hairy; racemes usually 3; spikelets solitary ...1. *B. distachya*

3b. Rhachis triquetrous, filiform, finely pubescent; racemes 5 to many; spikelets in pairs ...3. *B. ramosa*

1. Brachiaria distachya (L.) Stapf in Prain, Fl. Trop. Afr. 9: 565. 1919; Bor, Grass. Burm. Ceyl. Ind. Pak. 281. 1960. *Panicum distachyum* L., Mant. Pl. 138. 1767; Hook. *f.*, Fl. Brit. India 7: 37. 1896.

Annuals or perennials. Culms 20-45 cm long, creeping, spreading or decumbent; nodes pubescent. Leaves 3-15 cm long, glabrous or sparsely pilose, scaberulous on margins; sheaths shorter than internodes, ciliate on margins; ligules hairy. Inflorescence of usually 3, spreading racemes; rhachis flattened, glabrous or sparsely hairy. Spikelets elliptic, 3.5-4 mm long, glabrous. Lower glume 1/4th of the spikelet; upper glume *ca* 3 mm long, 5-7-nerved. Lower lemma empty, similar to upper glume; upper lemma pale brown, *ca* 2.2 mm long, transversely rugose. Anthers 3, yellow, *ca* 1 mm long. Caryopsis light yellow, ovoid, flattened, *ca* 1.6 mm long.

Common on sand dunes. Balaghat, Gwalior, Sidhi. *Fl. & Fr.*: Aug. Dec.

2. Brachiaria eruciformis (Sm.) Griseb. in Ledeb., Fl. Ross. 4: 469. 1853; Bor, Grass. Burm. Ceyl. Ind. Pak. 283. 1960. *Panicum eruciforme* Sm. in Sibth. & Sm., Fl. Graeca 1: 44. t. 59. 1806. *P. isachne* Roth *ex* Roem. & Schult., Syst. Veg. 2: 458. 1817; Hook. *f.*, Fl. Brit. India 7: 28. 1896.

Annuals. Culms 20-60 cm long, spreading; nodes pilose. Leaves flat; sheaths glabrous; ligules hairy. Racemes 2-8, erect, appressed to the rhachis, 1-2.5 cm long. Spikelets solitary, linear-lanceolate, 2-2.5 mm long, pubescent. Lower glume scale like, minute; upper glume 1.5-2 mm long, membranous, pubescent, 5-nerved. Lower lemma empty; upper lemma elliptic or lanceolate, 1.5-2 mm long, muticous, faintly nerved. Anthers 3, yellow, *ca* 1 mm long. Caryopsis ellipsoid, 1-1.5 mm long.

Bilaspur, Gwalior, Indore, Morena, Ratlam, Sidhi. *Fl. & Fr.*: Throughout the year.

3. Brachiaria ramosa (L.) Stapf in Prain, Fl. Trop. Afr. 9: 542. 1919; Bor, Grass. Burm. Ceyl. Ind. Pak. 284. 1960. *Panicum ramosum* L., Mant. Pl. 29. 1767; Hook. *f.*, Fl. Brit. India 7: 36. 1896.

Annuals. Culms 30-75 cm tall, decumbent-ascending. Leaves lanceolate, cordate at base, glabrous; sheaths loose, glabrous; ligule a short rim of hairs. Inflorescence of 5 to many racemes; rhachis finely pubescent. Spikelets usually in pairs, ovoid or obovoid, *ca* 3 mm long, turgid, apiculate. Lower glume *ca* 1 mm long; upper glume *ca* 2 mm long, 5-nerved. Upper lemma bisexual, 2-2.25 mm long, transversely rugose, apiculate. Palea equalling lemma. Anthers 3, yellow, *ca* 1.5 mm long. Caryopsis brown, ovoid, *ca* 1.5 mm long, apiculate.

Balaghat, Damoh, Mandla, Rewa, Sidhi. *Fl. & Fr.*: July - Oct.

4. Brachiaria reptans (L.) Gard. & Hubb. in Hook., Icon. Pl. sub t. 3363. 1939; Bor, Grass. Burm. Ceyl. Ind. Pak. 285. 1960. *Panicum reptans* L., Syst. Nat. ed. 10. 870. 1759. *P. prostratum* Lam., Tabl. Encycl. 1: 171. 1791; Hook. *f.*, Fl. Brit. India 7: 33. 1896.

Annuals. Culms 20-30 cm tall, slender, decumbent; nodes pubescent; internodes 2.5-7 cm long. Leaves ovate-lanceolate, cordate at base; sheaths 1-2 cm long, ciliate on margins; ligules hairy. Inflorescence of 5-8 racemes, alternate, 1.5-3 cm long. Spikelets in pairs, secund, 1.5-2 mm long; pedicels with bulbous-based bristles. Lower glume hyaline, minute; upper glume cymbiform, *ca* 2 mm long, pointed, 9-nerved. Lower floret neuter or male. Upper floret bisexual. Lemma golden brown, *ca* 1.6 mm long, apiculate, indurate. Palea clasped by lemma. Anthers 3, yellow, *ca* 0.3 mm long. Caryopsis flattened-ovoid, *ca* 1.2 mm long.

Balaghat, Hoshangabad, Morena, Ratlam, Rewa, Sagar, Sidhi. *Fl. & Fr.*: July - Sept.

Grains are used as food by tribals and also during famine.

14. CAPILLIPEDIUM Stapf

Annuals or perennials. Leaf blades flat, sometimes aromatic; ligules membranous. Inflorescence a delicate panicle with elongated central axis and capillary branches bearing short racemes with 1-5 (-8) sessile spikelets, without homogamous pairs at the base; internodes and pedicels linear, with a hyaline median line. Sessile spikelets dorsally compressed; callus very short, rounded. Lower glume broadly convex to slightly concave on the back, abruptly rounded on the flanks, without pits. Lower floret reduced to a hyaline lemma. Upper lemma entire, with a glabrous or puberulous awn. Pedicellate spikelets usually well developed. Caryopsis oblong, slightly dorsally compressed.

About 14 species; E. Africa and tropical Asia to Australia; 4 in M.P.

1a. Annuals; culms very weak, trailing or climbing; sessile spikelets 4-4.5 mm long ...2. *C. filiculme*

1b. Perennials; culms slender or stout, erect, sometimes shortly creeping; sessile spikelets 2.5-3 mm long (3-5 mm long in *C. parviflorum*):

2a. Leaves not distinctly narrowed at base; panicles diffuse; lower glume of sessile spikelet channelled on back ...4. *C. parviflorum*

2b. Leaves distinctly narrowed at base; panicles usually dense; lower glume of sessile spikelet flat on back:

3a. Culm nodes glabrous; ligules membranous; upper lemma *ca* 1.2 mm long with 1-1.5 cm long awn ...1. *C. assimile*

3b. Culm nodes hairy; ligules lacerate; upper lemma represented by *ca* 2 cm long awn ...3. *C. huegelii*

1. Capillipedium assimile (Steud.) A. Camus in Lecomte, Fl. Indo-Chine 7: 314. 1922; Bor. Grass. Burm. Ceyl. Ind. Pak. 110. 1960. *Andropogon assimilis* Steud., Syn. Pl. Glumac. 1: 397. 1854; Hook. *f.*, Fl. Brit. India 7: 179. 1896.

Perennials, erect or straggling, suffruticose. Culms usually 30-75 cm tall, slender or stout, with decumbent base. Leaves linear-lanceolate, 6-20 x 0.3-0.6 cm, often conspicuously narrowed at base; midrib hirsute, with tubercle-based hairs in the basal part; ligules membranous. Inflorescence an open, 5-12 cm long panicle; racemes with 2-6 sessile spikelets. Spikelets pale green, paired, dimorphic; lower spikelet sessile, fertile, *ca* 2.5 mm long; upper pedicellate; pedicels longitudinally grooved, ciliate on margins. Lower glume lanceolate, subcoriaceous, laterally 2-grooved, ciliate on back; upper glume broadly lanceolate, 2-keeled, ciliate, 5-nerved. Upper lemma *ca* 1.2 mm long, 1-nerved, awned; awns 1-1.5 cm long. Anthers 3, yellow, 1.5-2 mm long. Caryopsis brownish, *ca* 1 mm long.

Bastar, Bilaspur, Hoshangabad, Mandla, Raigarh, Sidhi, Surguja. *Fl. & Fr.*: Sept. Dec.

2. Capillipedium filiculme (Hook. *f.*) Stapf in Hook., Icon. Pl. sub t. 3085. 1922; Bor. Grass. Burm. Ceyl. Ind. Pak. 111. 1960. *Andropogon filiculmis* Hook. *f.*, Fl. Brit. India 7: 181. 1896.

Annuals, very weak, trailing or climbing. Culms 60-90 cm long, usually branched, glabrous; nodes bearded. Leaves elliptic-lanceolate, 5-20 cm long, scabrid on margins; sheaths bearded at tip; ligules membranous. Inflorescence a decompound, 5-12 cm long panicle; branches capillary; joints 2-2.5 mm long, longitudinally grooved and transluscent, densely hairy on margins; callus short, bearded. Sessile spikelets elliptic-lanceolate, 4-4.5 mm long, hairy, awned. Lower glume oblong-lanceolate, 3.8-4.5 mm long, dorsally hairy, 7-11-nerved, 2-keeled; upper glume 3-nerved, grooved. Lower lemma empty, ovate-oblong, 1.2-1.5 mm long; upper lemma reduced to 15-20 mm long awn. Anthers 3, yellow, *ca* 2 mm long. Caryopsis *ca* 1 mm long.

Endemic to India. Bastar, Surguja. *Fl. & Fr.*: Aug. - Jan.

3. Capillipedium huegelii (Hack.) Stapf in Hook., Icon. Pl. sub t. 3085. 1922; Bor. Grass. Burm. Ceyl. Ind. Pak. 111. 1960. *Andropogon*

huegelii Hack. in A. DC., Monogr. Phan. 6: 492. 1889; Hook. *f.*, Fl. Brit. India 7: 180. 1896.

Perennials. Culms 30-80 cm tall, erect or branching from base, shortly creeping, often red; nodes hairy. Leaves linear, 10-25 cm long, scabrid on margins; sheaths compressed; ligules lacerate (membranous ciliate). Panicle branches capillary, with bearded axils. Sessile spikelets pale green to purplish, *ca* 3 mm long; callus hairy. Lower glume ovate, truncate, villous; upper glume apiculate, glabrous. Lower lemma ovate, *ca* 2 mm long, glabrous; upper lemma represented by an awn, *ca* 2 cm long. Anthers 3, yellow, *ca* 1 mm long. Caryopsis ellipsoid, *ca* 2 mm long.

Endemic to India. Gwalior, Indore, Sagar. *Fl. & Fr.*: Sept. Nov.

4. Capillipedium parviflorum (R. Br.) Stapf in Prain, Fl. Trop. Afr. 9: 169. 1917; Bor, Grass. Burm. Ceyl. Ind. Pak. 112. 1960. *Holcus parviflorum* R. Br., Prodr. 199. 1810. *Andropogon micranthus* Kunth, Revis. Gramin. 1: 165. 1829; Hook. *f.*, Fl. Brit. India 7: 178. 1896.

Perennials. Culms 1-1.5 m tall, usually erect, tufted, branched; internodes channelled, glabrous. Leaves up to 30 cm long, glabrous or pubescent; sheaths pubescent - hirsute; ligules membranous. Inflorescence a compound, purple black panicle; racemes reduced to 1 sessile and 2 pedicellate spikelets; joints and pedicels *ca* 1.8 mm long, shortly ciliate. Sessile spikelets purplish olive brown, 3-5 mm long. Lower glume truncate, shallowly concave on back, 6-nerved, scabrid; upper glume similar to lower. Lemma 2-2.5 mm long; awn 1-2 cm long. Anthers 3, yellow, 1.5-2 mm long. Pedicellate spikelets usually male, similar to sessile.

Rare. Indore. *Fl. & Fr.*: Sept. Dec.

15. CENCHRUS L.

Annuals or perennials. Leaf blades flat or involute; ligule a line of hairs. Inflorescence a cylindrical, spike like panicle with an angular rhachis, each spikelet or cluster of spikelets enclosed by a deciduous involucre; involucre composed of 1 or more whorls of bristles, bristles more or less flattened and often spiny, connate at the base for some distance along their length. Spikelets lanceolate to ovate, dorsally compressed, acute to acuminate. Lower glume up to half as long as the spikelet, sometimes

suppressed; upper glume a little shorter than the spikelet. Lower floret male or barren. Lemma as long as the spikelet, membranous; upper lemma as long as the spikelet, firmly membranous to coriaceous, the margins covering up to two-thirds of the palea. Caryopsis ellipsoid to ovoid, dorsally compressed.

About 22 species; subtropical and dry regions of America, Africa and India; 3 in M.P.

1a. Bristles connate into a cup, all bristles erect ...3. *C. setigerus*

1b. Bristles connate at the base only, all bristles not erect:

2a. Bristles retrorsely scabrid, tips reflexed or hook like, inner bristles glabrous ...1. *C. biflorus*

2b. Bristles antrorsely scabrid, tips filiform, not hook like, inner bristles ciliate on margins ...2. *C. ciliaris*

1. Cenchrus biflorus Roxb., Fl. Ind. (Carey & Wallich ed.) 1: 238. 1820; Bor, Grass. Burm. Ceyl. Ind. Pak. 287. 1960.

Annuals. Culms 20-60 cm tall, erect or ascending. Leaves linear-lanceolate, scabrid; sheaths glabrous; ligules ciliate. Inflorescence racemose, 5-8 cm long, dense, straw-coloured, rarely purplish; rhachis scabrid; involucres subsessile or minutely stalked; bristles united at base forming a shallow disc, outer bristles in one row, spreading or deflexed, hook like, inner ones glabrous on back. Spikelets usually 2-flowered, 4-6 mm long. Involucral glumes membranous. Lower lemma barren, 3-5 mm long; upper lemma similar to lower, acuminate, membranous, 5-nerved. Anthers 3, yellow, *ca* 2 mm long. Caryopsis ellipsoid, dorsally compressed, *ca* 2.5 mm long, rugose.

Rare. Sidhi. *Fl. & Fr.*: Aug. Dec.

2. Cenchrus ciliaris L., Mant. Pl. 302. 1771; Bor, Grass. Burm. Ceyl. Ind. Pak. 287. 1960.

Annuals or perennials. Culms 20-80 cm tall, erect or decumbent. Leaves linear, glabrous; sheaths loose, glabrous; ligule a rim of hairs. Inflorescence a raceme, 3-15 cm long, pale or purplish. Involucres

subsessile, spreading; bristles antrorsely barbed, connate at the base only. Spikelets 1-3 in each involucre, 4-5 mm long. Lower lemma ovate-lanceolate, cuspidately acuminate, 3-5-nerved; upper lemma similar to lower, membranous, 5-7- nerved. Palea lanceolate, membranous. Anthers 3, yellow, 1-2 mm long. Caryopsis dorsally compressed, *ca* 2 mm long, truncate.

Gwalior, Indore, Sidhi. *Fl. & Fr.*: Sept. Dec.

3. Cenchrus setigerus Vahl, Enum. Pl. 2: 395. 1805: Bor. Grass. Burm. Ceyl. Ind. Pak. 290. 1960. *C. biflorus auct. non* Roxb., 1820: Hook. *f.*, Fl. Brit. India 7: 89. 1896.

Annuals or perennials from a stout rootstock. Culms 20-60 cm tall, erect or geniculately ascending; nodes glabrous. Leaves linear-lanceolate, flat, glabrous or pilose; sheaths keeled, ciliate in the lower part, bearded at mouth; ligules ciliate. Inflorescence a solitary, straw-coloured or purplish, cylindrical, 2-9 cm long raceme; rhachis scabrid. Involucres usually 2-3-flowered, rounded at base; bristles thick, connate into a cup, 1-3 mm long; outer ones 1.5-2.5 mm long. Spikelets in clusters of 2, 3 or 4, ovate-acute, usually 4 mm long, sessile. Lower lemma barren or male, *ca* 4 mm long, 5-7-nerved; upper lemma bisexual, 4-4.25 mm long. Palea *ca* 3 mm long. Lodicules absent. Anthers 3, yellow, 2-2.25 mm long. Caryopsis oblong, 2-2.25 mm long.

Gwalior, Raigarh. *Fl. & Fr.*: Aug. Nov.

16. CHIONACHNE R. Br.

Annuals or perennials, monoecious. Leaf blades linear, flat; ligules membranous. Inflorescence of terminal and axillary racemes or leafy, false panicles. Racemes male or with one to several female spikelets at the base, subtended by spathes; rhachis fragile above and below each female spikelet. Male spikelets 2-flowered, solitary or paired, one sessile, the other pedicellate. Lower glume herbaceous, shallowly concave, narrowly winged on each side; upper glume chartaceous, rarely herbaceous, narrow. Lemmas similar, membranous, paleate, both staminate or the upper empty. Stamens 3. Female spikelets 2-flowered, oblong, dorsally compressed. Lower glume thickly coriaceous, embracing but not concealing the rhachis, enclosing the upper glume and florets; upper glume membranous or

chartaceous. Lemmas hyaline, lower empty, paleate or not, the upper fertile, paleate. Caryopsis orbicular, compressed, grooved on ventral side.

About 5 species; S. E. Asia, Indo-Malesia and E. Australia; one in M.P.

Chionachne koenigii (Spreng.) Thwaites, Enum. Pl. Zeyl. 357. 1864; Bor, Grass. Burm. Ceyl. Ind. Pak. 262. 1960. *Coix koenigii* Spreng., Syst. Veg. 1: 228. 1825. *Polytoca barbata* (Roxb.) Stapf *ex* Hook. *f.*, Fl. Brit. India 7: 102. 1896. *Coix barbata* Roxb., Fl. Ind. 3: 569. 1832.

Perennials, monoecious. Culms 0.7-1.5 m tall, erect, stout; nodes hairy. Leaves linear-lanceolate, razor-sharp on margins; sheaths compressed, covered with irritating hairs which extend up to blade; ligules membranous. Inflorescence of racemes, single female spike at base and upper ones male; spathes herbaceous, 1-1.75 cm long, glabrous or hairy. Male spikelets linear-lanceolate, *ca* 10 mm long, glabrous. Lower glume 8.5-9.5 mm long, 9-11-nerved; keels pilose; upper glume membranous, 7-nerved. Lower lemma hyaline, muticous at apex, 3-nerved. Lodicules 2, cuneate. Anthers 3, yellow, *ca* 6.5 mm long. Female spikelets sessile, 4-6 mm long. Lower glume 4-5 mm long; upper glume 4-5 mm long, membranous, ciliate at margins. Lemma with hyaline margins; lower lemma empty, *ca* 3.5 mm long, 3-nerved, epaleate; upper lemma shorter than the lower, 1-nerved. Palea equal to lemma, nerveless. Lodicules 2. Caryopsis white, oblong, rounded above, 4-5 mm long, enclosed in hardened lower glume, shining, glabrous.

Common. Balaghat, Bastar, Betul, Bilaspur, Gwalior, Hoshangabad, Indore, Morena, Raigarh. *Fl. & Fr.*: Sept. - Jan.

17. CHLORIS Sw.

Annuals or perennials, tufted, rhizomatous or stoloniferous. Leaf blades linear, flat or folded; ligules membranous or ciliate. Inflorescence of few to many, digitate spikes. Spikelets 2-4 (-6)-flowered, subsessile or shortly pedicellate, unilateral, 2-seriate on a slender rhachis. Glumes unequal, membranous, 1-nerved, acute, acuminate or awned, usually persistent. Lowest floret bisexual. Lemma laterally compressed, entire or 2-lobed with a subapical awn at apex, cartilaginous or coriaceous, keeled, ciliate on the margins and the keel; callus rounded or pungent, ciliate. Second to 6th florets sterile or male, rarely bisexual. Lemmas more or less reduced or

vestigial, awned or awnless. Paleas usually absent. Caryopsis ellipsoid to linear.

About 10 species; tropical and subtropical regions; 4 in M.P.

1a. Empty lemma solitary above the fertile floret:

2a. Spikes spreading, 6-20 cm long; empty lemma reduced to an awn; caryopsis 4-4.5 mm long ...2. *C. dolichostachya*

2b. Spikes crowded, less than 6 cm long; empty lemma oblanceolate, not reduced; caryopsis 1-1.5 mm long ...4. *C. virgata*

1b. Empty lemmas 2-4 above the fertile floret:

3a. Culm glabrous below inflorescence; empty lemmas 2; caryopsis fusiform, *ca* 1.75 mm long ...1. *C. barbata*

3b. Culm puberulous below inflorescence; empty lemmas 3-4; caryopsis subtrigonous, 2-2.5 mm long ...3. *C. montana*

1. Chloris barbata Sw., Fl. Ind. Occid. 1: 200. 1797; Hook. *f.*, Fl. Brit. India 7: 292. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 465. 1960.

Perennials. Culms 25-75 cm tall, geniculate at base. Leaves flat, folded in xeric conditions, glabrous; sheaths compressed, keeled, glabrous; ligule a narrow membrane. Inflorescence of digitate spikes (4-17); rhachis scabrous. Spikelets 2.5-3 mm long, 2-seriate, imbricate, subsessile. Lower floret solitary, perfect; upper two florets imperfect; rhachilla disarticulates above glumes with a tuft of hairs at base. Lower glume *ca* 1 mm long, 1-nerved, short-awned; upper glume 2-2.5 mm long, with up to 5 mm long awn. Lower lemma broadly elliptic, 2.5-3 mm long, membranous, 3-nerved, often tinged with purple; keel ciliate; awn 2.5-4.5 mm long, bristle like; empty lemmas 2, smaller, truncate, with short awns. Anthers 3, yellow, *ca* 1.5 mm long. Caryopsis fusiform, *ca* 1.75 mm long.

Gwalior, Hoshangabad, Sagar. *Fl. & Fr.*: Aug. Jan.

2. Chloris dolichostachya Lag., Gen. Sp. Pl. 5. 1816; Bor, Grass. Burm. Ceyl. Ind. Pak. 466. 1960. *C. incompleta* Roth, Nov. Pl. Sp. 60. 1821; Hook. *f.*, Fl. Brit. India 7: 290. 1896.

Perennials. Culms 30-100 cm tall, erect or procumbent; nodes glabrous. Leaves flat, 10-25 cm long, glabrous except near sheath; sheaths compressed, hairy at mouth; ligules hairy. Inflorescence of 4-10, digitate spikes; rhachis scabrid. Spikelets 2-seriate, 6.5-7 mm long, subsessile. Florets awned, lower floret perfect and upper imperfect. Lower glume lanceolate, *ca* 2.5 mm long, membranous; upper glume similar in structure, 5-6 mm long, awned. Lower lemma 5-6 mm long, 3-nerved; awn *ca* 12 mm long; sterile lemma represented by 8-10 mm long awn. Lodicules 2, small. Anthers 3. Caryopsis brown, oblong-lanceolate, 4-4.25 mm long, subtrigonous.

Betul, Gwalior, Hoshangabad, Mandla, Morena, Raipur, Rewa, Sagar, Sidhi, Surguja. *Fl. & Fr.*: Sept. - Dec.

3. Chloris montana Roxb., Fl. Ind. (Carey & Wallich ed.) 1: 331. 1820; Hook. *f.*, Fl. Brit. India 7: 292. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 466. 1960.

Perennials. Culms 10-50 cm tall with variable habits. Leaves lanceolate, flat or folded, glabrous or sometimes pilose along the margins; sheaths compressed, glabrous, with long hairs at mouth; ligules membranous. Inflorescence of 3-6, digitate spikes; rhachis scabrid and pilose. Spikelets 2-seriate, ovate, *ca* 3 mm long, imbricate. Lowest floret perfect and 3-4 imperfect florets above it; rhachilla bearded at base. Lower glume 2-2.5 mm long, acute, keeled; upper glume 2.5-3 mm long. Lower lemma elliptic, 2.5-3 mm long, ciliate on margins; awns 6.5-7 mm long; upper lemma gradually smaller with smaller awns. Palea scabrid on keel. Anthers 3, small. Caryopsis brownish, 2-2.5 mm long.

Not common. Gwalior. *Fl. & Fr.*: Aug. - Jan.

4. Chloris virgata Sw., Fl. Ind. Occid. 1: 203. 1797; Hook. *f.*, Fl. Brit. India 7: 291. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 468. 1960.

Perennials. Culms 15-50 cm tall, erect or decumbent, usually flattened and profusely branched. Leaves flat, glabrous, hairy near throat; sheaths loose, glabrous, keeled; ligules membranous. Inflorescence of 4-9, digitate, 2.5-3.5 cm long spikes; rhachis capillary, scabrid. Spikelets 2-seriate, 3-4 mm long, subsessile. Lower glume *ca* 2 mm long, 1-nerved; upper glume lanceolate, 3-4 mm long, scabrid on keel, with short awn. Lower lemma

oblong-lanceolate. 2.5-3.5 mm long. 2-fid at tip; awns *ca* 7 mm long; empty lemma oblanceolate, 1.8-2 mm long, truncate, with *ca* 5 mm long awn. Anthers 3, yellow, 0.2-0.3 mm long. Caryopsis trigonous, 1-1.5 mm long, shining.

Common. Balaghat, Bastar, Bilaspur, Hoshangabad, Indore, Morena, Rajnandgaon, Rewa, Sagar, Satna, Sidhi. *Fl. & Fr.*: Aug. - Dec.

18. CHRYSOPOGON Trin., *nom. cons.*

Perennials, tufted. Leaf blades linear, often harsh and glaucous; ligule a short membrane or a line of hairs. Inflorescence a terminal panicle with whorls of slender, persistent branches bearing terminal racemes; each raceme reduced to a triad of 1 sessile and 2 pedicellate spikelets; pedicels linear. Sessile spikelets laterally compressed; callus oblique, obtuse to pungent. Lower glume cartilaginous, rounded on the back, sometimes spinulose on the margins; upper glume often awned. Lower floret reduced to a hyaline lemma; upper lemma hyaline, entire or 2-dentate, with a glabrous or pubescent awn. Palea hyaline, small or suppressed. Pedicellate spikelets male or barren, narrowly lanceolate, awned or awnless. Caryopsis narrowly ellipsoid.

About 24 species; subtropical regions especially of Old World; 4 in M.P.

1a. Plants with creeping rhizomes at base; length of pedicels at least half of sessile spikelet ...1. *C. aciculatus*

1b. Plants without creeping rhizomes; length of pedicels shorter than half of sessile spikelet:

2a. Leaves conspicuously distichous; panicles narrow, interrupted ...3. *C. polyphyllus*

2b. Leaves and panicles not as above:

3a. Sessile spikelets 4-6 mm long; upper glume of sessile spikelet pectinately ciliate on the keel ...2. *C. fulvus*

3b. Sessile spikelets 6-7 mm long; upper glume of sessile spikelet glabrous ...4. *C. serrulatus*

1. Chrysopogon aciculatus (Retz.) Trin., Fund. Agrost. 188. 1820; Bor, Grass. Burm. Ceyl. Ind. Pak. 115. 1960. *Andropogon aciculatus* Retz., Observ. Bot. 5: 22. 1788; Hook. *f.*, Fl. Brit. India 7: 188. 1896.

Perennials. Culms 30-50 cm tall, rarely more. Leaves linear, lanceolate or oblong, 15-30 cm long, acute at apex, cordate at base, scabrid on margins; sheaths overlapping, compressed, glabrous, flabellate on creeping part; ligule a hairy rim. Inflorescence an exserted panicle; branches in several whorls, purplish or dark brownish. Spikelets in groups of 3, one sessile, 2 pedicellate. Sessile spikelets bisexual, 3.5-4 mm long, oblique; callus very sharp, with golden brown hairs. Lower glume lanceolate, 3-3.2 mm long, 2-dentate, 3-nerved, upper part hirsute; upper glume cymbiform, *ca* 3.5 mm long, aristate, ciliate. Lower lemma hyaline, 2.5-3 mm long, 2-nerved; upper lemma *ca* 3 mm long, 1-nerved. Palea hyaline, *ca* 1 mm long. Anthers *ca* 1 mm long. Pedicellate spikelets 5-6 mm long. Lower glume 4-5 mm long, glabrous; upper glume 3-4 mm long. Lower floret empty. Lower lemma 3.2-3.5 mm long; upper lemma 2.8-3 mm long, mucronate. Anthers 3, orange-yellow, *ca* 2.5 mm long.

Rare. Damoh. *Fl. & Fr.*: July - Nov.

2. Chrysopogon fulvus (Spreng.) Chiov., Fl. Somala 1: 327. 1929; Bor, Grass. Burm. Ceyl. Ind. Pak. 116. 1960. *Pollinia fulva* Spreng., Pl. Min. Cogn. Pug. 2: 10. 1815. *Andropogon monticola* Roem. & Schult., Syst. Veg. 2, Mant. 665. 1827; Hook. *f.*, Fl. Brit. India 7: 192. 1896.

Perennials. Culms 50-70 cm tall, erect and branching, densely tufted. Leaves linear, acuminate, glabrous; sheaths keeled, glabrous, basal ones overlapping; ligule a hairy rim. Inflorescence a panicle; branches filiform, arranged in whorls. Spikelets in groups of 3, one sessile, 2 pedicellate. Sessile spikelets 4-6 mm long; callus short, densely covered with golden hairs. Lower glume narrowly oblong, 4-6 mm long, 2-4-nerved; upper glume *ca* 5 mm long, compressed, hyaline on margins, 3-nerved; awns 3-6 mm long. Palea absent or small. Pedicellate spikelets 4-5 mm long, dorsally compressed. Lower glume lanceolate, *ca* 5 mm long, acuminate, 7-nerved; upper glume *ca* 5 mm long, acuminate, 3-nerved. Lemma *ca* 3.5 mm long, hyaline. Anthers 3, yellow or purple, 3-4 mm long.

Common. Balaghat, Bastar, Gwalior, Raigarh, Sidhi, Surguja. *Fl. & Fr.*: July - Dec.

3. Chrysopogon polyphyllus (Hack. *ex* Hook. *f.*) Blatt. & McCann in J. Bombay Nat. Hist. Soc. 32: 416. 1928; Bor, Grass. Burm. Ceyl. Ind. Pak. 118. 1960. *Andropogon polyphyllus* Hack. *ex* Hook. *f.*, Fl. Brit. India 7: 194. 1896.

Perennials. Culms 50-100 cm tall, thick, glabrous. Leaves crowded, linear, scaberulous on margins, glabrous; sheaths compressed, hard; ligules membranous. Inflorescence a panicle; branches very unequal; peduncles glabrous. Sessile spikelets *ca* 5 mm long; callus hairy, white to rusty red. Lower glume strongly compressed; upper glume equal to spikelet, 2-fid, ciliate on margins, awned; keels hirsute. Lemma 4-5 mm long, hyaline, obtuse, ciliate. Pedicellate spikelets male or neuter. Anthers 3, yellow, *ca* 2 mm long.

Rare. Hoshangabad. *Fl. & Fr.*: Sept. Dec.

4. Chrysopogon serrulatus Trin. in Mem. Acad. Sci. Pétersb. ser. 6, 2: 318. 1833; Bor, Grass. Burm. Ceyl. Ind. Pak. 118. 1960. *Andropogon monticola* Schult. var. *trinii* Hook. *f.*, Fl. Brit. India 7: 193. 1896.

Perennials. Culms 30-80 cm tall, tufted. Leaves linear, flat, scabrid on margins, glabrous or sparsely hairy; sheaths compressed; ligules ciliate. Inflorescence a panicle, yellowish; rhachis scabrid. Sessile spikelets 6-7 mm long, awned. Lower glume 5.5-6 mm long, 5-7-nerved, aristate; upper glume 5.2-5.7 mm long, 3-nerved; arista 13-14 mm long. Lower lemma linear, 5-5.5 mm long, hyaline, nerveless; upper lemma reduced to awn. Pedicellate spikelets 6-7 mm long. Anthers 3, yellow, *ca* 2.5 mm long.

Rare. Sidhi. *Fl. & Fr.*: July - Dec.

19. COELACHNE R. Br.

Annuals or perennials. Culms slender, ascending or decumbent. Leaf blades short, linear or lanceolate; ligule a line of hairs or absent. Inflorescence a panicle, loose or spike like. Spikelets 2-flowered. Florets dissimilar, lower male and upper female; rhachilla slightly elongated between the florets, disarticulating above glumes. Glumes persistent, shorter than the florets, broad, obtuse, membranous; lower glume up to half as long as the spikelet and 5-nerved; upper glume a little longer and 3-7-nerved. Lemmas membranous, nerveless or few-nerved, obtuse; lower

lemma glabrous or pubescent only at the base; upper lemma shorter, pubescent. Stamens 2-3. Caryopsis ovoid, loose between lemma and palea.

About 5 species; tropical regions of Old World; one in M.P.

Coelachne simpliciuscula (Wight & Arnott *ex* Steud.) Munro *ex* Benth. in J. Linn. Soc. London (Bot.) 19: 93. 1881; Bor, Grass. Burm. Ceyl. Ind. Pak. 576. 1960; V. Prakash & Jain, Fasc. Fl. Ind. 14: 6. 1984. *Panicum simpliciusculum* Wight & Arnott *ex* Steud., Syn. Pl. Glumac. 1: 96. 1854. *Coelachne pulchella auct. non* R. Br., 1810: Hook. *f.*, Fl. Brit. India 7: 270. 1896.

Annuals. Culms 15-40 cm tall, decumbent, slender. Leaves scattered up to panicle, blades tapering to a point, rough to touch, with striate nerves; sheaths loose, striate; ligules hairy. Inflorescence a variable panicle. Spikelets sessile or shortly pedicellate, globose or ovoid. Lower glume *ca* 1 mm long, with obscure nerves; upper glume *ca* 1.5 mm long, herbaceous, with obscure nerves. Lower lemma *ca* 2 mm long, coriaceous, rounded on back. Upper floret neuter; rhachilla stipitate. Anthers 2, yellow, 0.2-0.4 mm long. Caryopsis narrowly ellipsoid, *ca* 0.5 mm long.

Common. Bastar, Bilaspur, Raigarh, Surguja. *Fl.* & *Fr.*: Dec. - March.

20. COIX L.

Annuals or perennials, monoecious, robust. Culms erect or floating. Leaf blades broad, flat; ligules short, membranous. Inflorescence terminal and axillary, often numerous, each subtended by a globose or elongated ivory like cupule and comprising of 2 racemes; male raceme exserted from the mouth of the cupule, the spikelets imbricate and borne in pairs or threes, one pedicellate, the other sessile; female raceme enclosed by the cupule, and consisting of one sessile spikelet and 2 barren pedicels. Male spikelet lanceolate to elliptic-oblong. Lower glume flat on the back, 2-keeled, the keels winged above; upper glume cymbiform. Florets 2, with membranous lemma and palea, the lower as long as the spikelet, the upper short and sometimes barren. Female spikelet: Glumes orbicular, membranous, with a cartilaginous beak, the upper keeled. Lower floret represented by an orbicular, membranous lemma. Upper floret with membranous lemma and palea. Stigmas 2, exserted from the cupule. Caryopsis subglobose to ellipsoid.

About 6 species; tropical Asia; 3 in M.P.

1a. Spikelets 5-6 mm broad; lower glume of the male spikelet broadly winged:

2a. Plants floating or creeping; stems succulent; nodes rooting; leaves glandular hairy on upper surface ...1. *C. aquatica*

2b. Plants erect; stems and nodes not as above; leaves glabrous ...2. *C. gigantea*

1b. Spikelets up to 2 mm broad; lower glume of the male spikelets narrowly winged ...3. *C. lacryma-jobi*

1. Coix aquatica Roxb., Fl. Ind. 3: 571. 1832; Hook. *f.*, Fl. Brit. India 7: 100. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 264. 1960.

Annuals or perennials. Culms 0.5-1.2 m tall; nodes glabrous. Leaves linear-lanceolate, flat, cordate at base, glandular hairy on upper surface, ciliate on margins; sheaths compressed, glabrous; ligules membranous. Inflorescence of 3-6 cm long, spiciform racemes, with one basal female spikelet enclosed in a globose bract through which rhachis passes and bears male spikelet on top. Male spikelet 2-3-nate, imbricate, elliptic-lanceolate, 11-12 x 4-6 mm, muticous, long or shortly pedicellate or all sessile. Lower glume harbaceous, elliptic-lanceolate, 10.5-11.5 mm long, concave, many-nerved; keels 2, winged; upper glume similar but wingless, 7-9-nerved. Lower lemma hyaline, equal to upper glume, 3-5-nerved. Anthers 3, orange-coloured, 6-6.5 mm long. Female spikelet cream-coloured, ovoid, 10-11 mm long, acuminate, enclosed by bract forming a bony involucre. Lower glume oblong-lanceolate, 8-9 mm long, acuminate at apex, beaked, chartaceous, inrolled on margins; upper glume hyaline, muticous, deeply 2-grooved, keeled. Lower lemma empty, oblong-lanceolate, 7-8 mm long, acuminate, 5-nerved; upper lemma similar, faintly nerved. Lodicules absent; sometimes staminodes present. Caryopsis ellipsoid, in turbinate involucre.

Common. Balaghat, Bastar, Hoshangabad, Raigarh, Rajnandgaon, Ratlam, Sidhi. *Fl. & Fr.*: Sept. - Dec.

2. Coix gigantea Koenig *ex* Roxb., Fl. Ind. 3: 570. 1832; Bor, Grass. Burm. Ceyl. Ind. Pak. 264. 1960. *C. lacryma-jobi* L. var. *gigantea* (Roxb.) Stapf *ex* Hook. *f.*, Fl. Brit. India 7: 100. 1896.

Perennials. Culms 1-2 m tall. Leaves linear, acuminate at apex, glabrous, scabrid on margins; sheaths terete, tight, glabrous; ligules membranous. Inflorescence male or bisexual, of several racemes. Spikelets groups 3, 2 sessile and 1 pedicellate. Sessile spikelet with short, glabrous callus. Lower glume many-nerved, winged; upper glume narrow, acuminate, wingless. Lower lemma *ca* 1 cm long, incurved on margins, 7-nerved. Palea 2-nerved, winged. Lodicules 2, cuneate. Anthers 3, orange-yellow, *ca* 7 mm long. Upper lemma lanceolate, *ca* 9.5 mm long, infolded on margins, 3-nerved. Palea hyaline, lanceolate, *ca* 9 mm long, 4-nerved. Anthers 3, yellow, 5.5-6 mm long. Lodicules 2, cuneate. Caryopsis dull white, 1-1.5 mm long, acute.

Common. Balaghat, Hoshangabad, Mandla, Sagar. *Fl. & Fr.*: Oct. Jan.

Notes : *Coix aquatica* and *C. gigantea* are morphologically very similar except their habit. *C. aquatica* has chromosome number 2n=10 while *C. gigantea* has 2n=20 and 40. A detailed study including experimental is required for the search of more distinguishing characters.

3. Coix lacryma-jobi L., Sp. Pl. 972. 1753; Hook. *f.*, Fl. Brit. India 7: 100. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 264. 1960.

Annuals or perennials. Culms 1-2 m tall, robust, branching, spongy, glabrous, polished. Leaves flat, 10-50 cm long, cordate at base; sheaths broad, glabrous; ligule a narrow membrane. Inflorescence of suberect spikes. Male spikelets terminal, 2-3-nate, loosely imbricate on a slender rhachis, 8-12 mm long, up to 2 mm broad. Lower glume papery, many-nerved, with winged margins, densely ciliate; upper glume oblong-lanceolate, acuminate, thin, 9-nerved. Lemma oblong-lanceolate, acuminate, membranous, faintly 5-nerved. Palea hyaline, 2-keeled. Female spikelet basal, ovoid, surrounded by the hardened bract forming a head like bony involucre, yellowish white or bluish grey, 6-11 mm long. Lower glume ovate-oblong, acute-papery; upper glume thinner. Lemma equal to spikelet. Anthers 3, orange-yellow, *ca* 5 mm long. Caryopsis bluish grey, broadly ovoid to globose, 6-10 mm long, smooth, polished.

Common. Bastar, Bilaspur, Gwalior, Hoshangabad, Indore, Mandla, Raigarh. *Fl. & Fr.*: Sept. Dec.

21. CRYPSIS Aiton, *nom. cons.*

Annuals. Culms prostrate or geniculately ascending. Leaf blades usually short. Inflorescence a hemispherical to ovoid head or a cylindrical spiciform panicle, embraced below by 1-2 inflated bract like leaf sheaths bearing a reduced blade, or sometimes exserted. Spikelets strongly laterally compressed, disarticulating below the floret, rarely falling entire, awned or awnless. Glumes subequal, shorter than the lemma. Lemma 1-nerved. Palea 1-2-nerved. Caryopsis rounded at the tip, not beaked.

About 7 species; Mediterranean region to N. China and tropical Africa; one in M.P.

Crypsis schoenoides (L.) Lam., Tabl. Encycl. 1: 166. 1791; Bor, Grass. Burm. Ceyl. Ind. Pak. 622. 1960. *Phleum schoenoides* L., Sp. Pl. 60. 1753. *Heleochloa schoenoides* (L.) Host, Icon. Descr. Gram. Austriac. 1: 23. 1801; Hook.*f.*, Fl. Brit. India 7: 235. 1896.

Annuals. Culms 5-15 cm tall, prostrate, striate, glabrous. Leaves narrowly lanceolate, 2-3 cm long, acuminate at apex; sheaths deeply furrowed, glabrous or ciliate on margins; ligules hairy. Inflorescence a compressed, spiciform panicle, major portion covered by the sheath. Spikelets *ca* 3.2 m long. Lower glume linear-lanceolate, *ca* 2.5 mm long, folded, glabrous; keels ciliate, 1-nerved; upper glume ovate-lanceolate, *ca* 2 mm long, acute, 1-nerved, ciliate. Lemma broadly ovate, *ca* 3.2 mm long, acute, membranous, 1-nerved. Palea oblong, *ca* 3.2 mm long, glabrous. Anthers 2-3, very small, yellow; filaments long. Caryopsis oblong or ellipsoid, *ca* 1.2 mm long.

Rare. Chhatarpur. *Fl. & Fr.*: Nov. - April.

22. CYMBOPOGON Spreng.

Tall perennials, robust. Leaf blades linear, aromatic; ligules membranous or scarious. Inflorescence of paired racemes borne on a short peduncle and enclosed by a cymbiform spatheole which appears like leafy false panicle; racemes short, the lowermost pair of spikelets in each receme homogamous and resembling the pedicellate; internodes and pedicels linear. Sessile spikelets dorsally compressed; callus obtuse, inserted in the concave or cupular tip of the internode. Lower glume chartaceous, often streaked

with oil glands, shallowly concave or with a V-shaped median groove, 2-keeled; keels usually lateral and often winged near the apex, with or without inter-coninal nerves. Lower floret reduced to a hyaline lemma. Upper lemma hyaline or stipitiform, 2-lobed (rarely entire), with or without a glabrous awn from the sinus. Palea absent. Pedicellate spikelets male or barren, equal to sessile, not depressed on the back, awnless. Caryopsis oblong, subterete to plano-convex.

About 56 species; tropical and subtropical regions of Old World; 4 in M.P.

1a. Panicles large; hairs of pedicels and joints not concealing the sessile spikelet:

2a. Leaves cordate and amplexicaul at base; lower glume of sessile spikelet grooved in the lower half ...2. *C. martinii*

2b. Leaves not cordate at base; lower glume of sessile spikelet with 2 shallow pits at base ...3. *C. pendulus*

1b. Panicles narrow; hairs of pedicels and joints concealing the sessile spikelet:

3a. Leaf blades flat; sheaths often coiled; raceme-fascicles compound ...1. *C. jwarancusa*

3b. Leaf blades more or less filiform; sheaths never coiled; raceme-fascicles more or less simple ...4. *C. schoenanthus*

1. Cymbopogon jwarancusa (Jones) Schult., Mant. Syst. 2: 458. 1824; Bor, Grass. Burm. Ceyl. Ind. Pak. 128. 1960. *Andropogon jwarancusa* Jones in Asiat. Res. 4: 109. 1795; Hook. *f.*, Fl. Brit. India 7: 203. 1896.

Perennials. Roots aromatic. Culms tufted, erect, up to 1.5 m tall. Leaves flat, linear, filiform above, up to 50 x 0.5 cm; sheaths often coiled, glabrous; ligules *ca* 0.5 mm long, membranous. Panicles 15-40 cm long, narrow, interrupted. Spathe up to 5 cm long; spatheoles lanceolate, 1.25-1.8 cm long. Racemes 1-1.8 cm long; joints and pedicels long hairy. Spikelets 3-4 pairs. Sessile spikelets lanceolate, *ca* 5 mm long. Lower glume

2-keeled, flat or concave between the keels, glabrous, inflexed on margins; nerves 2-4 or absent. Upper glume as long as the lower, 3-nerved, acute. Lower floret empty; lemma lanceolate, up to 5 mm long, 2-nerved; palea absent. Upper floret bisexual; lemma narrow, 2-3 mm long, deeply 2-fid, with 5-7 mm long awn. Pedicellate spikelets *ca* 5 mm long. Lower glume elliptic-lanceolate, membranous, 7-9-nerved. Upper glume 3-nerved. Lower floret empty. Upper floret: Lemma lanceolate, hyaline. Palea absent. Anthers 3, *ca* 2 mm long. Caryopsis oblong.

Chhatarpur. *Fl. & Fr.*: Aug. Nov.

2. Cymbopogon martinii (Roxb.) Wats. in Atkins., Gaz. N. W. Prov. Ind. 392. 1882; Bor, Grass. Burm. Ceyl. Ind. Pak. 129. 1960. *Andropogon martinii* Roxb., Fl. Ind. (Carey & Wallich ed.) 1: 280. 1820. *A. schoenanthus* L. var. *martinii* Hook. *f.*, Fl. Brit. India 7: 204. 1896.

Perennials. Culms 1.5-2 m tall, erect, tufted, glabrous; lower nodes often swollen. Leaves linear-lanceolate, flat, cordate and amplexicaul at base, glabrous; sheaths terete, glabrous; ligules membranous. Inflorescence a compound panicle; spathe 3-6 cm long; spatheole *ca* 2 cm long, enclosing 3-6 spikelets. Sessile spikelets ovate or ovate-oblong, 3-5 mm long, awned. Lower glume ovate-oblong, obtuse, grooved on the back; upper glume lanceolate, acute; keel winged, serrulate. Lower floret empty. Lemma *ca* 3.5 mm long, nerveless, ciliate, awned. Palea absent. Upper floret bisexual. Lemma *ca* 3 mm long, 2-lobed, awned. Pedicellate spikelets male. Lower glume lanceolate-oblong, obtuse; upper glume 3-nerved. Lemma hyaline. Palea absent. Anthers 3, yellow-brown, 2.5-3 mm long. Caryopsis oblong, 2.5-3 mm long.

Common. Bastar, Gwalior, Hoshangabad, Raigarh, Rajnandgaon, Sidhi. *Fl. & Fr.*: Sept. Feb.

3. Cymbopogon pendulus (Nees *ex* Steud.) Wats. in Atkins., Gaz. N. W. Prov. Ind. 392. 1882; Bor, Grass. Burm. Ceyl. Ind. Pak. 131. 1960. *Andropogon pendulus* Nees *ex* Steud., Syn. Pl. Glumac. 1: 388. 1854.

Perennials. Culms 1-2 m tall, erect or ascending, tufted. Leaves up to 1 m long; median nerve very thick, spatheolate at base; sheaths tight, glabrous, striate; ligules membranous, truncate. Inflorescence 30-50 cm long, decompound (tertiary branching). Sessile spikelets bisexual, pale green,

lanceolate, 5-6 mm long; awns 9-11 mm long. Lower glume equalling the spikelet, winged, 4-nerved, with 2 shallow pits at base; upper glume equal to lower. Male spikelets violet or reddish at summit. Anthers 3, yellow, 1.5-2 mm long.

Rare. Bastar. *Fl. & Fr.*: Feb. April.

4. Cymbopogon schoenanthus (L.) Spreng., Pl. Min. Cogn. Pug. 2: 15. 1815; Bor. Grass. Burm. Ceyl. Ind. Pak. 131. 1960. *Andropogon schoenanthus* L., Sp. Pl. 1046. 1753; Hook.*f*., Fl. Brit. India 7: 204. 1896.

Perennials. Culms 1-2 m tall, erect. Leaves linear, glabrous, glaucous; sheaths terete, glabrous; ligules membranous, notched. Inflorescence a panicle of spikes enclosed in spathes; joints and pedicels narrowly clavate, ciliate on margins. Sessile spikelets *ca* 5 mm long, glabrous. Lower glume equal to spikelet, irregularly dentate; upper glume similar, ciliate. Lemma oblong, ciliate; awn 12 -15 mm long. Anthers 3, pinkish, 1.5-2 mm long. Pedicellate spikelets male, otherwise similar to sessile one.

Rare. Balaghat. *Fl. & Fr.*: Sept. Nov.

23. CYNODON Rich., *nom. cons.*

Perennials, rhizomatous or stoloniferous, usually low-growing. Leaf blades linear, flat, sometimes filiform or lanceolate; ligules membranous, often ciliate on upper edge. Inflorescence of digitate, 1-sided spikes, borne sometimes in 2 or more closely spaced whorls. Spikelets narrowly ovate, 1-flowered, strongly laterally compressed, imbricate in 2 rows, awnless; rhachilla produced or not. Glumes 2, narrow, subequal, shorter than the floret, 1-nerved (rarely the upper 3-nerved). Lemma narrowly ovate in side view, more or less ciliate on the keel and side nerves, usually glabrous on flanks; callus glabrous. Caryopsis ellipsoid, laterally compressed.

About 8 species; tropical and subtropical regions; 3 in M.P.

1a. Lemmas equal to or shorter than upper glume; lemma hairs clavellate ...2. *C. barberi*

1b. Lemmas longer than the upper glume; lemma hairs usually not clavellate:

2a. Plants rhizomatous; ligule a ring of hairs; inflorescence of 2-6 spikes, up to 6 cm long ...3. *C. dactylon*

2b. Plants not rhizomatous; ligule membranous; inflorescence of 4 to several spikes, 6-10 cm long ...1. *C. arcuatus*

1. Cynodon arcuatus J. Presl *ex* K. Presl, Reliq. Haenk. 1: 290. 1830; Bor, Grass. Burm. Ceyl. Ind. Pak. 469. 1960. *C. intermedius* Rang. & Tad. in J. Bombay Nat. Hist. Soc. 26: 304. 1918.

Perennials. Culms 20-40 cm tall, stoloniferous, leafy all over. Leaves linear, 2-10 cm long, acuminate at apex, glabrous, scabrid on margins; sheaths compressed, glabrous; ligules membranous, truncate. Inflorescence of 4 to several spikes. Spikelets 1.5-2 mm long, 1-flowered, awnless, arranged in two rows on the rhachis. Lower glume lanceolate, *ca* 1 mm long, curved, 1-nerved; upper glume *ca* 1.5 mm long, straight. Lemma obliquely ovate or oblong, *ca* 2 mm long, chartaceous, 3-nerved; margin and keel hairy. Palea scabrid on keel. Anthers 3, yellow, 0.5-1 mm long. Caryopsis brownish, ellipsoid, *ca* 1.5 mm long.

Common. Balaghat, Bastar, Damoh, Gwalior. *Fl. & Fr.*: July - Sept.

2. Cynodon barberi Rang. & Tad. in J. Bombay Nat. Hist. Soc. 24: 846. 1916; Bor, Grass. Burm. Ceyl. Ind. Pak. 469. 1960.

Perennials. Culms 25-40 cm tall from creeping stolons, rooting at nodes, slender, often branched. Leaves linear or lanceolate, acute at apex, scabrid on margins; sheaths compressed, keeled, glabrous, bearded at mouth; ligules ciliate. Inflorescence of 4-5 spikes, whorled, spreading; rhachis scaberulous, hairy at base. Spikelets sessile, 2-seriate, imbricate, 1-flowered, compressed, 2-2.5 mm long. Lower glume membranous, 1-nerved; upper glume similar, 2.25-2.5 mm long, acute or mucronate at apex. Lemma cymbiform, 1.8-2 mm long, acute, membranous; keel and margins hispid with clavellate hairs. Anthers 3, small. Caryopsis oblong, 1-1.3 mm long.

Rare. On sandy river beds. Gwalior, Rajnandgaon, Raigarh. *Fl. & Fr.*: Aug. Nov.

Notes : Bor (1960) has reported it as endemic to Madras, while the present report extends its distribution to Madhya Pradesh.

3. **Cynodon dactylon** (L.) Pers., Syn. Pl. 1: 85. 1805; Hook. *f.*, Fl. Brit. India 7: 288. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 469. 1960. *Panicum dactylon* L., Sp. Pl. 58. 1753.

Perennials. Culms 10-40 cm tall, stoloniferous, rooting at nodes. Leaves narrow, linear, glabrous, glaucous; sheaths compressed, glabrous; ligules ciliate. Inflorescence of 2-6 spikes, erect, spreading; rhachis slender. Spikelets sessile, 1.5-2.5 mm long, compressed, 1-flowered. Lower glume narrowly oblong, 1-1.5 mm long, membranous, acute, keeled; upper glume similar, 1.5-2 mm long. Lemma 2-2.5 mm long, acute, membranous, 3-nerved; keels and margins hispid with white hairs. Anthers 3, very small. Caryopsis 1.25-1.5 mm long.

Common throughout the state. *Fl. & Fr.*: Throughout the year in moist places.

24. CYRTOCOCCUM Stapf

Perennials. Culms slender, geniculate, ascending from a decumbent or creeping base. Leaf blades linear, lanceolate, flat; ligules membranous. Spikelets brown or greenish brown, gibbous, laterally compressed, keeled, awnless, falling entire from the pedicels, arranged in open or contracted panicle. Glumes unequal or nearly equal, thinly membranous, 3-5-nerved. Florets 2. Lower floret barren, with or without a palea. Lemma similar to upper glume, equal to spikelet. Upper floret bisexual. Lemma cymbiform, gibbous, papery to coriaceous, with rigidly narrow, involute margins, obscurely 5-nerved. Palea very narrow, convex on the back. Lodicules 2. Stamens 3. Caryopsis grooved.

About 11 species; tropical regions of Old World; one in M.P.

Cyrtococcum oxyphyllum (Steud.) Stapf in Hook., Icon. Pl. sub t. 3096. 1922; Bor, Grass. Burm. Ceyl. Ind. Pak. 291. 1960. *Panicum oxyphyllum* Steud., Syn. Pl. Glumac. 1: 65. 1854. *P. pilipes* Nees & Arnott *ex* Buese in Miq., Pl. Jungh. 3: 376. 1854; Hook. *f.*, Fl. Brit. India 7: 57. 1896.

Perennials. Culms 20-60 cm tall, branched at base, glabrous. Leaves scabrid on margins, sparsely hairy; sheaths shorter than internodes, shortly hairy or glabrous; ligules membranous, truncate. Inflorescence a panicle;

branches filiform, with scattered long white hairs. Spikelets crowded, 1.5-2 mm long, glabrous. Lower glume 1-1.5 mm long, acute, 3-nerved; upper glume elliptic, 1.5-1.8 mm long. Lower lemma coriaceous, shining, smooth, with a brown scar at top. Anthers 2, yellow, *ca* 1 mm long. Caryopsis white, *ca* 2 mm long, grooved along the centre.

In damp shady places. Bastar, Hoshangabad. *Fl.* & *Fr.*: Nov. Feb.

25. DACTYLOCTENIUM Willd.

Annuals or perennials, tufted or stoloniferous. Leaf blades linear, flat or loosely folded; ligules membranous, truncate, often ciliolate. Inflorescence digitate, of several linear to narrowly oblong, secund spikes which disarticulate at maturity from top of the culm (very tardily in some species); uppermost spikelets abortive; the spike terminating in a pointed extension of the flattened rhachis. Spikelets several-flowered, elliptic to ovate, laterally compressed, 2-seriate, closely overlapping, disarticulating above the glumes but not between the florets. Glumes 1-nerved, keeled, subequal, shorter than lemmas, persistent; lower glume sharply acute; upper glume with a stout spreading awn. Lemma 3-nerved, keeled, membranous, glabrous; lateral nerves shorter than the lemma and obscure. Palea subequal to lemma; keel sometimes winged. Caryopsis angular, ornamental, enclosed within a free, hyaline pericarp which ruptures to release the grain.

About 13 species; subtropical regions; 3 in M.P.

1a. Ligules membranous; spikes 2-5 cm long; caryopsis reniform ...1. *D. aegyptium*

1b. Ligules membranous or hairy; spikes 0.5-2 cm long; caryopsis not reniform:

2a. Annuals; rhachis projection 3-4 mm long, back of rhachis not grooved ...2. *D. aristatum*

2b. Perennials; rhachis projection *ca* 2 mm long, back of rhachis grooved on each side ...3. *D. scindicum*

1. **Dactyloctenium aegyptium** (L.) P. Beauv., Ess. Agrostogr. 15. 1812; Bor, Grass. Burm. Ceyl. Ind. Pak. 489. 1960. *Cynosurus aegyptius* L., Sp. Pl. 72. 1753. *Eleusine aegyptia* (L.) Desf., Fl. Atlant. 1: 85. 1798; Hook. *f.*, Fl. Brit. India 7: 295. 1896.

Annuals. Culms 15-50 cm tall, terete or compressed, erect or ascending, glabrous. Leaves linear-lanceolate, flat, acute at apex, glabrous or hispid; sheaths compressed, sparsely hispid; ligules membranous. Inflorescence of 2-6, digitate spikes; rhachis stout, projected as rigid sharp point beyond the spikelets. Spikelets closely placed, pectinate in two rows on one side of the rhachis, 3-5-flowered, *ca* 2 mm long, laterally compressed. Lower glume ovate, 3.5-4 mm long, 1-nerved; keel narrowly winged, scabrid; upper glume similar to lower one but cuspidate at apex, 1.5-2 mm long, incurved. Lower lemma ovate, 3-3.5 mm long, 1-nerved; empty lemma one or absent. Palea keels hispid. Anthers 3, yellow, *ca* 0.5 mm long. Caryopsis reniform, *ca* 0.8 mm long.

Bastar, Raipur, Sidhi. *Fl. & Fr.*: Aug. - Nov.

2. Dactyloctenium aristatum Link, Hort. Berol. 1: 59. 1827; Bor, Grass. Burm. Ceyl. Ind. Pak. 489. 1960. *Eleusine aristata auct. non* Ehrenb. *ex* Boiss., 1859: Hook. *f.*, Fl. Brit. India 7: 296. 1896.

Annuals, tufted. Culms 5-50 cm tall, erect. Leaves linear-lanceolate, sparsely hairy or glabrous; sheaths compressed, hairy; ligules very small, membranous. Inflorescence usually a solitary spike; rhachis slender, hairy at base; apical prolongation 3-4 mm long beyond the spikelets. Spikelets densely crowded, laterally compressed, sessile, in two rows, 3-flowered. Lower glume 2.5-3 mm long, 1-nerved; keel winged, produced into incurved, 1.5-1.8 mm long cusp. Lower lemma 3.5-4 mm long, membranous, 1-nerved, similar to upper glume; empty lemma one, similar to fertile. Palea keels hispid. Anthers 3, *ca* 0.4 mm long. Caryopsis globose, 0.75-1 mm long, rugose.

Common. Balaghat, Bilaspur, Indore, Mandla, Raigarh, Raipur, Rewa, Satna, Sidhi, Surguja. *Fl. & Fr.*: July - Oct.

3. Dactyloctenium scindicum Boiss., Diagn. ser. 2, 4: 131. 1859; Bor, Grass. Burm. Ceyl. Ind. Pak. 489. 1960. *Eleusine scindica* (Boiss.) Duthie, Fodd. Grass. N. India 58. 1888.

Perennials. Culms 5-40 cm long, spreading, rooting at nodes, tomentose with long hairs; nodes villous. Leaves linear, small, hairy; sheaths compressed, hairy; ligules hairy. Inflorescence of digitate spike forming a cross, hairy at base; rhachis projection *ca* 2 mm long. Spikelets *ca* 3.2

mm long. Lower glume *ca* 2 mm long, keeled, arista *ca* 1 mm long; upper glume ovate, *ca* 2.7 mm long, arista *ca* 0.7 mm long, glabrous. Anthers 3, yellow, 0.5-0.8 mm long. Caryopsis ovoid, *ca* 0.5 mm long, rugose.

Rare. Jabalpur. *Fl. & Fr.*: Sept. Jan.

26. DENDROCALAMUS Nees

Arborescent bamboos. Culms usually erect from a densely branched rootstock; culm sheaths caducous, variably auricled, usually elongate; imperfect blade narrowly triangular. Leaf blades shortly petiolate, without transverse veinlets, but frequently pellucid glands instead. Inflorescence a large, compound panicle. Spikelets usually in globose heads in long spikes, subtended by 1 or more glume like bracts, often with secondary spikelets arising from buds in their axils, ovate, acute or obtuse, few-flowered. Florets usually bisexual. Glumes and lemmas similar, ovate, acute or mucronate, many-nerved. Palea ovate, acute, truncate, emarginate or cleft, the lower 2-keeled, ciliate, the upper usually rounded on the back, often nearly glabrous. Lodicules absent or poorly developed. Stamens 6. Style 1. Caryopsis small. Seeds surrounded by crustaceous or hardened pericarp.

About 30 species; S. & E. Asia; one in M.P.

Dendrocalamus strictus (Roxb.) Nees in Linnaea 9: 476. 1834; Gamble in Hook. *f.*, Fl. Brit. India 7: 404. 1896. *Bambos stricta* Roxb., Pl. Coromandel 1: 58. 1798.

Perennials, deciduous. Culms robust, 6-15 m tall, 2.5-8 cm in diameter; internodes 30-45 cm long, hollow in wet and solid in dry climate, young ones glaucous-green, older ones dull green or yellowish; nodes swollen; culm sheaths variable, 7-30 cm long, rounded at the top, slightly auricled, ciliate on margins, covered on the back with golden-brown stiff hairs, sometimes glabrous striate; imperfect blade triangular, hairy; ligules narrow. Leaves linear-lanceolate, 2.5-25 cm long, terminating above in a sharp acuminate twisted point, rounded at the base into short petiole, scabrous on margins; leaf sheaths striate, hairy, ending in a prominent callus and short auricle, with a few wavy, caducous cilia; ligules narrow. Inflorescence a large, branched panicle with dense, glabrous, spaced heads; rhachis rounded, smooth. Spikelets 8-12 mm long, hairy, spinescent, fertile and sterile mixed. Empty glumes 2 or more, ovate, spinescent, many-nerved.

Lemma ovate, ending in a sharp spine, surrounded by ciliate tufts of hairs. Palea ovate or obovate, emarginate, 6-8-nerved; keels ciliate. Anthers yellow, 4-5 mm long, apiculate. Ovary ovate; style 6-10 mm long, undivided, ending into purple, feathery stigma. Caryopsis brown, ovoid-subglobose, 7-8 mm long, shining, beaked, with persistent style.

Common. Balaghat, Bastar, Bilaspur, Hoshangabad, Indore, Jabalpur, Raigarh, Raipur, Rajnandgaon, Rewa, Seoni, Sidhi, Surguja. *Fl. & Fr.*: Nov. - April.

27. DESMOSTACHYA (Stapf) Stapf

Perennials. Leaf blades linear, flat or inrolled; ligule a short lacerate membrane. Inflorescence a narrow, erect, linear panicle of short, densely clustered or spaced, ascending or spreading spikes. Spikelets several to many-flowered, laterally compressed, sessile or subsessile, crowded and secund on the branches, falling entire. Glumes unequal, lanceolate, membranous, 1-nerved. Lemmas ovate-acute, muticous, membranous or chartaceous to coriaceous, glabrous, keeled, faintly 3-nerved, the side nerves shorter than the lemma. Palea shorter than the lemma, 2-keeled. Caryopsis obliquely ovoid, triquetrous; pericarp adnate.

A monotypic genus; tropical regions of Old World.

Desmostachya bipinnata (L.) Stapf in Dyer, Fl. Cap. 7: 632. 1900; Bor, Grass. Burm. Ceyl. Ind. Pak. 491. 1960. *Briza bipinnata* L., Syst. Nat. ed. 10. 2: 875. 1759. *Eragrostis cynosuroides* (Retz.) P. Beauv., Ess. Agrostogr. 71, 162. 1812; Stapf in Hook. *f.*, Fl. Brit. India 7: 324. 1896. *Poa cynosuroides* Retz., Observ. Bot. 4: 20. 1786.

Perennials. Rhizomes thick, creeping, deep rooted. Culms 0.3-1.2 m tall. Leaves linear, convolute, acute at apex, coriaceous; sheaths coriaceous, glabrous, hairy at throat; ligule a ring of hairs. Inflorescence a large panicle of many spikes. Spikelets 2-seriate, purple brown, pectinate, 3-6-flowered. Lower glume 0.5-0.7 mm long, mucronate, keeled, 1-nerved; upper glume obtuse, *ca* 1 mm long. Lemma 1.5-1.7 mm long; keels scabrid. Anthers 3, purplish yellow, 0.8-1 mm long. Caryopsis obliquely ovoid, compressed, *ca* 0.4 mm long.

Common. Gwalior, Raipur, Rewa, Shivpuri. *Fl. & Fr.*: Aug. Oct. and March April.

Notes : Strong, extensive, scaly rhizome and the needle like new, emerging shoots are good field characters.

28. DICHANTHIUM Willemet

Annuals or perennials. Leaf blades flat or inrolled, sometimes aromatic; ligules membranous. Inflorescence of single or subdigitate racemes, with or without homogamous spikelet pairs at the base; internodes and pedicels linear, solid. Sessile spikelets dorsally compressed; callus very short, rounded. Lower glume broadly convex to slightly concave on the back, abruptly rounded on the flanks, with or without a circular pit. Lower floret reduced to a hyaline lemma. Upper lemma stipitiform, entire or rarely minutely 2-dentate, with a glabrous or puberulous awn. Pedicellate spikelets similar to sessile. Caryopsis oblong, dorsally compressed.

About 20 species; tropical regions of Old World; 3 in M.P.

1a. Peduncle of raceme hairy ...2. *D. aristatum*

1b. Peduncle of raceme glabrous:

2a. Ligule a large membrane; lower glume of the sessile spikelet cymbiform, keel not winged, median nerve present ...1. *D. annulatum*

2b. Ligule a short ciliate membrane; lower glume of the sessile spikelet not as above ...3. *D. caricosum*

1. Dichanthium annulatum (Forssk.) Stapf in Prain, Fl. Trop. Afr. 9: 178. 1917; Bor, Grass. Burm. Ceyl. Ind. Pak. 133. 1960. *Andropogon annulatus* Forssk., Fl. Aegypt.-Arab. 173. 1775; Hook. *f.*, Fl. Brit. India 7: 196. 1896.

Perennials. Culms 40-100 cm tall, erect or ascending. Leaves linear, acuminate at apex, hairy, scabrid on margins. Inflorescence of 2-10, subdigitate racemes. Sessile spikelets bisexual, 3-3.5 mm long, narrow, with 0.15-2.5 cm long awn. Anthers 3, yellow, *ca* 2 mm long. Pedicellate spikelets male or neuter. Caryopsis light brown, broadly ellipsoid, *ca* 2 mm long.

Common. Bastar, Betul, Bilaspur, Gwalior, Hoshangabad, Raigarh, Raipur, Rajnandgaon, Rewa, Sidhi, Surguja. *Fl. & Fr.*: Throughout the year.

2. Dichanthium aristatum (Poir.) Hubb. in Kew Bull. 1939: 654. 1940; Bor, Grass. Burm. Ceyl. Ind. Pak. 134. 1960. *Andropogon aristatus* Poir. in Lam., Encycl. Suppl. 1: 585. 1810. *A. caricosus* L. var. *mollicomus* (Kunth) Hack. in A. DC., Monogr. Phan. 6: 569. 1889; Hook. *f.*, Fl. Brit. India 7: 196. 1896.

Perennials. Culms 0.7-2 m tall, erect or ascending, leafy, branched; nodes hairy. Leaves linear, glabrous; sheaths compressed, glabrous; ligules short, ciliate. Inflorescence of 1-7 racemes; peduncles 3-10 cm long; joints *ca* 2 mm long; callus short, hairy. Sessile spikelets compressed, 5-6 mm long, awned. Lower glume 5-5.5 mm long, 7-9-nerved; upper glume similar, 3-nerved. Lower lemma empty, hyaline, 4-4.5 mm long, ciliate on margins, epaleate; upper lemma reduced, 2-fid, awned from sinus; awn 2-3 cm long. Anthers 1.2-1.5 mm long. Pedicellate spikelets similar to sessile except being narrow and rusty. Caryopsis slate-coloured, fusiform, *ca* 2 mm long.

Bilaspur, Hoshangabad, Indore, Mandla, Morena, Sagar, Satna, Seoni, Sidhi. *Fl. & Fr.*: Aug. -Nov.

Notes : Based on morphological characters and ecological adaptations, it appears that *D. aristatum* is an ecological form of *D. caricosum*. However, thorough experimental investigation is necessary to sort out the problem.

3. Dichanthium caricosum (L.) A. Camus in Bull. Mus. Hist. Nat. Paris 27: 549. 1921; Bor, Grass. Burm. Ceyl. Ind. Pak. 134. 1960. *Andropogon caricosus* L., Sp. Pl. ed. 2. 1480. 1763; Hook. *f.*, Fl. Brit. India 7: 196, 1896.

Perennials. Culms 0.5-2 m tall, erect or decumbent, simple or branched; nodes hairy to glabrous. Leaves linear-lanceolate, glabrous to hairy; sheaths compressed or terete, glabrous, hairy at mouth; ligules membranous. Inflorescence of 1-8 racemes; joints 1.5-1.7 mm long; callus short hairy. Sessile spikelets imbricate, 5-6 mm long, awned. Lower glume elliptic, 5-5.5 mm long, 7-9-nerved; upper glume similar, 3-nerved. Lower lemma empty, elliptic, 4-4.5 mm long, 7-9-nerved, ciliate on margins, epaleate; upper lemma reduced to stipe, 2-fid, awned from sinus; awn *ca* 2.5 cm long. Anthers 3, yellow, 1-1.5 mm long. Pedicellate spikelets 5-6 mm long, acute. Lower glume 2-keeled, 9-13-nerved; keels hairy; upper glume similar, 3-nerved. Lemma 3-3.5 mm long, nerveless, epaleate. Anthers 3, yellow, *ca* 1.5 mm long. Caryopsis linear to fusiform, 1.5-1.8 mm long.

Common. Bilaspur, Raigarh, Satna, Shivpuri, Sidhi, Surguja. *Fl. & Fr.*: July Dec.

29. DIECTOMIS Kunth, *nom. cons.*

Perennials. Leaves linear. Spikes solitary; peduncle in the axil of a spathiform leaf sheath; limbs and pedicels bucciniform, the mouth with large teeth. Sessile spikelets laterally compressed with short callus. Lower glume applied to the edges and as broad as the opening of upper glume, cymbiform, much broader, long awned; keels marginal, margins very narrowly inflexed. Lemma 2-dentate with long stout awn from the sinus. Palea hyaline, narrow. Pedicellate spikelet with a very large glume; pedicel flattened, villous, concealing the inner sessile spikelet.

A monotypic genus: tropical regions.

Diectomis fastigiata (Sw.) Kunth in Humb., Bonpl. & Kunth, Nov. Gen. Sp. 1: 193. 1816; Bor, Grass. Burm. Ceyl. Ind. Pak. 135. 1960. *Andropogon fastigiatus* Sw., Prodr. 26. 1788; Hook. *f.*, Fl. Brit. India 7: 167. 1896.

Perennials. Culms 30-50 cm tall, erect or decumbent, branched; nodes glabrous. Leaves narrowly linear, acuminate at apex, scabrid; sheaths loose, glabrous; ligules membranous. Inflorescence a solitary spike in the axil of a spathiform leaf sheath; peduncle short or long; callus bearded. Sessile spikelets laterally compressed, *ca* 3 mm long. Lower glume linear, acuminate, keeled, centre hyaline, villous; upper glume *ca* 2.5 mm long, membranous, 2-fid, awned; keel villous. Lemma 2.5-3 mm long, 2-dentate; awn 3-3.5 cm long. Palea minute, hyaline. Pedicellate spikelets neuter, hyaline, 11-nerved, with slender awn. Anthers 3, brownish yellow, *ca* 1.5 mm long. Caryopsis light brown, fusiform, 1.8-2 mm long; style persistent.

In moist places. Bastar, Bilaspur, Mandla, Sidhi. *Fl. & Fr.*: Sept. Dec.

30. DIGITARIA Haller, *nom. cons.*

Annuals or perennials. Leaf blades mostly linear and flat; ligules short, scarious or membranous, glabrous or ciliate. Inflorescence of racemes, digitate or borne upon an elongated central axis, rarely solitary, sometimes with secondary branchlets; rachis flat or triquetrous, bearing the spikelets

in appressed groups of 4-5 or more; pedicels terete or triquetrous, usually smooth. Spikelets lanceolate to oblong-elliptic, flattened on the front, convex on the back. Lower glume small or suppressed, abaxial; upper glume membranous, as long as the spikelet or much shorter and exposing the upper lemma. Lower floret barren, represented by a prominently nerved membranous lemma, as long as the spikelet (rarely much reduced), usually hairy, typically with the hairs forming stripes between the 1st and 2nd lateral nerves and along the margin. Upper floret bisexual. Lemma chartaceous to cartilaginous, finely longitudinally striate, with its hyaline margins enfolding and concealing most of the palea, more or less dorsally compressed, usually rounded on the back, subacute to acuminate, rarely rostrate. Caryopsis oblong, plano-convex, mostly acute to subacute.

About 170 species; tropical and subtropical regions; 9 in M.P.

1a. Verrucose hairs present on the spikelets:

2a. Culms erect; all leaves linear; inflorescence of 2-6 racemes; caryopsis purplish ...9. *D. violascens*

2b. Culms creeping with short stolons; innovative leaves broader; inflorescence of 2-3 racemes; caryopsis pale ...5. *D. longiflora*

1b. Verrucose hairs absent on the spikelets:

3a. Hairs on spikelets clavate:

4a. Spikelets 2.2-2.5 mm long, arranged in threes; caryopsis broadly ellipsoid, *ca* 2.5 mm long ...8. *D. ternata*

4b. Spikelets 1.2-1.5 mm long, arranged in pairs; caryopsis ovoid or ellipsoid, *ca* 1 mm long:

5a. Inflorescence of 3-7 racemes; anthers yellow, *ca* 0.5 mm long; tip of caryopsis protruding above the lower lemma ...1. *D. abludens*

5b. Inflorescence of 2-3 racemes; anthers purplish, *ca* 0.3 mm long; tips of caryopsis not protruding above the lower lemma ...7. *D. stricta*

3b. Hairs on the spikelets, if any, not clavate:

6a. Upper glume not well developed, only a scale:

7a. Ligules 0.5-2 mm long membrane; racemes densely pubescent on the lower axils; upper glume 3-nerved; caryopsis not transparent ...6. *D. setigera*

7b. Ligules very short membrane; racemes puberulous or glabrous; upper glume nerveless; caryopsis transparent ...4. *D. duthieana*

6b. Upper glume well developed:

8a. Spikelets of each pair heteromorphous; lower lemma of sessile spikelet 7-nerved, pectinate; anthers *ca* 0.5 mm long ...2. *D. bicornis*

8b. Spikelets of each pair not heteromorphous; lower lemma of sessile spikelet 3-nerved, glabrous; anthers *ca* 1.2 mm long ...3. *D. ciliaris*

1. Digitaria abludens (Roem. & Schult.) Veldk. in Blumea 21: 53. 1973. *Panicum abludens* Roem. & Schult., Syst. Veg. 2. 457. 1817. *Digitaria granularis* (Trin. *ex* Spreng.) Henr., Monogr. Gen. Digitaria 302. 1950; Bor, Grass. Burm. Ceyl. Ind. Pak. 301. 1960. *Paspalum granulare* Trin. *ex* Spreng., Neue Entdeck. 2: 47. 1821. *P. pedicellare* Trin. *ex* Hook. *f.*, Fl. Brit. India 7: 19. 1896.

Annuals. Culms 10-40 cm tall, erect or ascending from base. Leaves linear, 6-10 cm long, acuminate at apex; sheaths glabrous; ligules membranous, truncate. Inflorescence of 3-7 racemes on a long, glabrous peduncle; rhachis narrowly winged; pedicels unequal, with clavate hairs. Spikelets elliptic-lanceolate, 1.2-1.5 mm long. Lower glume absent; upper glume elliptic, *ca* 1 mm long, acute, 3-5-nerved. Lower floret sterile. Upper floret bisexual. Lemma brownish black at maturity, elliptic, 1-1.2 mm long. Anthers 3, yellow, *ca* 0.5 mm long. Caryopsis ellipsoid, *ca* 1 mm long.

Rare. Damoh. *Fl. & Fr.*: Sept. Oct.

2. Digitaria bicornis (Lam.) Roem. & Schult. *ex* Loud., Hort. Brit. n. 1578. 24. 1830; Henr., Monogr. Gen. Digitaria 71. 1950; Bor, Grass.

Burm. Ceyl. Ind. Pak. 299. 1960. *Paspalum bicorne* Lam., Tabl. Encyl. 1: 176. 1791. *Panicum bicorne* Kunth, Enum. Pl. 1: 83. 1833. *Digitaria biformis* Willd., Enum. Pl. 1: 92. 1809; Bor, Grass. Burm. Ceyl. Ind. Pak. 299. 1960.

Annuals. Culms 30-50 cm tall, decumbent. Leaves scabrid, sparsely soft hairy; sheaths glabrous to pilose; ligules membranous, truncate. Inflorescence of 2-5 racemes; rhachis winged, serrate. Spikelets 2-nate, lanceolate, 2.75-3.5 mm long, glabrous to slightly pubescent. Lower glume variable, 0.2-0.5 mm long, acute, 2-fid; upper glume 1-2.75 mm long, 3-nerved, pubescent. Sterile lemma equal to spikelet. Sessile spikelets 7-nerved, glabrous or slightly pubescent and pectinate; pubescence usually mixed with bristles. Fertile lemma slightly shorter than the spikelet. Anthers 3, purple, *ca* 0.5 mm long. Caryopsis yellowish, *ca* 2.5 mm long.

In moist places. Balaghat, Bilaspur, Mandla, Raigarh, Raipur, Sidhi, Surguja. *Fl. & Fr.*: Aug. Oct.

3. **Digitaria ciliaris** (Retz.) Keeler, Descr. Gram. 27. 1802; Henr., Monogr. Gen. Digitaria 129. 1950; Clayton in Fl. W. Trop. Afr. 2, 3: 453. 1972. *Panicum ciliare* Retz., Observ. Bot. 4: 16. 1786. *Paspalum sanguinale* Lam. var. *ciliare* (Retz.) Hook. *f.*, Fl. Brit. India 7: 15. 1896. *Digitaria adscendens* (Humb., Bonpl. & Kunth) Henr. in Blumea 1: 92. 1934; Bor, Grass. Burm. Ceyl. Ind. Pak. 298. 1960. *Panicum adscendens* Humb., Bonpl. & Kunth, Nov. Gen. Sp. 1: 97. 1816.

Annuals. Culms 20-60 cm tall, erect or decumbent. Leaves glabrous except with bulbous-based hairs at base; sheaths 5-10 cm long; ligules membranous, truncate. Inflorescence of 2-9, variable sized racemes; rhachis 0.5-1 mm wide, flat with a sharp median keel on one side, 2.5-3 mm long. Lower glume triangular, *ca* 0.3 mm long; upper glume narrowly triangular, *ca* 2 mm long, acute, hairy, 3-nerved. Lower floret sterile. Upper floret bisexual. Lemma lanceolate, *ca* 2.8 mm long, acute, glabrous, 3-nerved. Anthers 3, purplish, *ca* 1.2 mm long. Caryopsis *ca* 2 mm long.

Common. Betul, Bilaspur, Gwalior, Mandla, Hoshangabad, Raigarh, Shivpuri. *Fl. & Fr.*: Aug. - Nov.

4. **Digitaria duthieana** Henr. *ex* Bor in Kew Bull. 1953: 273. 1953 & Grass. Burm. Ceyl. Ind. Pak. 300. 1960.

Perennials, caespitose, stoloniferous. Culms 15-30 cm tall, decumbent. Leaves glabrous, scabrous on margins; sheaths glabrous, pilose at mouth; ligules membranous. Inflorescence of racemes; rhachis angular with scabrous margins. Spikelets *ca* 2.5 mm long, 5-nerved. Anthers 3, yellow, *ca* 1 mm long. Caryopsis narrowly ellipsoid, 1.2-1.5 mm long, transparent.

Endemic. Sagar. *Fl. & Fr.*: July Dec.

Notes : Bor (1960) has reported this species endemic to M.P. However, the author has examined several collections in Coimbatore and observed it as a common species in that area.

5. Digitaria longiflora (Retz.) Pers., Syn. Pl. 1: 85. 1805; Henr., Monogr. Gen. Digitaria 408. 1950; Bor, Grass. Burm. Ceyl. Ind. Pak. 302. 1960. *Paspalum longiflorum* Retz., Observ. Bot. 4: 15. 1786; Hook. *f.*, Fl. Brit. India 7: 17. 1896.

Annuals. Culms 10-50 cm tall, with short creeping stolons. Leaves linear, hairy or glabrous; ligules membranous. Inflorescence of 2-3 racemes; rhachis flat, winged, glabrous. Spikelets ellipsoid, 1.5-2 mm long. Lower glume absent; upper glume 1.5-1.7 mm long, membranous, covered with verrucose hairs. Lower lemma empty, 5-7-nerved; upper lemma bisexual, elliptic, *ca* 1.5 mm long. Anthers 3, yellow, *ca* 0.5 mm long. Caryopsis pale, ellipsoid.

Bilaspur, Hoshangabad. *Fl. & Fr.*: Sept. Dec.

6. Digitaria setigera Roth *ex* Roem. & Schult., Syst. Veg. 2: 474. 1817; Henr., Monogr. Gen. Digitaria 684. 1950; Bor, Grass. Burm. Ceyl. Ind. Pak. 305. 1960. *Panicum corymbosum* Roxb., Fl. Ind. (Carey & Wallich ed.) 1: 295. 1820. *Paspalum sanguinale* Lam. var. *extensum* Hook. *f.*, Fl. Brit. India 7: 15. 1896 & var. *pruriens* (Trin.) Hook. *f.*, Fl. Brit. India 7: 15. 1896.

Annuals. Culms 0.7-1.5 m tall, erect. Leaves 10-30 x 0.5-1 cm, acuminate at apex, ventrally pubescent, dorsally glabrous; sheaths loose, glabrous; ligules 0.5-2 mm long, membranous. Inflorescence of 4-15 racemes, up to 6 cm long. Spikelets elliptic-acute; rhachis winged, scabrid on margins. Lower glume small, hyaline, scale like; upper glume narrow, *ca* 1.25 mm long, sparsely hairy, 3-nerved. Lower floret sterile. Upper floret bisexual. Lemma pale, elliptic-acute, shining, margins clasping the

palea. Anthers 3, *ca* 1.25 mm long. Caryopsis whitish, ellipsoid, *ca* 2 mm long.

Balaghat, Hoshangabad, Raigarh. *Fl. & Fr.*: Aug. Oct.

7. Digitaria stricta Roth *ex* Roem. & Schult., Syst. Veg. 2: 474. 1817; Henr., Monogr. Gen. Digitaria 715. 1950; Bor, Grass. Burm. Ceyl. Ind. Pak. 305. 1960. *Paspalum royleanum* Nees *ex* Hook. *f.*, Fl. Brit. India 7: 18. 1896.

Annuals. Culms 15-60 cm tall, decumbent-ascending. Leaves 5-15 cm long, scabrid or ciliate at base; sheaths glabrous, with long hairs at throat; ligules 0.7-2.5 mm long, membranous, truncate. Inflorescence of 2-3 racemes. Spikelets paired, elliptic or lanceolate, acute. Upper glume ovate, 0.2-0.5 mm long, obtuse. Lower floret sterile. Upper floret fertile. Lemma purple or dark brown, apiculate. Palea *ca* 1 mm long. Anthers 3, purplish, *ca* 0.3 mm long. Caryopsis deep purple, ovoid, *ca* 1 mm long.

Balaghat, Bastar, Bilaspur, Indore, Mandla, Rewa, Sidhi. *Fl. & Fr.*: Sept. Dec.

8. Digitaria ternata (A. Rich.) Stapf in Dyer, Fl. Cap. 7: 376. 1898; Henr., Monogr. Gen. Digitaria 737. 1950; Bor, Grass. Burm. Ceyl. Ind. Pak. 306. 1960. *Cynodon ternatus* A. Rich., Tent. Fl. Abyss. 2: 405. 1850. *Paspalum ternatum* Hook. *f.*, Fl. Brit. India 7: 17. 1896.

Annuals. Culms 10-40 cm tall, erect, leafy at base. Leaves 5-10 cm long, finely acuminate at apex; sheaths loose, glabrous; ligules membranous, truncate. Inflorescence usually of 2 racemes, subsessile; rhachis triquetrous, winged, scabrid. Spikelets in threes, elliptic, 2.2-2.5 mm long, acute, hairy. Lower glume absent; upper glume elliptic, 2-2.3 mm long, membranous, 3-nerved, covered with clavate hairs. Lower floret sterile. Upper floret bisexual. Lemma brownish black at maturity, elliptic, 2-2.2 mm long, cartilaginous. Palea tightly enclosed in lemma. Anthers 3, yellow, *ca* 0.5 mm long. Caryopsis deep pink, broadly ellipsoid, *ca* 2.5 mm long.

Rare. Damoh, Hoshangabad. *Fl. & Fr.*: Sept. Oct.

9. Digitaria violascens Link, Hort. Berol. 1: 229. 1827; Henr., Monogr. Gen. Digitaria 790. 1950; Bor, Grass. Burm. Ceyl. Ind. Pak. 307. 1960.

Annuals. Culms 20-60 cm tall, prostrate or decumbent, glabrous. Leaves linear-lanceolate, tapering to fine point, contracted at base, rough; sheaths loose, glabrous; ligules membranous, truncate. Inflorescence of subdigitate, false spikes or racemes; rhachis 0.8 mm wide, flat, midrib very prominent, wing definitely scabrid. Spikelets elliptic-oblong, 1.2-1.7 mm long, glabrescent to silky. Lower glume minute or absent; upper glume equal to spikelet, 5-7-nerved. Lower floret sterile. Upper floret bisexual, lanceolate, 0.8-1.5 mm long, acute, incurved on margins. Anthers 3, yellow, *ca* 0.5 mm long. Caryopsis purplish, ellipsoid, *ca* 1.2 mm long.

Bilaspur. *Fl. & Fr.*: Aug. Sept.

31. DIMERIA R. Br.

Annuals, densely tufted. Culms slender. Leaves narrow. Inflorescence of 1 or more racemes, all jointed to the main axis; rhachis usually winged (not in *D. velutina*), not jointed, bearing single spikelet on short pedicels in alternate rows; callus hairy. Glumes usually reddish, narrow, stiff, keeled, the upper much wider than the lower, subequal in length. Lower floret neuter. Lemma thin, translucent, shorter than the glumes. Upper floret bisexual. Lemma thin, translucent, cleft at apex, with an awn from the sinus, basal part of awn dark and rusted, apical part slender, pale, hardly twisted. Palea absent. Stamens 2. Caryopsis narrow, flat.

About 40 species; Mascarenes to Polynesia; one in M.P.

Dimeria ornithopoda Trin., Fund. Agrost. 167. t. 14. 1820; Hook. *f.*, Fl. Brit. India 7: 104. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 142. 1960.

Annuals. Culms 25-40 cm tall, slender. Leaves 10-13 cm long, basal portion with tubercle-based hairs; sheaths keeled, glabrous, hairy at throat; ligules ciliate. Inflorescence usually of 2 spikes; rhachis scabrid on margins. Spikelets solitary, linear, 1.5-2 mm long; callus hairy. Lower glume *ca* 1.5 mm long, coriaceous, keeled, 1-veined, ciliate on margins; upper glume lanceolate, equal to spikelet, papery, keeled, fimbriate. Lower lemma minute, linear, *ca* 1 mm long, acute, nerveless, glabrous; upper lemma fertile, oblong-acute, *ca* 1.5 mm long, 2-dentate with 9-10 mm long awn. Anthers 3, yellow, *ca* 0.6 mm long. Caryopsis cylindrical, *ca* 1.6 mm long.

Bastar, Bilaspur, Raigarh, Shivpuri, Sidhi, Surguja. *Fl. & Fr.*: Sept. Feb.

32. DINEBRA Jacq.

Annuals. Leaf blades linear, flat; ligules membranous, truncate, lacerate or ciliate. Inflorescence of several to many secund spikes, irregularly arranged along a central axis. Spikes varying from short, broad and crowded to linear and distant, caducous from the main rhachis at maturity or persistent but with the lower spikelets on each side often replaced by small, caducous branchlets. Spikelets 1 to several-flowered, wedge-shaped, laterally compressed, sessile, 2-seriate, closely overlapping, disarticulating between the florets. Glumes subequal, acuminate-aristate, much longer than the florets, strongly keeled, coriaceous or membranous. Lemmas thinly membranous, 3-nerved, pilose on the nerves, acute to 2-lobed at tip. Caryopsis elliptic-oblong, trigonous, shallowly concave on the hilar side.

Three species; tropical E. Africa to India; one in M.P.

Dinebra retroflexa (Vahl) Panz. in Denkschr. Acad. Wiss. Munchen 270. t. 12. 1814; Bor, Grass. Burm. Ceyl. Ind. Pak. 491. 1960. *Cynosurus retroflexa* Vahl, Symb. Bot. 2: 20. 1791. *Dinebra arabica* Jacq., Fragm. Bot. 77. t. 121. f. 1. 1809; Hook. *f.*, Fl. Brit. India 7: 297. 1896.

Annuals, tufted. Culms 20-60 cm tall, erect or ascending from base, glabrous. Leaves linear-lanceolate, glabrous or sparsely pilose; sheaths compressed, glabrous, with long hairs at mouth; ligules membranous. Inflorescence a raceme of several spikes, alternate, opposite or whorled, green, yellowish or purplish, 0.5-3 cm long, erect when young, deflexed with age; rhachis flat, scabrid. Spikelets closely imbricate, 4.5-5.5 mm long, 2-3-flowered. Lower glume 4.5-5 mm long, aristate; upper glume similar except a little longer. Lower lemma *ca* 2 mm long, pilose, 3-nerved. Anthers 3, yellow, *ca* 0.4 mm long. Caryopsis oblong, free in lemma and palea.

Bilaspur, Indore. *Fl. & Fr.*: Aug. Nov.

33. DIPLACHNE P. Beauv.

Perennials, aquatic or semiaquatic, rhizomatous. Leaf blades linear, often inrolled; ligules membranous. Inflorescence open, of several to

numerous racemes scattered along a central axis; racemes slender, straight or flexuous, secund. Spikelets several-flowered, narrow, acuminate, often rounded, 2-seriate, subsessile or shortly pedicellate, disarticulating between the florets. Glumes persistent, unequal, shorter than the lemmas, membranous, 1-nerved. Lemma rounded or flattened on the back, hairy or rarely almost glabrous, 2-dentate, mucronate or shortly awned, 3-nerved. Palea scabrid on the keels and appressed sericeous on the inturned margins. Caryopsis ellipsoid-oblong, plump or dorsoventrally flattened.

About 18 species; tropical and subtropical regions; one in M.P.

Diplachne fusca (L.) P. Beauv., Ess. Agrostogr. 80, 163. 1812; Hook. *f.*, Fl. Brit. India 7: 329. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 492. 1960. *Festuca fusca* L., Sp. Pl. ed. 2. 109. 1762.

Perennials, rhizomatous. Culms 50-80 cm tall, tufted. Leaves usually involute, glabrous; sheaths loose, glabrous; ligules 2-5 mm long, membranous. Inflorescence a 15-20 cm long panicle; rhachis fragile. Spikelets grey or olive green, elliptic, 6-10 mm long, 6-10-flowered. Lower glume lanceolate, *ca* 2 mm long, acute, scabrid, 1-nerved; upper glume oblong, *ca* 2.6 mm long, mucronate or shortly awned from sinus, 3-nerved. Anthers 3, yellow, *ca* 1 mm long. Caryopsis ovoid or oblong, *ca* 1.2 mm long, subtrigonous.

Usually on saline soil and in moist places. Damoh. *Fl. & Fr.*: Jan. April.

34. ECHINOCHLOA P. Beauv., *nom. cons.*

Annuals or perennials. Leaf blades linear, flat; ligules usually absent, if present then a line of hairs. Inflorescence of racemes arranged on a central axis; rhachis triquetrous, scabrid, often setose. Spikelets paired, rarely single or on short side branchlets and forming 2-4 rows, narrowly elliptic to subrotund, convex on the back, flat on the front, more or less hispid, cuspidate or awned, rarely obtuse and then the spikelet borne upon a short stipe. Lower glume ovate, about one third the length of the spikelet, typically acute to acuminate; upper glume as long as the spikelet, acute to acuminate, rarely with a short awn-point or obtuse. Lower floret male or barren, with or without a palea, its lemma resembling the upper glume but often awned. Upper lemma crustaceous, smooth and shining, acute (rarely obtuse), clasping only the margins of the palea. Upper palea acute, with

the tip reflexed and more or less protuberant between the lemma margins. Caryopsis broadly ellipsoid, dorsally flattened.

About 20 species; subtropical regions; 4 in M.P.

1a. Ligules present; spikelets long awned ...4. *E. stagnina*

1b. Ligules absent; spikelets not long awned (except *E. crusgalli*):

2a. Plants robust, branched from lower swollen nodes; midrib of leaves prominently white; spikelets densely crowded; lower glume *ca* 2.5 mm long; caryopsis not deciduous ...3. *E. frumentacea*

2b. Plants and midrib of leaves not as above; spikelets not crowded; lower glume less than 2 mm long; caryopsis deciduous:

3a. Spikes distantly arranged; spikelets 2.5-3 mm long; lower lemma acute, not produced into an awn ...1. *E. colonum*

3b. Spikes relatively crowded; spikelets 3-4 mm long (excluding awn); lower lemma usually produced into an awn ...2. *E. crusgalli*

1. Echinochloa colonum (L.) Link, Hort. Berol. 2: 209. 1833; Bor, Grass. Burm. Ceyl. Ind. Pak. 308. 1960. *Panicum colonum* L., Syst. Nat. ed. 10. 2: 870. 1759; Hook. *f.*, Fl. Brit. India 7: 32. 1896.

Annuals. Culms 15-50 cm tall, erect or decumbent. Leaves narrow, 5-15 cm long, scaberulous; sheaths compressed, glabrous; ligules absent. Inflorescence of several racemes along the main axis. Spikelets usually 2-nate, globose, 2.5-3 mm long, acute, hispid. Lower glume 1.5-1.7 mm long, acute, 5-nerved; upper glume 2.5-3 mm long, acute, 7-nerved. Lower lemma 2-2.5 mm long; upper lemma *ca* 1.8 mm long. Anthers 3, yellow, *ca* 0.6 mm long. Caryopsis dull white, ovoid, *ca* 1.25 mm long.

In moist places. Balaghat, Bastar, Bilaspur, Gwalior, Hoshangabad, Indore, Raigarh, Raipur, Rajnandgaon, Satna, Sidhi, Surguja. *Fl.* & *Fr.*: Aug. - April.

2. Echinochloa crusgalli (L.) P. Beauv., Ess. Agrostogr. 53, 161. 1812; Bor, Grass. Burm. Ceyl. Ind. Pak. 310. 1960. *Panicum crusgalli* L., Sp. Pl. 56. 1753; Hook. *f.*, Fl. Brit. India 7: 30. 1896.

Annuals. Culms 30-80 cm tall, usually erect, terete. Leaves soft, acuminate at apex, glabrous; sheaths compressed, glabrous; ligules absent. Inflorescence of racemes, solitary or 2-nate; rhachis triquetrous, glabrous, scabrid on margins. Spikelets paired, ovate to elliptic, 3-4 mm long, cuspidate or awned. Lower glume ovate-orbicular, *ca* 1.25 mm long, 5-nerved; upper glume equalling spikelets, 5-7-nerved, cuspidate. Lower lemma barren, membranous, awned or cuspidate; upper lemma fertile, yellowish white, ovate-elliptic, *ca* 2.5 mm long, polished. Anthers 3, yellow, oblong. Caryopsis ellipsoid, *ca* 2 mm long.

Common. Balaghat, Indore, Raigarh, Satna, Shivpuri. *Fl. & Fr.*: Aug. - Nov. and also during summer in paddy fields.

3. Echinochloa frumentacea (Roxb.) Link, Hort. Berol. 1: 204. 1827; Bor, Grass. Burm. Ceyl. Ind. Pak. 311. 1960. *Panicum frumentaceum* Roxb., Fl. Ind. (Carey & Wallich ed.) 1: 307. 1820, *non* Salisb., 1796. *P. crusgalli* L. var. *frumentaceum* Hook. *f.*, Fl. Brit. India 7: 31. 1896. *Sanwa.*

Annuals. Culms up to 1.5 m tall, very robust, branched from lower swollen nodes. Leaves 1-2 cm broad; midrib prominently white; sheaths loose, membranous, glabrous, longer than internodes; ligules absent. Inflorescence of racemes, 2-nate or 3-nate; rhachis angled, scabrid, villous in the axis or branches. Spikelets 3-4 mm long, cuspidate, turgid, awnless. Lower glume *ca* 2.5 mm long, apiculate, minutely hispid, 5-nerved; upper glume similar to spikelet, compressed, cuspidate, 5-7-nerved. Lower lemma barren; upper lemma fertile, elliptic, acute, minutely ciliolate, awnless. Anthers 3, yellow, *ca* 1.5 mm long. Caryopsis ellipsoid, 2-2.5 mm long.

Balaghat, Indore. *Fl. & Fr.*: Aug. - Nov.

4. Echinochloa stagnina (Retz.) P. Beauv., Ess. Agrostogr. 53, 161. 1812; Bor, Grass. Burm. Ceyl. Ind. Pak. 311. 1960. *Panicum stagnium* Retz., Observ. Bot. 5: 17. 1789. *P. crusgalli auct. non* L., 1753; Hook. *f.*, Fl. Brit. India 7: 30. 1896, *p.p.*

Annuals or perennials. Culms usually 50-100 cm tall, spongy, glabrous. Leaves rigid, glabrous, scabrid on margins; sheaths glabrous, ciliate at mouth; ligules hairy. Inflorescence of racemes, distantly appressed; rhachis hispid or scabrid. Spikelets paired, elliptic, 5-6 mm long, acuminate. Lower glume elliptic, 1.5-2.5 mm long, acute-cuspidate, membranous, pubescent, 5-nerved. Lower lemma male or barren, similar to upper glume, dorsally depressed, cuspidate or awned; upper lemma fertile, straw-coloured, 3.5-4 mm long, acuminate-mucronate, polished. Anthers 3, transluscent dotted, *ca* 2 mm long. Caryopsis yellowish white, broadly ellipsoid, *ca* 3 mm long.

Balaghat, Sidhi, Surguja. *Fl. & Fr.*: Sept. - Dec.

35. ELEUSINE Gaertn.

Annuals or perennials, tufted or tussocky, from a short ascending rhizome. Culms slender to robust, flattened. Leaf blades linear, usually folded; sheaths keeled; ligules membranous, truncate, often ciliate. Inflorescence digitate or shortly racemose, composed of a number of second spikes clustered at the top of the culm. Spikelets several-flowered, ovate to narrowly oblong, laterally compressed, 2-seriate, usually closely overlapping, disarticulating between the florets. Glumes shorter than the lemmas, persistent, 1 to several-nerved, keeled. Lemma elliptic to oblong, membranous, glabrous, keeled, 3-nerved, sometimes with additional nerves on either side of the keel, the lateral nerves shorter than the lemma, the tip entire, obtuse to acute. Caryopsis enclosed within a free hyaline pericarp, blackish (except in *E. coracana*), the surface ornamental, usually obtusely trigonous.

About 9 species; tropical and subtropical regions; 2 in M.P.

1a. Leaves not folded; spikes stout, incurved; caryopsis globose ...1. *E. coracana*

1b. Leaves usually folded; spikes slender, straight; caryopsis oblong ...2. *E. indica*

1. Eleusine coracana (L.) Gaertn., Fruct. Sem. Pl. 1: 8. t. 1. 1788; Hook. *f.*, Fl. Brit. India 7: 294. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 492. 1960. *Cynosurus coracanus* L., Syst. Nat. ed. 10. 2: 875. 1759. - *Mandua*.

Annuals. Culms 30-75 cm tall, erect, tufted, stout, 2-3-noded. Leaves flat, usually overtopping the culms; sheaths loose, compressed; ligules hairy. Inflorescence of 4-7 spikes; rhachis stout, flattened or subtrigonous, scabrid, pubescent at base. Spikelets 3-5-flowered, laterally compressed. Lower glume lanceolate, 1-nerved; upper glume similar to lower, 3-7-nerved. Lower lemma lanceolate, 4-5 mm long. Palea 2/3 of lemma; keels winged. Anthers 3, yellow, 1-5 mm long. Caryopsis dark brown, globose, *ca* 1 mm long.

Cultivated. East Nimar. *Fl. & Fr.*: Aug. Oct.

2. Eleusine indica (L.) Gaertn., Fruct. Sem. Pl. 1: 8. 1788; Hook. *f.*, Fl. Brit. India 7: 293. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 493. 1960. *Cynosurus indicus* L., Sp. Pl. 72. 1753.

Annuals. Culms 30-70 cm tall, loosely tufted, glabrous. Leaves deep green, usually folded; sheaths compressed, glabrous; ligules membranous. Inflorescence of 4-8 subdigitate spikes, pubescent at base. Spikelets 2-seriate, elliptic, serrulate on top. Lower glume 1.5-2.5 mm long, acute, 1-nerved; upper glume 2-4 mm long, keeled and folded, scabrid. Lemma 2.5-4 mm long, acute. Anthers 3, yellow, *ca* 0.5 mm long. Caryopsis dark brown, oblong, *ca* 1.2 mm long, rugose, pointed at ends.

Balaghat, Bilaspur, Hoshangabad, Indore, Raigarh, Raipur, Satna, Sidhi. *Fl. & Fr.*: Aug. Nov.

36. ELYONURUS Humb. & Bonpl. *ex* Willd.

Annuals or perennials, caespitose, aromatic. Culms moderately tall. Leaf blades narrow, flat or involute; ligules membranous, short. Inflorescence a cylindrical, spike like raceme with disarticulation in the rhachis. Spikelets paired, awnless, the pedicellate spikelets staminate, similar in size and appearance to the perfect sessile ones. Lower glume of the perfect spikelet firm and moderately coriaceous; upper glume thinner. Lemmas of the sterile and fertile florets thin and hyaline. Paleas absent. Grain oblong, dorsally compressed; embryo about half the length of the grain.

About 15 species; tropical and subtropical regions; one in M.P.

Elyonurus royleanus Nees *ex* A. Rich., Tent. Fl. Abyss. 2: 471. 1850; Hook. *f.*, Fl. Brit. India 7: 161. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 145. 1960.

Annuals. Culms 10-25 cm tall, tufted, decumbent, branched; nodes glabrous. Leaves linear, involute, acute at apex, glabrous or sparsely hairy; sheaths compressed, bearded at mouth; ligules lacerate. Inflorescence of solitary raceme, often tinged with purple, partly enclosed in a flattened sheath; joints 2-2.5 cm long, densely bearded at apex. Sessile spikelets linear, *ca* 12 mm long, awned. Lower glume linear-lanceolate, 11-12 mm long, beaked at apex, coriaceous, 7-9-nerved, 2-keeled; keels hairy; beak *ca* 6 mm long, 2-fid, violet-coloured; margins below the beak with violet tubercles having a pencil of white-glistening hairs; upper glume cymbiform, 5-5.5 mm long, acuminate to aristate, membranous, 1-nerved. Lower lemma empty. Palea absent. Upper lemma bisexual, obovate or lanceolate, 2.5-3 mm long, 1-nerved. Palea absent. Anthers 3, 1-1.5 mm long. Caryopsis *ca* 3 mm long.

Rare. Gwalior. *Fl. & Fr.*: Aut. - Nov.

37. ELYTROPHORUS P. Beauv.

Annuals, erect, glabrous. Leaves very narrow, flat. Inflorescence of globose clusters of minute, sessile spikelets, crowded together in long, continuous or interrupted, catkin like spikes (rarely on the short spike like branches of a very contracted raceme). Spikelets short (many imperfect or reduced to empty glumes), strongly laterally compressed, not articulate at the base, 4-6-flowered; rhachilla very short, articulate at the base and between the flowering glumes. Glumes subequal, lanceolate, aristately acuminate, hyaline, glabrous or ciliate, 1-nerved, keeled. Lemma longer, 3-nerved, awned, ciliate on margins. Palea shorter, very broad, truncately 3-lobed; lobes ciliate; keels winged, smooth. Lodicules 2, obliquely oblong. Anthers 3, minute. Grains minute, fusiform or narrowly oblong; pericarp loose at both ends.

Two species; tropical regions of Old World; one in M.P.

Elytrophorus spicatus (Willd.) A. Camus in Lecomte, Fl. Gen. Indo-Chine 7: 547. 1923; Bor, Grass. Burm. Ceyl. Ind. Pak. 493. 1960. *Dactylis spicata* Willd. in Ges. Naturf. Fr. N. Schr. 3: 416. 1801. *Elytrophorus*

articulatus P. Beauv., Ess. Agrostogr. 67. t. 14. f. 2. 1812; Hook. *f.*, Fl. Brit. India 7: 306. 1896.

Annuals. Culms 10-35 cm tall, erect or decumbent, tufted, slender; nodes glabrous. Leaves mostly basal, linear, acute at apex, glabrous; sheaths compressed, glabrous; ligules membranous, truncate. Inflorescence of false spikes, narrow, cylindrical, interrupted towards base, green or straw-coloured. Spikelets sessile, laterally compressed, 2-4 mm long, awned. Glumes subequal, 2-3 mm long, shortly appressed hairy, 1-nerved; keels scaberulous; awns short. Lemma lanceolate, 2.5-3 mm long, acute, ciliolate on margins, 3-keeled; awn *ca* 1 mm long. Palea 1-1.5 mm long, broadly winged, lacerate at apex, 2-keeled. Anthers 3, yellow, 0.2-0.3 mm long. Caryopsis reddish, ellipsoid, small.

Bastar, Bilaspur, Durg, Gwalior, Raigarh, Raipur, Rewa, Surguja. *Fl.* & *Fr.*: Sept. Feb.

38. ENNEAPOGON Desv. *ex* P. Beauv.

Perennials or sometimes annuals. Culms tufted, wiry. Leaf blades linear, flat or involute, sparsely to densely hairy; hairs usually glandular. Inflorescence a terminal panicle, usually contracted or spiciform, rarely open. Spikelets 3-6-flowered, the lowest 1-3 bisexual (African and Asian species 3 rarely 4-5-flowered, the lowest bisexual, the second usually male, the upper 1 or 2 represented only by a lemma and often reduced to a brush like appendage). Glumes lanceolate, membranous, sparsely hairy on the outer surface; upper glume slightly longer than the lower one and almost as long as the spikelet. Lemmas broad, chartaceous, outer surface sparsely hairy all over or the upper half almost glabrous or the lower half with dense silky hairs, 9-awned; awns forming continuations of some of the nerves, 3-5 times as long as the lemma, ciliate for much of their length and usually scaberulous at the tip sometimes throughout. Palea hyaline, oblong, slightly longer than the lemma, 2-keeled, often ciliate along the keels. Stamens 3. Caryopsis ovoid or cylindrical.

About 30 species; subtropical regions; 2 in M.P.

1a. Basal leaves filiform; panicles steel grey; awns straight, not bristly ...1. *E. brachystachyus*

1b. Basal leaves not filiform; panicles with purplish tinge; awns curved at maturity, bristly ...2. *E. schimperanus*

1. Enneapogon brachystachyus (Jaub. & Spach) Stapf in Dyer, Fl. Cap. 7: 654. 1900; Bor, Grass. Burm. Ceyl. Ind. Pak. 608. 1960. *Pappophorum brachystachyum* Jaub. & Spach in Ann. Sci. Nat. Bot. ser. 3, 14: 365. 1850 & in Ill. Pl. Orient. 4: 34. t. 324. 1851; Hook. *f.*, Fl. Brit. India 7: 302. 1896.

Perennials. Culms 15-40 cm tall, tufted, filiform; nodes hairy. Leaves linear, filiform, convolute; sheaths pubescent; ligule a short rim of hairs. Inflorescence a compact, steel grey panicle. Spikelets 2-3-flowered, *ca* 5 mm long with awns. Lower glume *ca* 2.2 mm long, ciliate on margins and keels, 3-4-nerved; upper glume ovate-lanceolate, *ca* 3.2 mm long, softly pubescent outside, hyaline on margins. Lemma *ca* 1.5 mm long, densely villous near base, all awns almost equal, shortly ciliate, not bristly, straight. Palea *ca* 1.5 mm long, shortly ciliate on the keels. Caryopsis reddish brown, *ca* 1.5 mm long.

Rare (without locality). *Fl. & Fr.*: Aug. Dec.

2. Enneapogon schimperanus (Hochst. *ex* A. Rich.) Renvoize in Kew Bull. 22: 400. 1968. *Pappophorum schimperanum* Hochst. *ex* A. Rich., Tent. Fl. Abyss. 2: 403. 1854. *Enneapogon elegans* (Nees *ex* Steud.) Stapf in Kew Bull. 1907: 224. 1907; Bor, Grass. Burm. Ceyl. Ind. Pak. 610. 1960. *Pappophorum elegans* Nees *ex* Steud., Syn. Pl. Glumac. 1: 199. 1854; Hook. *f.*, Fl. Brit. India 7: 301. 1896.

Perennials. Culms 5-20 cm tall, erect, slender, often thickened at base; nodes tomentose. Leaves narrowly linear, convolute, rigid, softly pubescent; sheaths pubescent with long hairs; ligule a ring of long hairs. Inflorescence a compact, 3-7 cm long panicle, with purplish tinge; rhachis villous. Spikelets *ca* 6 mm long with awns, shortly pedicellate. Lower glume ovate or lanceolate, *ca* 3.5 mm long, pubescent, 9-nerved; upper glume *ca* 5 mm long, 7-nerved. Lemma orbicular below, *ca* 1.5 mm long, 9-nerved, plumose in the lower half. Palea keels pubescent. Caryopsis brownish, cylindrical, *ca* 1.5 mm long.

Rare. Confined to dry hills (without locality). *Fl. & Fr.*: Aug. - Dec.

39. ERAGROSTIELLA Bor

Perennials, densely tufted, slender. Culms erect, unbranched. Leaf blades mainly basal, usually filiform; ligule a narrow ciliate membrane.

Inflorescence a solitary, terminal, subsecund spike of 2-seriate, imbricate spikelets. Spikelets many-flowered, with tightly imbricate florets, narrow, often linear-oblong, laterally compressed, the lemmas disarticulating irregularly at maturity leaving the paleas on the rhachilla, sometimes also the rhachilla breaking and the upper part of the spikelet falling away. Glumes unequal, cartilaginous, shorter than the lemmas; lower glume 1-nerved; upper glume 1-3-nerved. Lemma lanceolate to ovate in profile, 3/4 as long as the glume, acute to emarginate, cartilaginous, glabrous, keeled, 3-nerved with lateral nerves. Palea narrowly to broadly winged on the keels, smooth or ciliolate along the wing margins. Caryopsis light brown, small, plump.

About 5 species; Sri Lanka to Australia; 4 in M.P.

1a. Basal leaves very long, rolled or folded, reaching to the base of the inflorescence:

2a. Keels of the palea broadly winged; wings smooth ...3. *E. leioptera*

2b. Keels of the palea narrowly winged; wings ciliate ...4. *E. nardoides*

1b. Basal leaves much shorter, never reaching the base of inflorescence:

3a. Leaves almost filiform; keels of the palea broadly winged; wings ciliate ...1. *E. bifaria*

3b. Leaves broader, not filiform; keels of the palea not broadly winged; wings smooth ...2. *E. brachyphylla*

1. Eragrostiella bifaria (Vahl) Bor in Ind. For. 66: 270. 1940 & Grass. Burm. Ceyl. Ind. Pak. 494. 1960. *Poa bifaria* Vahl, Symb. Bot. 2: 19. 1791. *Eragrostis bifaria* (Vahl) Wight *ex* Steud., Syn. Pl. Glumac. 1: 264. 1854; Stapf in Hook. *f.*, Fl. Brit. India 7: 325. 1896. *E. coromandeliana* (Koen. *ex* Rottl.) Trin. in Mem. Acad. Sci. Pétersb. 6, 1: 415. 1830; Stapf in Hook. *f.*, Fl. Brit. India 7: 326. 1896. *Poa coromandeliana* Koen. *ex* Rottl. in Ges. Natur. Fr. N. Schr. 4: 191. 1803.

Perennials. Culms 20-50 cm tall, with remains of old leaves at base. Leaves filiform, convolute; sheaths glabrous, hard; ligules membranous, truncate. Inflorescence a 8-20 cm long raceme. Spikelets overlapping by

half of their length, linear-elliptic, 6-20 mm long. Lower glume lanceolate, *ca* 1.7 mm long; upper glume narrowly ovate, *ca* 1.8 mm long. Lemma ovate, *ca* 2 mm long, acute. Palea winged along the keels, ciliolate on margins. Anthers 3, yellow, *ca* 0.3 mm long. Caryopsis pale brownish, broadly ovate, *ca* 0.5 mm long.

On rocky slopes. Balaghat, Shivpuri, Sidhi. *Fl. & Fr.*: Aug. Oct.

2. Eragrostiella brachyphylla (Stapf) Bor in Ind. For. 66: 270. 1940 & Grass. Burm. Ceyl. Ind. Pak. 494. 1960. *Eragrostis brachyphylla* Stapf in Hook. *f.*, Fl. Brit. India 7: 327. 1896.

Perennials. Culms 25-45 cm tall, erect. Leaves nearly radical, 7-20 cm long; sheaths terete, glabrous; ligules *ca* 1.5 mm long, hairy. Inflorescence a raceme, 7-20 cm long, compressed. Spikelets 2-seriate, linear or oblong, 6-18 mm long, secund. Lower glume *ca* 2 mm long, acute, keeled; upper glume similar to lower. Lemma 2-2.5 mm long, 3-nerved. Palea obovate, 2-2.5 mm long, concave; keels scabrid. Anthers 3, yellow, *ca* 0.8 mm long. Caryopsis ellipsoid, trigonous, *ca* 1 mm long.

Bilaspur, Damoh, Hoshangabad, Indore, Rewa, Shivpuri. *Fl. & Fr.*: Aug. Dec.

3. Eragrostiella leioptera (Stapf) Bor in Ind. For. 66: 270. 1940 & Grass. Burm. Ceyl. Ind. Pak. 495. 1960. *Eragrostis leioptera* Stapf in Hook. *f.*, Fl. Brit. India 7: 325. 1896.

Perennials. Culms 30-60 cm tall, erect, tufted. Leaves terete, long, glabrous; sheaths short, slightly compressed, glabrous, with a few hairs at mouth; ligule a very narrow rim of hairs. Inflorescence 15-25 cm long, slender racemes with secund, distichous and distantly placed spikelets; rhachis angular, smooth. Spikelets 8-12 mm long, subsessile, compressed, 10-20-flowered. Glumes subequal, *ca* 1.75 mm long; lower glume distinctly keeled; upper glume dorsally rounded. Lemma broadly ovate, *ca* 2.5 mm long, obtuse or subacute. Palea equalling the lemma, 2-keeled; keels winged, smooth, hyaline. Anthers 3, *ca* 1.5 mm long. Caryopsis brown, narrowly ellipsoid, *ca* 1 mm long.

Rare. Surguja. *Fl. & Fr.*: Sept. Nov.

4. Eragrostiella nardoides (Trin.) Bor in Ind. For. 6: 270. 1940 & Grass. Burm. Ceyl. Ind. Pak. 495. 1960. *Eragrostis nardoides* Trin. in Mem. Acad. Sci. Pétersb. ser. 6, 1: 415. 1831; Stapf in Hook. *f.*, Fl. Brit. India 7: 326. 1896. **Fig. 55.**

Perennials. Culms 30-50 cm tall, erect, densely tufted. Leaves as long as the stem, convolute, sparsely hairy on lower portion; sheaths glabrous, slightly compressed, without hairs at mouth; ligule a minute membrane. Inflorescence 15-20 cm long, slender, subflexuous; rhachis terete, smooth. Spikelets oblong to linear, 5-10 mm long, 20-30-flowered, relatively close-set than *E. leioptera*. Glumes subequal, ovate, 1.5-1.75 mm long, subacute; nerves faint. Palea equal to lemma; wings shortly ciliate. Anthers 3, yellow, *ca* 0.8 mm long. Caryopsis brown, subovoid or subglobose, *ca* 0.5 mm long; embryo end pointed.

Balaghat, Rajnandgaon, Surguja. *Fl. & Fr.*: Aug. Oct.

40. ERAGROSTIS Wolf

Annuals or perennials, often glandular particularly on leaf sheaths and inflorescence. Leaf blades linear; ligule usually reduced to a ciliate rim, rarely membranous. Inflorescence an open, contracted or spike like panicle; branches sometimes racemose but at least the longer with short, side branchlets (except *E. flavicans*), rarely ending in a slender bristle. Spikelets laterally compressed, variously disarticulating, awnless (except *E. aristiglumis*). Glumes mostly subequal, shorter than the lowest lemma, 1-nerved. Lemmas acuminate to emarginate, rarely mucronulate, mostly glabrous, 3-nerved. Palea little shorter than the lemma, caducous or persistent; keels sometimes long ciliate, rarely winged. Anthers 2-3. Caryopsis usually globose to ellipsoid, smooth or finely striate to finely reticulate; pericarp adherent (sometimes slightly loose but not free).

About 250 species; temperate and tropical regions; 24 in M.P.

1a. Spikelets not breaking up at maturity ...18. *E. tef*

1b. Spikelets breaking up at maturity:

2a. Spikelets breaking up from above downwards; rhachis fragile:

3a. Lemmas ciliate on the margins:

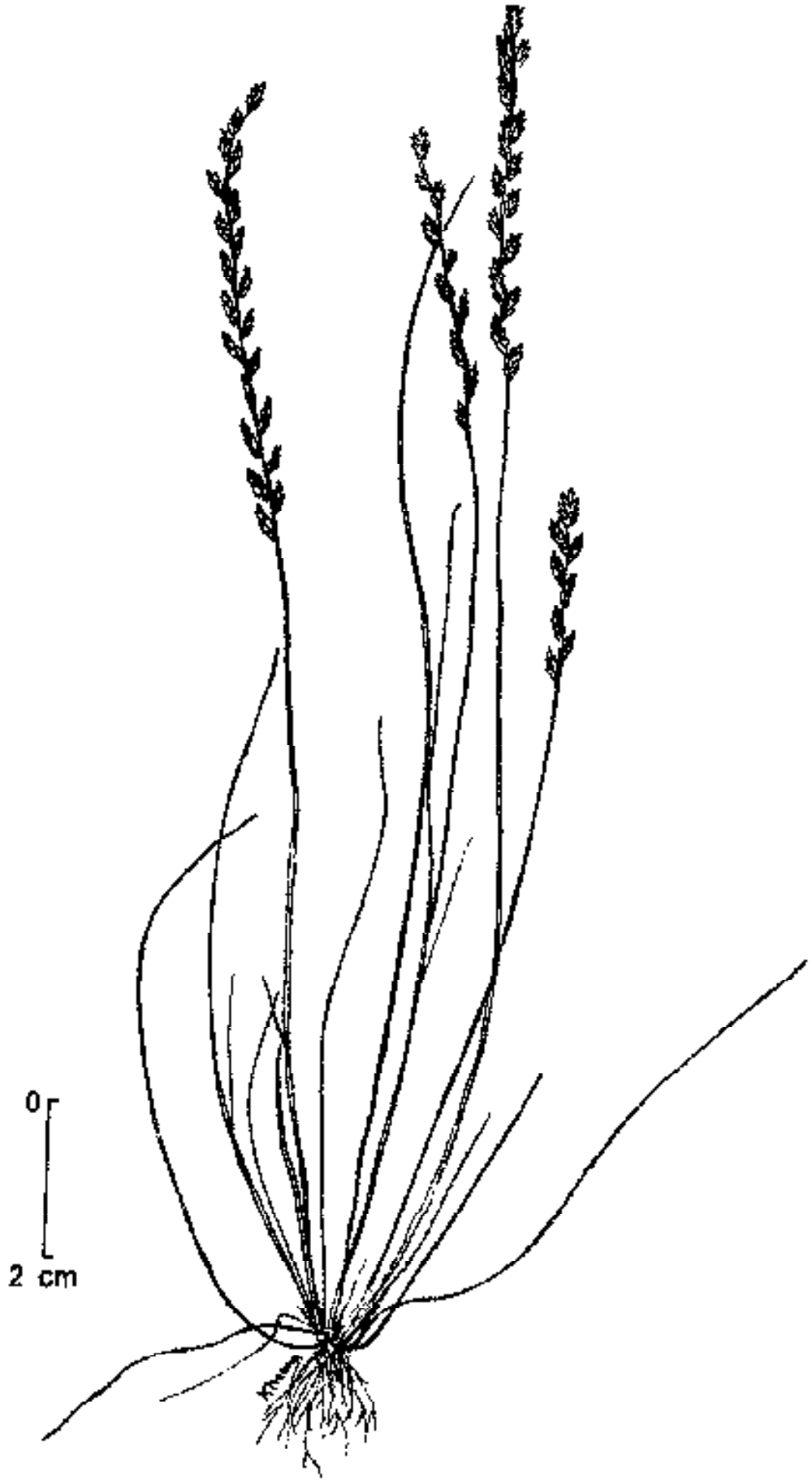

Fig. 55. Eragrostiella nardoides (Trin.) Bor

4a. Panicles cylindrical; lemmas acuminate, 2-2.5 mm long ...5. *E. ciliata*

4b. Panicles subspiciform, lobed; lemmas obtuse, *ca* 1.5 mm long ...6. *E. coarctata*

3b. Lemmas not ciliate on the margins:

5a. Keels of palea ciliate:

6a. Panicles compact and dense (little effuse in *E. ciliaris*):

7a. Annuals; palea hairs longer than the width of floret and glands of hair base conspicuous; anthers 2 ...4. *E. ciliaris*

7b. Perennials; palea hairs shorter than the width of floret and glands of hair base inconspicuous; anthers 3 ...17. *E. riparia*

6b. Panicles effuse:

8a. Inflorescence sticky due to glands on branchlets and glumes ...23. *E. viscosa*

8b. Inflorescence not sticky and without glands on branchlets and glumes ...19. *E. tenella*

5b. Keels of palea scabrid or smooth, not ciliate:

9a. Panicles thyrsiform, bearing numerous capillary branches; lemmas 1-1.5 mm long, markedly truncate ...1. *E. aspera*

9b. Panicles oblong or linear, branches not capillary; lemmas *ca* 1 mm long, obtuse:

10a. Culms stout; inflorescence branches 5-12 cm long; caryopsis 0.3-0.5 mm long ...12. *E. namaquensis* var. *diplachnoides*

10b. Culms slender; inflorescence branches less than 5 cm long; caryopsis 0.5-0.7 mm long:

11a. Branches of the panicle almost whorled; spikelets loose, scattered, few-flowered; caryopsis ellipsoid, *ca* 1.7 mm long ...10. *E. japonica*

11b. Branches of the panicle mostly solitary; spikelets densely clustered, 6-10-flowered; caryopsis ovoid, *ca* 0.5 mm long ...8. *E. diarrhena*

2b. Spikelets breaking up from below upwards; rhachis tough:

12a. Plants glandular:

13a. Lower branches of panicle fascicled or subwhorled, with glandular bands below culm nodes ...15. *E. pilosa*

13b. Lower branches of panicle not whorled; glandular bands below the culm nodes absent:

14a. Fresh plants without any specific odour; pedicels of spikelets with crateriform glands; spikelets 1.5-2 mm broad; anthers 2 ...16. *E. poaeoides*

14b. Fresh plant with specific odour; pedicels of spikelets without crateriform glands; spikelets 2-4 mm broad; anthers 3 ...3. *E. cilianensis*

12b. Plants eglandular:

15a. Spikelets ovate to oblong, 2-3.5 mm broad ...22. *E. unioloides*

15b. Spikelets linear, up to 2 mm broad:

16a. Lemma up to 1.5 mm long, with overlapping margins or tips:

17a. Anthers 2:

18a. Culms 40-75 cm tall; spikelets more than 10-flowered; lemma acute or subobtuse ...9. *E. gangetica*

18b. Culms up to 20 cm tall; spikelets 6-8-flowered; lemma very acute ...11. *E. multicaulis*

17b. Anthers 3 ...13. *E. nutans*

16b. Lemma more than 1.5 mm long, margins not overlapping:

19a. Anthers 2:

20a. Spikelets versatile; pedicels more than 5 mm long; lemmas broadly ovate ...21. *E. tremula*

20b. Spikelets not versatile; pedicels less than 2 mm long; lemmas narrow, elliptic or lanceolate ...14. *E. pappiana*

19b. Anthers 3:

21a. Pedicel of the spikelet with a glandular band; caryopsis compressed, dorsally grooved ...20. *E. tenuifolia*

21b. Pedicels of the spikelets devoid of glands; caryopsis neither compressed nor grooved:

22a. Lateral nerves of lemma very prominent; caryopsis cylindrical, *ca* 0.5 mm long ...2. *E. atrovirens*

22b. Lateral nerves of lemma not prominent; caryopsis ellipsoid to subglobose or ovoid-subglobose, 0.6-1 mm long:

23a. Leaves flat or convolute; spikelets fascicled in groups, dark brown or reddish ...24. *E. zeylanica*

23b. Leaves filiform; spikelets in effuse panicle, slaty green ...7. *E. curvula*

1. **Eragrostis aspera** (Jacq.) Nees, Fl. Afr. Austral. Ill. 408. 1841; Stapf in Hook. *f.*, Fl. Brit. India 7: 314. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 501. 1960. *Poa aspera* Jacq., Hort. Bot. Vindob. 3: 32. 1776. *P. paniculata* Roxb., Fl. Ind. (Carey & Wallich ed.) 1: 341. 1820.

Annuals, tufted. Culms 20-80 cm tall. Leaves up to 30 cm long; sheaths glabrous, with long hairs at throat; ligules ciliate. Inflorescence a panicle, loose, ovate-elliptic, 15-30 cm long. Spikelets often purple, 3-10 x 1-1.5 mm; pedicels long, fine; rhachilla fragile. Lemma 1-1.5 mm long, markedly truncate. Palea keels scabrid. Anthers 3, pinkish yellow, 0.2-0.3 mm long. Caryopsis subglobose, *ca* 0.5 mm long.

Rare. Damoh. *Fl. & Fr.*: Aug. Oct.

2. Eragrostis atrovirens (Desf.) Trin. *ex* Steud., Nomencl. Bot. ed. 2. 1: 562. 1840; Bor, Grass. Burm. Ceyl. Ind. Pak. 503. 1960. *Poa atrovirens* Desf., Fl. Atlant. 1: 73. 1798.

Perennials, with woody base. Culms 50-80 cm tall, erect. Leaves narrow, linear, 10-20 cm long, acute at apex; sheaths striate, smooth; ligules membranous, truncate. Inflorescence a branching panicle, ovate or oblong, 5-20 cm long. Spikelets grey or purplish, 5-10 mm long, 6-12-flowered, glaucous; pedicels 1-3 mm long. Lower glume lanceolate, *ca* 1.4 mm long, acute, 1-nerved; upper glume cymbiform, lanceolate-acute, *ca* 1.8 mm long, 1-nerved. Lemma 1.4-2 mm long, acute, 3-nerved, scabrid along mid nerve. Palea narrowly ovate, equalling lemma; keels scabrid. Anthers 3, brownish yellow, sometimes purple, 0.6-1 mm long. Caryopsis reddish brown, cylindrical, *ca* 0.5 mm long.

Bilaspur, Gwalior, Hoshangabad, Jabalpur, Raigarh, Rewa, Sagar, Shivpuri, Sidhi. *Fl. & Fr.*: Aug. - Nov. but in moist places throughout the year.

3. Eragrostis cilianensis (All.) Vignolo-Lutati in Malpighia 18: 386. 1904; Bor, Grass. Burm. Ceyl. Ind. Pak. 503. 1960. *Poa cilianensis* All., Fl. Pedem. 2: 246. t. 91. f. 2. 1785. *Eragrostis major* Host, Icon. Descr. Gram. Austriac. 4: 14. t. 24. 1809; Stapf in Hook. *f.*, Fl. Brit. India 7: 320. 1896.

Annuals. Culm 10-50 cm tall, with disagreeable odour in living plant, all glands pitted. Leaves 2-7 mm wide; sheaths pilose at throat; ligule a ring of hairs. Inflorescence a condensed panicle, with glands on pedicels and branches. Spikelets 5-15 x 2-4 mm. Lemma 2-2.8 mm long, glandular on keels. Palea persistent, scabrid. Anthers 3, yellowish brown, 0.3-0.5 mm long. Caryopsis reddish brown, globose, 0.5 mm across, rugose.

Throughout the state. *Fl. & Fr.*: During and just after rainy season.

4. Eragrostis ciliaris (L.) R. Br. in Tuckey, Narr. Exp. Congo, App. 478. 1818; Stapf in Hook. *f.*, Fl. Brit. India 7: 314. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 506. 1960. *Poa ciliaris* L., Syst. Nat. ed. 10. 2: 875. 1759.

Annuals. Culms *ca* 35 cm tall, erect. Leaves up to 12 cm long; sheaths glabrous; ligules ciliate, with long hairs at the throat of sheath. Inflorescence a spike like panicle, appears woolly due to the long cilia on the keel of paleas. Spikelets clustered, 2-4.5 mm long; rhachilla fragile. Lemma 1-1.5 mm long, obtuse; mid nerve slightly excurrent. Palea keels tuberculate, ciliate; hairs exceeding the width of the floret. Anthers 2, light pink, *ca* 0.2 mm long. Caryopsis ovate or ellipsoid, 0.3-0.5 mm long.

Common. Throughout the state. *Fl. & Fr.*: Aug. Oct.

5. Eragrostis ciliata (Roxb.) Nees, Agrost. Bras. 512. 1829; Stapf in Hook. *f.*, Fl. Brit. India 7: 313. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 506. 1960. *Poa ciliata* Roxb., Fl. Ind. (Carey & Wallich ed.) 1: 336. 1820.

Perennials. Culms 50-100 cm tall, noded at base. Leaves linear or lanceolate, acuminate at apex, glabrous; sheaths hard, bearded at mouth; ligules hairy. Inflorescence a cylindrical, compact panicle; branches hirsute. Spikelets compressed, 2-3 mm long, 6-12-flowered. Lemma 2-2.5 mm long; nerves prominent. Palea keels long ciliate. Anthers *ca* 1.5 mm long. Caryopsis ovoid to ellipsoid, terete, 0.5-0.7 mm long.

Bastar, Gwalior, Raigarh. *Fl. & Fr.*: Nov. - Feb.

6. Eragrostis coarctata Stapf in Hook. *f.*, Fl. Brit. India 7: 313. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 507. 1960.

Perennials. Culms 5-40 cm tall. Leaves linear, convolute, acuminate at apex, glabrous, glaucous; sheaths tight, bearded at mouth; ligules very short. Inflorescence a panicle, subspiciform, lobed or lax, 5-14 x 1-1.5 cm; branches hispid. Spikelets slightly compressed, 2-3 mm long, 5-12-flowered. Lemma *ca* 1.5 mm long, obtuse, membranous; nerves prominent. Palea keels ciliate. Anthers 1-1.2 mm long. Caryopsis ovoid, *ca* 1 mm long.

Bastar, Bilaspur, Raigarh, Raipur, Sidhi. *Fl. & Fr.*: During and just after rainy season.

Notes : There is form variation in this species as Stapf (*l.c.*) has mentioned that the dwarf ones are 5-7 cm tall and the tall ones 60-90 cm tall. Leaves 1-1.5 cm broad and panicle 15 cm long.

7. Eragrostis curvula (Schrad.) Nees, Fl. Afr. Austral. Ill. 397. 1841; Bor, Grass. Burm. Ceyl. Ind. Pak. 507. 1960. *Poa curvula* Schrad. in Goett. Gel. Anz. Ges. Wiss. 3: 2073. 1821.

Perennials. Culms 0.3-1.2 m tall, erect, densely tufted. Leaves narrow, up to 30 cm long; basal leaf sheaths striate, keeled, hairy below. Panicles variable, contracted to open spreading; lower branches whorled and hairy in the axils. Spikelets slaty green, linear, 8-10 mm long; rhachilla fragile. Lemma broadly elliptic, 1.5-2.5 mm long, obtuse-subacute. Palea smooth to scabrid on keel, persistent. Anthers 3, yellowish, 0.7-1 mm long. Caryopsis ellipsoid to subglobose, 0.6-0.8 mm long.

Introduced. *Fl. & Fr.*: Feb. - April.

Notes : This is a polymorphic species with variable chromosome numbers (2n = 20, 42, 63, 80). The integrating forms have been recorded. A detailed biosystematic study is required to evaluate this complex.

8. Eragrostis diarrhena (Schult.) Steud., Syn. Pl. Glumac. 1: 266. 1854; Bor, Grass. Burm. Ceyl. Ind. Pak. 507. 1960. *Poa diarrhena* Schult., Syst. Veg. 2, Mant. 616. 1927. *Eragrostis interrupta auct. non* (R. Br.) P. Beauv., 1812: Stapf in Hook. *f.*, Fl. Brit. India 7: 316. 1896, *incl.* var. *koenigii* Stapf in Hook. *f.*, Fl. Brit. India 7: 316. 1896.

Perennials. Culms 50-100 cm tall, thick. Leaf size very variable; sheaths glabrous; ligules membranous. Inflorescence a panicle, either contracted with appressed branches or interrupted branches, mostly solitary. Spikelets minute, clustered, 6-10-flowered. Lemma *ca* 1 mm long, obtuse. Palea keels scaberulous. Anthers 2, yellowish brown, *ca* 0.3 mm long. Caryopsis reddish brown, ovoid, polished, *ca* 0.5 mm long; embryo end pointed.

Gwalior, Hoshangabad, Indore, Mandla, Rewa, Sagar, Sidhi. *Fl. & Fr.*: Sept. - Jan.

Notes : Usually found on damp soil, near water logged places, around large perennial tanks, moist river beds and rock crevices during rains. Plants

collected from dry places during off seasons or overgrazed areas are relatively much smaller. Generally this is a tall grass confined to good soil and moist places.

9. Eragrostis gangetica (Roxb.) Steud., Syn. Pl. Glumac. 1: 266. 1854; Bor, Grass. Burm. Ceyl. Ind. Pak. 508. 1960. *Poa gangetica* Roxb., Fl. Ind. (Carey & Wallich ed.) 1: 341. 1820. *Eragrostis stenophylla* Hochst. *ex* Miq. in Verh. Konink.-Ned. Inst. 3, 4: 39. 1851, *p.p.*; Stapf in Hook. *f.*, Fl. Brit. India 7: 318. 1896.

Annuals or perennials. Culms 40-75 cm tall. Leaves linear, flat or inrolled, 10-22 cm long, acute at apex; sheaths glabrous; ligules membranous, truncate. Inflorescence a terminal, branched panicle; lower branches not whorled, usually solitary. Spikelets linear, 4-10 x 1-1.5 mm. Glumes lanceolate, about half of lemma, 1-nerved, scabrid on back. Lemma 1-1.5 mm long, acute to subobtuse. Palea scabrid on keel. Anthers 2, dark pink appearing blackish, *ca* 0.3 mm long. Caryopsis subglobose, 0.4-0.6 mm long.

Bilaspur, Hoshangabad, Jabalpur, Raigarh, Sagar, Seoni, Shivpuri, Sidhi, Tikamgarh. *Fl. & Fr.*: Sept. Nov.

Notes : Narrow panicle, few branches, greyish spikelets and persistent paleas after the falling of lemmas and caryopsis distinguish this species from others.

10. Eragrostis japonica (Thunb.) Trin. in Mem. Acad. Sci. Pétersb. ser. 6, 1: 405. 1831; Bor, Grass. Burm. Ceyl. Ind. Pak. 509. 1960. *Poa japonica* Thunb., Fl. Jap. 51. 1784. *Eragrostis interrupta* var. *tenuissima* Stapf in Hook. *f.*, Fl. Brit. India 7: 316. 1896.

Perennials. Culms 15-80 cm tall. Leaves flat, linear; sheaths glabrous; ligules membranous. Inflorescence a contracted panicle; branches whorled. Spikelets loose, scattered, few-flowered (usually less than 8 flowers). Lemma less than 1 mm long. Palea keels scabrid. Anthers 2, yellow, *ca* 0.3 mm long. Caryopsis reddish brown, ellipsoid, polished, *ca* 0.7 mm long.

Bilaspur, Damoh, Mandla, Raigarh, Sidhi. *Fl. & Fr.*: Sept. - Jan.

11. Eragrostis multicaulis Steud., Syn. Pl. Glumac. 1: 426. 1855; Bor, Grass. Burm. Ceyl. Ind. Pak. 510. 1960.

Annuals, eglandular. Culms up to 20 cm tall, erect, tufted. Leaves linear to lanceolate, up to 10 cm long, acute; ligule a short ring of hairs. Inflorescence a terminal, branched panicle. Spikelets 6-8-flowered, 3-4 mm long, breaking up from below upwards; rhachis tough. Glumes *ca* 1 mm long. Lemma 1-1.5 mm long, very acute. Palea 1.3-1.5 mm long, deciduous; keels scabrid. Anthers 2, dark pink, 0.2-0.3 mm long. Caryopsis dark brown, globose, *ca* 0.8 mm long.

Rare. Indore. *Fl. & Fr.*: Aug. Oct.

12. Eragrostis namaquensis Schrad. var. **diplachnoides** (Steud.) W.D. Clayton in Kew Bull. 25: 251. 1971. *E. diplachnoides* Steud., Syn. Pl. Glumac. 1: 268. 1854; Bor, Grass. Burm. Ceyl. Ind. Pak. 508. 1960. *E. interrupta* var. *diplachnoides* (Steud.) Stapf in Hook. *f.*, Fl. Brit. India 7: 316. 1896.

Annuals or perennials. Culms 0.3-1.2 m tall, erect, tufted. Leaves flat, up to 30 cm long; sheaths compressed, glabrous; ligules membranous, truncate. Panicles linear, 10-40 cm long; branches scaberulous. Spikelets 4-8-flowered, ovate-oblong, 1.5-3 mm long, shortly pedicellate, compressed; rhachilla fragile. Lemma broadly ovate, 0.7-1 mm long, obtuse. Palea keels scabrid. Anthers 2, 0.2-0.3 mm long. Caryopsis ellipsoid, 0.3-0.5 mm long.

Morena, Raipur. *Fl. & Fr.*: Aug. - Jan.

13. Eragrostis nutans (Retz.) Nees *ex* Steud., Nomencl. Bot. ed. 2. 1: 563. 1840; Bor, Grass. Burm. Ceyl. Ind. Pak. 511. 1960. *Poa nutans* Retz., Observ. Bot. 4: 19. 1786. *Eragrostis stenophylla auct. non* Hochst., 1851: Stapf in Hook. *f.*, Fl. Brit. India 7: 318. 1896, *p.p. Eragrostis elegantula* Nees *ex* Steud., Syn. Pl. Glumac. 1: 266. 1854; Stapf in Hook. *f.*, Fl. Brit. India 7: 318. 1896.

Annuals or perennials. Culms 30-50 cm tall, erect, densely tufted. Leaves *ca* 10 cm long; sheaths smooth, with long silky hairs at mouth; ligules fringed, *ca* 0.3 mm long. Inflorescence a panicle, *ca* 10 cm long; branches alternate, rather distant. Spikelets 6-10-flowered, blue-grey, 5-6 mm long; rhachilla tough. Lemma *ca* 1.5 mm long, chartaceous. Palea keels scabrid, gently curved. Anthers 3, 0.5-0.7 mm long. Caryopsis ellipsoid or subglobose, 0.5-0.6 mm long.

Endemic to India. Balaghat. Bilaspur, Damoh, Raipur, Sidhi. *Fl. & Fr.*: Sept. Dec.

14. Eragrostis pappiana Chiov. in Ann. Ist. Bot. Roma 8: 371. 1908; Bor, Grass. Burm. Ceyl. Ind. Pak. 511. 1960.

Annuals. Culms 3-9 cm tall, erect. Leaves and sheaths glabrous; ligules membranous, truncate. Inflorescence an open panicle. Spikelets 1.5-2 mm wide. Lemma narrower, elliptic or lanceolate-acute. Palea caducous, scabrid. Anthers 2, light yellow, 0.6-1 mm long. Caryopsis dark brown, spindle-shaped, narrow, 0.6-1 mm long; styles persistent.

Rare. Bilaspur, Raipur. *Fl. & Fr.*: Sept. - Dec.

Notes : This species is superficially similar to *Eragrostis tremula* but the pedicels are not more than 2 mm long. Lemma, palea and caryopsis are also distinct.

15. Eragrostis pilosa (L.) P. Beauv., Ess. Agrostogr. 71, 162, 175. 1812; Stapf in Hook. *f.*, Fl. Brit. India 7: 323. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 512. 1960. *Poa pilosa* L., Sp. Pl. 68. 1753.

Annuals. Culms 10-50 cm tall, erect or ascending from decumbent base, slender; sheaths glabrous, striate; ligules ciliate. Inflorescence a delicate, open panicle; lower branches fascicled or subwhorled with glands, long hairy in the axils of branches. Spikelets very narrow, straight, 3-5 mm long. Lemma acute with purple tip, 1.2-1.5 mm long. Palea smooth. Anthers 3, dark pink, *ca* 0.2 mm long. Caryopsis brown, ellipsoid, 0.6-1 mm long.

Usually on moist open ground and in wastelands. Balaghat, Bilaspur, Raigarh, Raipur, Rewa, Sagar, Shivpuri, Sidhi. *Fl. & Fr.*: Sept. Dec.

16. Eragrostis poaeoides P. Beauv., Ess. Agrostogr. 162. 1812; Bor, Grass. Burm. Ceyl. Ind. Pak. 512. 1960. *Poa eragrostis* L., Sp. Pl. 68. 1753.

Annuals. Culms 10-50 cm tall. Leaf margins and sheaths glandular, ciliate; ligules truncate. Inflorescence an open panicle; crateriform glands present on the pedicels, spikelets and branches, not obvious in younger plants. Spikelets olive grey or purplish, 1.5-2 mm broad. Lemma ovate,

ca 2 mm long, obtuse. Palea keels scabrid. Anthers 2, pinkish yellow, 0.2-0.3 mm long. Caryopsis red-brown, 0.5-0.7 mm long, rounded in outline and slightly flat on dorsal side.

Common. Throughout the state. *Fl. & Fr.*: Aug. Oct.

17. Eragrostis riparia (Willd.) Nees, Agrost. Bras. 512. 1829; Bor, Grass. Burm. Ceyl. Ind. Pak. 513. 1960. *Poa riparia* Willd. in Ges. Natur. Fr. Schr. 4: 185. 1803. *Eragrostis tenella* (L.) P. Beauv. var. *riparia* Stapf in Hook. *f.*, Fl. Brit. India 7: 315. 1896.

Perennials. Culms 30-70 cm tall, tufted. Leaves often at right angles to the culm; sheaths glabrous; ligules ciliate. Inflorescence a delicate, contracted, narrow, subcylindrical panicle; rhachis glabrous. Spikelets crowded, *ca* 3 x 1.5 mm. Lemma 1-1.25 mm long, rounded at apex. Palea ciliate, but cilia shorter than the width of the floret, hairs not tubercle-based as in *E. ciliaris*. Anthers 3, light pink, *ca* 0.2 mm long. Caryopsis brown, ovoid, 0.4-0.5 mm long.

Rare. Raipur. *Fl. & Fr.*: Aug. Nov.

18. Eragrostis tef (Zuccagni) Trott. in Bull. Soc. Bot. Ital. 62. 1918 in obs.; Bor, Grass. Burm. Ceyl. Ind. Pak. 513. 1960. *Poa tef* Zuccagni, Diss. Ist. Pianta Panizz. Abiss. 1774.

Annuals. Culms 30-100 cm tall, branched and spreading. Leaves linear, acute; sheaths glabrous; ligules membranous. Inflorescence a panicle with long flexuous branches. Spikelets straw-coloured to dark green, 6-8 mm long, 4-12-flowered. Florets persistent. Lemma 2-2.7 mm long, acute. Palea scabrid on keels. Anthers 2-3, yellow, 0.6-0.8 mm long. Caryopsis red-brown, spindle-shaped, 1-1.2 mm long.

Introduced. *Fl. & Fr.*: Aug. Dec. and April May.

19. Eragrostis tenella (L.) P. Beauv. *ex* Roem. & Schult., Syst. Veg. 2: 576. 1817; Stapf in Hook. *f.*, Fl. Brit. India 7: 315. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 513. 1960. *Poa tenella* L., Sp. Pl. 69. 1753. *Eragrostis tenella* var. *plumosa* (Retz.) Stapf in Hook. *f.*, Fl. Brit. India 7: 315. 1896.

Annuals. Culms 10-40 cm tall, slender. Leaves linear, flat, smooth; sheaths glabrous but with long hairs at throat; ligules ciliate. Inflorescence a terminal panicle, pyramidal to elliptic, 3-15 cm long. Spikelets 1.5-2.5 mm long. Lemma 0.8-1.2 mm long, scaberulous on the keel. Palea hairy on the nerves; hairs shorter than the width of the floret. Anthers 3, light to dark pink, 0.2-0.3 mm long. Caryopsis pale to light brown, ovoid, polished, 0.4-0.6 mm long.

Bilaspur, Damoh, Gwalior, Hoshangabad, Indore, Mandla, Raigarh, Raipur, Sagar, Sidhi. *Fl. & Fr.*: July - Oct.

20. Eragrostis tenuifolia (A. Rich.) Steud., Syn. Pl. Glumac. 1: 268. 1854; Stapf in Hook. *f.*, Fl. Brit. India 7: 322. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 514. 1960. *Poa tenuifolia* A. Rich., Tent. Fl. Abyss. 2: 425. 1850.

Perennials. Culms 10-70 cm tall, erect, tufted, laterally compressed. Leaves 5-30 cm long, glabrous; sheaths compressed; ligules hairy. Panicles 5-20 cm long; pedicels usually with glandular rings. Spikelets 5-10-flowered, dark green or olive-grey, coarsely serrate on margins, breaking up from base; rhachilla persistent. Glumes unequal, lanceolate. Lemma oblong-elliptic, 1.7-2.5 mm long; nerves obscure. Palea green, persistent; keels scabrid. Anthers 3, pinkish yellow, 0.5-1 mm long. Caryopsis oblong, compressed, *ca* 1 mm long, dorsally grooved.

Damoh, Chhatarpur, Hoshangabad. *Fl. & Fr.*: Aug. Dec.

21. Eragrostis tremula (Lam.) Hochst. *ex* Steud., Syn. Pl. Glumac. 1: 269. 1854; Stapf in Hook. *f.*, Fl. Brit. India 7: 320. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 514. 1960. *Poa tremula* Lam., Tabl. Encycl. 1: 185. 1791. *P. multiflora* Roxb., Fl. Ind. (Carey & Wallich ed.) 1: 340. 1820.

Annuals. Culms 30-100 cm tall, erect. Leaf margins and sheaths glabrous; ligules membranous. Inflorescence an open panicle; branches filiform. Spikelets showing trembling motion on long fine pedicels (usually over 5 mm), 8-50 mm long, usually slightly curved, 10-100-flowered, pallid to purplish. Lemma broadly ovate-acute, 1.7-2 x 2.5-3 mm, with irregularly wavy and hyaline margins. Palea keels scabrid. Anthers 2, deep pink, 0.3-0.5 mm long. Caryopsis reddish brown, round like a lentil seed and beaked at the embryo end, 0.4-0.6 mm long.

Bilaspur, Damoh, Hoshangabad, Raigarh, Sidhi, Tikamgarh. *Fl. & Fr.*: Aug. Dec.

22. Eragrostis unioloides (Retz.) Nees *ex* Steud., Syn. Pl. Glumac. 1: 264. 1854; Bor, Grass. Burm. Ceyl. Ind. Pak. 515. 1960. *Poa unioloides* Retz., Observ. Bot. 5: 19. 1789. *Eragrostis amabilis auct. non* Wight & Arnott *ex* Nees, 1838: Stapf in Hook. *f.*, Fl. Brit. India 7: 317. 1896.

Annuals, rarely perennials. Culms 20-50 cm tall. Leaves flat, 2-4 mm broad; sheaths striate; ligules membranous. Inflorescence a panicle; branches ascending. Spikelets often pink or purplish, ovate-oblong, strongly compressed, 4-12 x 2-3.5 mm, obtuse. Florets closely imbricate. Lemma narrowly ovate in side view, *ca* 2 mm long, acute, membranous, strongly keeled, with pink or purple tinge; lateral nerves prominent. Palea scabrid on nerves, falling with lemma. Anthers 2, deep pink, *ca* 0.3 mm long. Caryopsis dark brown, *ca* 0.7 mm long, embryo end narrow, pointed, lower end rounded and broad.

Bastar, Bilaspur, Damoh, Hoshangabad, Indore, Raigarh, Rajnandgaon, Surguja. *Fl. & Fr.*: Sept. - March.

23. Eragrostis viscosa (Retz.) Trin. in Mem. Acad. Sci. Pétersb. ser. 6, 1: 397. 1830; Bor, Grass. Burm. Ceyl. Ind. Pak. 515. 1960. *Poa viscosa* Retz., Observ. Bot. 4: 20. 1786. *Eragrostis tenella* var. *viscosa* (Retz.) Stapf in Hook. *f.*, Fl. Brit. India 7: 315. 1896.

Annuals, sweet scented glandular, more than half of the plant consists of the panicle. Culms 10-40 cm tall. Inflorescence, glumes and younger parts of the stem sticky owing to presence of glands and particles adhering to them. Ligule base and mouth of sheaths with very long cilia. Spikelets 1.5-4.5 mm long; rhachilla fragile. Lemma oblong-elliptic, 1-1.25 mm long, smooth or scaberulous on keel. Palea keels ciliate. Anthers 2-3 mm long. Caryopsis pale brown, polished, 0.5-0.7 mm long.

Raipur, Sidhi. *Fl. & Fr.*: Sept. - Nov.

24. Eragrostis zeylanica Nees & Meyen in Nov. Act. Nat. Cur. 19. Suppl. 1: 204. 1843; Bor, Grass. Burm. Ceyl. Ind. Pak. 515. 1960. *E. elongata auct. non* Jacq., 1813: Stapf in Hook. *f.*, Fl. Brit. India 7: 319. 1896.

Perennials. Culms 40-100 cm tall, tufted, stiff. Leaves narrow, flat or convolute; sheaths bearded at mouth; ligule a short ring of hairs. Panicles variable; branches simple; rhachis glabrous. Spikelets crowded, shortly pedicellate, dark brown or reddish, 10-20-flowered. Lemma ovate-lanceolate, 2-2.5 mm long. Palea curved; keels very stout and scabrid. Anthers 3, yellow, *ca* 1 mm long. Caryopsis ovoid to subglobose, *ca* 1 mm long.

Rare. Bilaspur, Sidhi. *Fl. & Fr.*: Feb. - April.

41. EREMOPOGON Stapf

Perennials, rarely annuals. Culms slender, simple below, more or less branched above; branches often gathered in fastigiate bundles, each supported by a bladeless sheath and terminated by solitary raceme. Spikelets small, 2-nate, one sessile, the other pedicellate, similar in shape, different in sex, on the fragile rhachis of many-jointed, solitary, spatheate racemes, caducous; joints and pedicels filiform, compressed, solid or slightly grooved, disarticulating horizontally. Florets 2 in the fertile spikelets, the lower reduced to an empty floral glume, the upper bisexual; in pedicellate spikelet the lower male or neuter, the upper quite suppressed, or both suppressed. Sessile spikelets dorsally compressed, awned; callus small, shortly bearded. Involucral glumes equal, thinly chartaceous to membranous; lower glume 2-keeled, with narrow inflexed margins; upper glume cymbiform, 3-nerved, acutely keeled. Floral glume of lower floret hyaline, nerveless, of upper floret reduced to a hyaline, upwards firmer, linear stipe passing into a slender awn. Stamens 3. Stigmas exserted laterally near the middle of the spikelet, longer than the styles. Pedicellate spikelet awnless.

About 5 species; tropical and subtropical regions of Old World; one in M.P.

Eremopogon foveolatus (Delile) Stapf in Prain, Fl. Trop. Afr. 9: 183. 1917; Bor, Grass. Burm. Ceyl. Ind. Pak. 148. 1960. *Andropogon foveolatus* Delile, Fl. d' Egypte. 16a, t. 8. f. 2. 1812; Hook. *f.*, Fl. Brit. India 7: 168. 1896.

Perennials. Culms 30-70 cm tall, densely tufted, usually decumbent; nodes bearded. Leaves narrow, linear, rigid, scaberulous beneath; sheaths

shorter than the internodes, basal sheaths silky-villous; ligules ciliate, hyaline, truncate. Inflorescence of 3-6 racemes, 2-4 cm long; joints and pedicels with long silky hairs. Spikelets purplish, oblong-lanceolate, *ca* 5 mm long, glabrous; callus shortly hairy. Lower glume 4-5 mm long, 4-nerved, usually with a pit above the middle; upper glume equal to lower, 3-nerved. Lower lemma much shorter, glabrous, nerveless; upper lemma reduced to an awn, 5-8 mm long. Anthers 3, yellow, *ca* 2 mm long.

Gwalior, Rewa, Sidhi. *Fl. & Fr.*: Sept. - Nov.

42. ERIOCHLOA Kunth

Annuals or perennials. Leaf blades linear, flat, tapering to a fine point; ligule represented by a line of hairs. Inflorescence of racemes arranged along a central axis; racemes usually numerous and ascending or appressed to the axis; rhachis narrow. Spikelets single, in pairs or on short side branchlets, usually lanceolate, dorsally compressed, acute to aristate, supported upon a bead like swelling formed from the lowest rhachilla internode and adherent vestigial lower glume (rarely the latter developed). Upper glume as long as the spikelet. Lower floret male or barren. Lemma resembling the upper glume but a little shorter; upper lemma crustaceous, finely muricate, clasping only the edges of the palea, obtuse and mucronate. Caryopsis oblong-ellipsoid, dorsally compressed, obtuse.

About 30 species; tropical and subtropical regions; one in M.P.

Eriochloa procera (Retz.) Hubb. in Kew Bull. 1930: 256. 1930; Bor, Grass. Burm. Ceyl. Ind. Pak. 312. 1960. *Agrostis procera* Retz., Observ. Bot. 4: 19. 1786. *Eriochloa polystachya auct. non* Humb., Bonpl. & Kunth, 1816: Hook. *f.*, Fl. Brit. India 7: 20. 1896.

Perennials, rhizomatous. Culms 20-100 cm tall, terete, erect. Leaves linear-lanceolate or linear, flat, glabrous; sheaths compressed, glabrous; ligules hairy. Inflorescence a panicle; rhachis angular; pedicels short, scabrid. Spikelets paired, rarely solitary, 3-3.5 mm long, acute, hispid. Lower glume flushed with rhachis; upper glume *ca* 3 mm long, 5-nerved, membranous. Lower lemma empty, similar to upper glume; upper lemma elliptic to ovate, 2-2.5 mm long, mucronate. Anthers 3, yellow. Caryopsis ellipsoid.

Very rare. Gwalior. *Fl. & Fr.*: July - Dec.

43. EULALIA Kunth

Perennials, rarely annuals, tufted. Leaf blades linear; ligules short, membranous, densely ciliate. Inflorescence of 1-20 subdigitate racemes, terminal on the culms, the common axis (if present) short in relation to the long, slender racemes; racemes conspicuously hairy, bearing paired, similar spikelets; internodes and pedicels linear. Spikelets dorsally compressed; callus obtuse. Lower glume firmly cartilaginous to subcoriaceous, flat across the back, with the margins sharply inflexed, sometimes 2-keeled towards the tip, usually without inter-carinal nerves, often obtuse or truncate, rarely 2-lobed or 2-awned; upper glume usually awnless. Lower floret reduced to a cartilaginous or hyaline lemma, sometimes suppressed. Upper lemma hyaline, linear to cordate, 2-dentate or deeply 2-fid, with a glabrous (rarely puberulous) awn from the sinus. Palea small or absent. Stamens 3. Caryopsis oblong.

About 25 species; tropical regions of Old World; 3 in M.P.

1a. Ligules membranous; sessile spikelets *ca* 3 mm long; anthers *ca* 2 mm long ...1. *E. hirtifolia*

1b. Ligules hairy or lacerate; sessile spikelets 4-6 mm long; anthers 2-3 mm long:

2a. Lower glume coriaceous, 5-6 mm long, 4-nerved; awns of sessile spikelets 15-20 mm long ...2. *E. quadrinervis*

2b. Lower glume papery, 3.5-4 mm long, nerveless; awns of sessile spikelets 9-12 mm long ...3. *E. trispicata*

1. Eulalia hirtifolia (Hack.) A. Camus in Ann. Soc. Linn. Lyon, n.s. 68: 202. 1922; Bor, Grass. Burm. Ceyl. Ind. Pak. 155. 1960. *Pollinia hirtifolia* Hack. in A. DC., Monogr. Phan. 6: 165. 1889; Hook. *f.*, Fl. Brit. India 7: 111. 1896.

Annuals. Culms 60-90 cm tall, erect, leafy. Leaves narrow, filiform towards apex, pubescent; sheaths glabrous; ligules *ca* 1.5 mm long, membranous. Inflorescence of 3-8, up to 8 cm long spikes; rhachis with golden violet, stiff hairs. Sessile spikelets lanceolate, *ca* 3 mm long, awned. Glumes subequal, *ca* 3 mm long; lower glume chartaceous, shining, ciliate,

with golden hairs; upper glume obtuse, glabrous, hairy in the lower portion, one-nerved, ciliate on margins. Pedicels of pedicellate spikelets *ca* 2.5 mm long, with pale violet hairs. Anthers 3, yellow, *ca* 2 mm long.

Rare. Raigarh. *Fl. & Fr.*: Oct. Dec.

2. Eulalia quadrinervis (Hack.) Kuntze, Revis. Gen. Pl. 2: 775. 1891; Bor, Grass. Burm. Ceyl. Ind. Pak. 156. 1960. *Pollinia quadrinervis* Hack. in A. DC., Monogr. Phan. 6: 158. 1889; Hook. *f.*, Fl. Brit. India 7: 110. 1896.

Perennials. Culms 50-100 cm tall, slender, glabrous or pubescent at top, leafy up to inflorescence. Leaves linear, acuminate at apex, glabrous or hairy below, scabrid on margins; sheaths glabrous or with scattered tubercle-based hairs; ligules short, hairy. Inflorescence of 3-6, subdigitate, 7-15 cm long, false spikes, with golden brown or mauve hairs; internodes of rhachis and pedicels 2.5-3 mm long; joints of rhachis oblique and swollen at tip, stiff, with white hairs. Spikelets oblong-lanceolate, 5-6 mm long. Lower glume ovate-lanceolate, 5-6 mm long, coriaceous; keels hispid, 4-nerved; upper glume lanceolate, equal to lower, shining; keels glabrous, 3-nerved. Lower floret empty. Upper floret bisexual. Lemma 2.5-3 mm long, 2-lobed; awn 15-20 mm long. Anthers 3, yellow, *ca* 3 mm long.

Very rare. Indore. *Fl. & Fr.*: Aug. Nov.

3. Eulalia trispicata (Schult.) Henr. in Blumea 3: 453. 1940; Bor, Grass. Burm. Ceyl. Ind. Pak. 157. 1960. *Andropogon trispicatus* Schult., Syst. Veg. 2, Mant. 452. 1824. *Pollinia argentea* Trin. in Bull. Sci. Acad. Pétersb. 1: 71. 1836; Hook. *f.*, Fl. Brit. India 7: 111. 1896. **Fig. 56.**

Perennials. Culms 50-100 cm tall, leafy at base, turning reddish brown with age. Leaves linear-lanceolate, usually flat, glabrous or sparsely hairy; sheaths terete, glabrous except at mouth; ligules lacerate, truncate. Inflorescence of 3-7, densely silky, digitate racemes. Sessile spikelets lanceolate, 4-5 mm long, obtuse, awned. Lower glume papery, 3.5-4 mm long, hairy at base; upper glume cymbiform, 1-nerved. Lower lemma empty; upper lemma linear, *ca* 3 mm long, with cleft at apex, awned from sinus; awns 9-12 mm long, ciliate. Palea absent. Anthers 3, yellow, *ca* 2 mm long. Caryopsis oblong.

Very rare. Bilaspur. *Fl. & Fr.*: Sept. - Dec.

Fig. 56. Eulalia trispicata (Schult.) Henr.

44. EULALIOPSIS Honda

Perennials, tufted, with woolly base. Leaf blades folded or convolute, wiry; ligule a dense ciliate fringe. Inflorescence of (1-) 2-4, subdigitate racemes, terminal on the culms, the common axis (if present) shorter than the racemes; racemes fragile, hairy, bearing paired, similar spikelets. Spikelets 2-flowered, falling entire, dorsally compressed; callus obtuse. Lower glume subchartaceous, convex on the back, obtuse or acute, 2-3-dentate, the margins neither hyaline nor inflexed; upper glume cymbiform, 2-dentate and mucronate, or shortly awned in the sinus. Lower floret male with hyaline lemma. Upper floret bisexual. Lemma hyaline, linear, minutely 2-dentate and awned from the sinus. Palea shorter. Stamens 3. Caryopsis ellipsoid.

Two species; India, China, Taiwan and Philippines; one in M.P.

Eulaliopsis binata (Retz.) Hubb. in Hook., Icon. Pl. 33: sub t. 3262. 1935; Bor. Grass. Burm. Ceyl. Ind. Pak. 158. 1960. *Andropogon binatus* Retz., Observ. Bot. 5: 21. 1789. *Ischaemum angustifolium* (Trin.) Hack. in A. DC., Monogr. Phan. 6: 241. 1889; Hook. *f.*, Fl. Brit. India 7: 129. 1896. *Spodiopogon angustifolius* Trin. in Mem. Acad. Sci. Pétersb. ser. 6, 2: 300. 1832.

Perennials. Culms 40-100 cm tall, erect, densely tufted, with rootstock and basal sheaths. Leaves 20-45 cm long, rounded at base, ventrally glabrous, dorsally hirsute with tubercle-based hairs; ligules hairy. Inflorescence of 2-4, up to 5 cm long racemes. Sessile spikelets lanceolate, *ca* 4.5 mm long; callus short, with rusty hairs. Lower glume *ca* 3.5 mm long, 3-4-dentate, 5-7-nerved, ciliate; upper glume *ca* 4 mm long, 5-nerved, ciliate. Lower lemma lanceolate, *ca* 3 mm long, male or neuter, 1-nerved; upper lemma fertile, 2-dentate, ciliate, *ca* 4 mm long; awns 5-8 mm long. Pedicellate spikelets similar. Anthers 3, yellow, *ca* 1 mm long. Caryopsis black, *ca* 1.5 mm long.

Common. Balaghat, Bastar, Bilaspur, Hoshangabad, Raipur, Seoni, Sidhi, Surguja. *Fl. & Fr.*: June - Aug.

45. GARNOTIA Brongn.

Annuals or perennials. Culms usually caespitose. Leaves flat, involute or canaliculate; ligule a ciliate membrane or fringe of hairs. Panicles simple

or compound. Spikelets geminate on unequal pedicels, rarely solitary or in threes, 1-flowered, lanceolate, dorsally compressed, bearded at base, disarticulating below the glumes. Glumes 2, equal or unequal, membranous, acute to awned, 3-nerved; nerves mostly scabrid. Lemma equal or shortly smaller to glumes, awnless or awned from an entire or 2-lobed tip, faintly 3-nerved. Palea equal to lemma, narrow, hyaline, 2-nerved, auricled at base.

About 32 species; Asia and Pacific regions; one in M.P.

Garnotia tenella (Arn. *ex* Miq.) Jan. in Fedd. Repert. Sp. Nov. 17: 86. 1921; Gould in Kew Bull. 27: 528. 1972; Ved Prakash and Jain in Fasc. Fl. India 3: 13. 1979. *Berghausia tenella* Arn. *ex* Miq. in Verh. Konink. Nederl. Inst. III. 4: 34. 1851. *Garnotia stricta auct. non* Brongn., 1832: Hook. *f.*, Fl. Brit. India 7: 243. 1896, *p.p.*; Bor, Grass. Burm. Ceyl. Ind. Pak. 569. 1960, *p.p.*

Annuals, loosely tufted. Culms up to 70 cm tall, erect or ascending, rooting at lower nodes. Leaves lanceolate, linear-lanceolate, 2-15 x 0.2-1.4 cm, acute, glabrous or hispid with papilla-based hairs; ligule a ring of hairs, up to 2 mm long. Panicles narrowly contracted, 3-20 cm long. Spikelets 2-5 mm long, scabrid. Lower glume *ca* 3 mm long, with *ca* 0.5 mm long awn; upper glume *ca* 2.75 mm long, with *ca* 0.3 mm long awn. Lemma *ca* 1.8 mm long, with *ca* 9 mm long geniculate awn. Caryopsis linear-oblong, *ca* 1.5 mm long.

Rare. On hill slopes and in rock crevices. Balaghat. *Fl. & Fr.*: Sept. Oct.

46. GIGANTOCHLOA Kurz *ex* Munro

Culms usually of medium size, erect, bunched, unbranched below, the tops erect, usually glabrous with age; culm sheaths usually dark, hairy; auricles low, dark green when young; ligules well developed. Spikelets in dense, nodal groups of leafless branches; rhachilla very short, not jointed. Glumes 2 to several. Perfect florets 2-5, with a terminal, empty lemma which is the longest. Lemmas apiculate, fringed along the margins. Palea thin, translucent, 2-keeled; keels usually fringed. Stamens 6; filaments joined to form a firm tube exceeding the palea at anthesis; anthers long with distinct tips. Ovary hairy at the top, with a simple, hairy stigma. Fruits narrowly cylindrical, hairy at the top only.

About 20 species; Indo-Malesia; one in M.P.

Gigantochloa hasskarliana (Kurz) Backer *ex* K. Heyne, Nutt. Pl. Ned.-Ind. ed. 2. 1: 299. 1927. *Shizostachyum hasskarlianum* Kurz in Ind. For. 1: 352. 1876. *Oxytenanthera nigrociliata* Munro in Trans. Linn. Soc. London 26: 228 1868; Gamble in Hook.*f*., Fl. Brit. India 7: 401. 1896.

Perennials. Culms 6-12 m tall, 2-5 cm in diameter, with dark hairs below the nodes; culms sheaths *ca* 15 cm long, dark hairy on back, blade deflexed, narrow at base, hairy above, auricles stiff, dark green, entire; ligules up to 4 mm long. Leaf blades lanceolate, 15-40 x 2.5-4.5 cm, glabrous; midrib prominent; nerves 9-12; auricles small; ligules short. Panicles large, compressed; rhachis pubescent. Spikelets in small groups at the nodes of inflorescence, *ca* 2 x 0.5 cm. Glumes 2-3, fringed with dark hairs. Lemma 4-5, the longest *ca* 2 cm long, fringed with dark hairs. Palea narrow, equal to lemma; keels ciliate. Anthers 6, purple, tips hairy, *ca* 7 mm long. Ovary pubescent. Fruits narrow, hairy at tip, dorsally grooved; beak penicillate.

Rare. Bastar. *Fl. & Fr.*: Rare.

47. HACKELOCHLOA Kuntze

Annuals. Leaf blades flat, coarse; ligule a very short, ciliate membrane. Inflorescence in groups from the sheaths of the upper leaves; racemes fragile, bearing paired spikelets, dorsally compressed; internodes flattened, oblong, cupuliform above, fused to the adjacent pedicel. Sessile spikelet 2-flowered, falling entire, globose; callus truncate, oblique. Lower glume hemispherical, crustaceous, pitted and tuberculate, wingless; upper glume partly adherent to the enclosing internodes. Lower floret reduced to a hyaline lemma. Upper floret bisexual. Lemma entire, awnless. Pedicellate spikelet narrowly ovate, herbaceous, narrowly winged; pedicels broadly linear, scarcely distinguishable from the internode. Caryopsis slightly dorsally flattened.

Two species; tropical regions; one in M.P.

Hackelochloa granularis (L.) Kuntze, Revis. Gen. Pl. 2: 776. 1891; Bor, Grass. Burm. Ceyl. Ind. Pak. 159. 1960. *Cenchrus granularis* L., Mant. Pl. 575. 1771. *Manisuris granularis* (L.) L. *f*., Nov. Gram. Gen. 40. 1779; Hook.*f*., Fl. Brit. India 7: 159. 1896.

Annuals. Culms 60-90 cm tall, erect, hirsute with tubercle-based hairs. Leaves 5-10 cm long, cordate at base, hirsute; sheaths loose, hispid; ligules membranous, hairy at tip. Inflorescence a terminal, axillary raceme; peduncles 1.5-2 cm long; joints flattened, fused with pedicels. Sessile spikelets globose, *ca* 1.3 mm long. Lower glume rounded-orbicular, pitted and tubercled; upper glume 1-1.2 mm long, obtuse, membranous. Lower lemma empty, *ca* 1 mm long; upper lemma obtuse, bisexual. Anthers 3, orange-yellow, *ca* 0.5 mm long. Caryopsis ovoid, shining, *ca* 0.5 mm long.

Balaghat, Bilaspur, Hoshangabad, Indore, Mandla, Raigarh, Sidhi, Surguja. *Fl. & Fr.*: July - Nov.

48. HEMARTHRIA R. Br.

Perennials, tufted or stoloniferous. Leaf blades flat; ligule a very short, ciliate membrane. Inflorescence a single raceme embraced below by the subtending sheath, borne in the upper axils of the culm; racemes tough, dorsally compressed; internodes thickened, clavate, nearly always obliquely articulate, fused to the adjacent pedicel. Sessile spikelets dorsally compressed. Lower glume narrowly elliptic, rigidly herbaceous, broadly convex, 2-keeled, smooth, indistinctly winged above, obtuse, caudate or 2-fid. Upper lemma entire and awnless. Pedicellate spikelets like the sessile; pedicels flattened, broadly linear. Caryopsis narrowly obovoid, slightly dorsally compressed.

About 12 species; subtropical regions; one in M.P.

Hemarthria compressa (L. *f.*) R. Br., Prodr. 207. 1810; Bor, Grass. Burm. Ceyl. Ind. Pak. 161. 1960. *Rottboellia compressa* L. *f.*, Suppl. Pl. 144. 1782; Hook. *f.*, Fl. Brit. India 7: 153. 1896.

Perennials. Culms 40-80 cm tall, erect or decumbent. Leaves 9-15 cm long, rounded or subcordate at base, scaberulous on margins; sheaths hairy at base and throat; ligules membranous. Inflorescence a solitary raceme or of false spikes. Sessile spikelets obtuse, ciliate, 5-7-nerved, winged. Upper glume cymbiform, *ca* 4 mm long, mucronate. Lower lemma oblong, *ca* 3 mm long, hyaline. Anthers 3, yellow, 1.2-1.5 mm long. Caryopsis brownish, *ca* 1 mm long.

Common. Bilaspur, Damoh, Hoshangabad, Indore, Rewa, Sidhi, Surguja, Tikamgarh. *Fl. & Fr.*: Sept. Dec.

49. HETEROPOGON Pers.

Annuals or perennials. Leaf blades linear; ligules very short, membranous, ciliate on the upper edge. Inflorescence a single raceme, arising terminally, and in the axils sometimes loosely aggregated into a false panicle; racemes with homogamous spikelets for the lower quarter to two-thirds of their length; internodes linear. Sessile spikelets terete; callus pungent. Lower glume coriaceous, convex, sometimes longitudinally grooved, obtuse. Lower floret reduced to a hyaline lemma. Upper lemma stipitiform, passing directly into a hairy awn. Palea absent. Pedicellate spikelets male or barren, lanceolate, larger than the sessile, awnless, with a long, slender callus functioning as a pedicel (the true pedicel reduced to a small stump). Caryopsis lanceolate, channelled on one side.

About 6 species; tropical and warm temperate regions; 2 in M.P.

1a. Culms up to 1 m tall; lower glume 4-5 mm long; awn 5-8 cm long ...1. *H. contortus*

1b. Culms more than 1 m tall; lower glume 8-9 mm long; awn *ca* 10 cm long ...2. *H. triticeus*

1. Heteropogon contortus (L.) P. Beauv. *ex* Roem. & Schult., Syst. Veg. 2: 836. 1817; Bor, Grass. Burm. Ceyl. Ind. Pak. 163. 1960. *Andropogon contortus* L., Sp. Pl. 1045. 1753; Hook. *f.*, Fl. Brit. India 7: 199. 1896.

Perennials. Culms 25-100 cm tall, erect, tufted. Leaves linear, 4-20 cm long, acute at apex, ciliate at base; sheaths striate, glabrous; ligule a fringed membrane with short hairs. Inflorescence a terminal, up to 12 cm long raceme. Sessile spikelets lanceolate, terete, 6.5-7 mm long. Upper glume *ca* 5 mm long, 3-nerved. Lower lemma hyaline, *ca* 3 mm long, empty; upper lemma stout, epaleate; awn geniculate, 5-8 cm long. Anthers 3, yellow, 2-2.5 mm long. Pedicellate spikelets male or barren. Caryopsis cylindrical, 1-1.5 mm long, hairy.

Common. Balaghat, Bastar, Bilaspur, Gwalior, Hoshangabad, Indore, Raigarh, Raipur, Sagar, Sidhi, Surguja. *Fl. & Fr.*: Aug. - Jan.

2. Heteropogon triticeus (R. Br.) Stapf *ex* Craib in Kew Bull. 1912: 432. 1912; Bor, Grass. Burm. Ceyl. Ind. Pak. 165. 1960. *Andropogon triticeus* R. Br., Prodr. 201. 1810; Hook. *f.*, Fl. Brit. India 7: 200. 1896.

Perennials. Culms tufted, terete, up to 2.5 m tall. Leaves linear-lanceolate, 20-40 x 0.5-1.5 cm, acuminate at apex, puberulous, scabrid on margins; sheaths compressed, keeled, glaucous; ligules ciliate, membranous. Inflorescence a terminal, solitary, 8-14 cm long raceme. Lower spikelets homogamous, male or barren, awnless, upper one heterogamous, awned; joints short; callus bearded with rufous hairs. Spikelets linear-lanceolate, 8-10 mm long. Lower glume oblong, 8-9 mm long, truncate, with 2-3 ridges and grooves; upper glume cymbiform, *ca* 9 mm long, obtuse, ciliolate on margin. Lower lemma oblong-lanceolate, *ca* 5 mm long, epaleate; upper lemma hyaline, with *ca* 10 cm long, ciliolate awn. Palea obovate-lanceolate, *ca* 2.5 mm long, hyaline. Anthers 3, yellow, 0.9-1 cm long. Caryopsis cylindrical, *ca* 8 mm long. Pedicellate spikelets shorter than sessile.

Rare. On hill slopes. Bastar. *Fl. & Fr.*: Aug. Dec.

50. HORDEUM L.

Annuals or perennials. Leaf blades usually flat. Inflorescence a linear to oblong spike. Spikelets 3 at each node, falling together at maturity, the triads arranged in two longitudinal rows with the fertile florets in 2, 4 or 6 longitudinal rows, each triad with a central, bisexual spikelet and 2 lateral bisexual, male or sterile spikelets. Florets 1, rarely 2; rhachilla usually prolonged. Glumes linear-subulate to lanceolate, awned, free to the base. Lemma lanceolate or ovate, 5-nerved. Palea 2-keeled.

About 20 species; N. temperate regions; one in M.P.

Hordeum vulgare L., Sp. Pl. 84. 1753; Hook. *f.*, Fl. Brit. India 7. 371. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 677. 1960.

Annuals. Culms 30-75 cm tall, erect, tufted. Leaves 15-30 cm long, soft, with well developed auricles; sheaths glabrous, loose; ligules 1.5-2 mm long, membranous. Inflorescence a terminal spike. Spikelets 1-flowered, 3 at each node, falling together at maturity, all spikelets fertile, the triads arranged in 6 longitudinal rows of fertile spikelets in each spike. Glumes linear-lanceolate, 5-6 mm long, hairy, awned. Lemma 7-10 mm long, 5-nerved, hairy on keel; awn 5-7 mm long, scabrid. Anthers 3, pale yellow, linear, 3-3.5 mm long. Caryopsis cream-coloured, 8-9 mm long.

Cultivated throughout the state. *Fl. & Fr.*: Jan. - March.

51. HYGRORYZA Nees

Aquatic, floating. Stems stout, diffusely branched, rooting at nodes; branches short, erect, leafy. Leaf blades ovate-oblong, flat, obtuse at apex; sheaths inflated, strongly keeled. Panicles shortly exserted from the uppermost leaf sheath, few-branched, the lowermost branches whorled. Spikelets few, 1-flowered, long awned. Glumes absent. Lemma thinly chartaceous, laterally compressed, keeled, strongly 5-nerved; nerves scabrid and ciliate. Palea keeled, 3-nerved, ciliate on the keel. Stamens 6. Styles free and divergent; stigmas 2.

A monotypic genus; Indo-Malesia.

Hygroryza aristata (Retz.) Nees *ex* Wight & Arnott in Edinb. New Phil. J. 15: 380. 1833; Hook. *f.*, Fl. Brit. India 7: 95. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 597. 1960. *Pharus aristatus* Retz., Observ. Bot. 5: 23. 1789.

Annuals, aquatic, free floating. Roots fibrous. Culms 15-35 cm tall, spreading. Leaves ovate-lanceolate, 2-3.5 x 0.8-1.7 cm, papillate on adaxial surface; sheaths flat, loose, glabrous; ligules *ca* 0.8 mm long, membranous, truncate. Inflorescence a globose panicle. Spikelets 1-flowered, 17-18 mm long including awn. Glumes reduced. Lemma *ca* 7 mm long, chartaceous, hispid, 5-nerved; awn *ca* 10 mm long. Palea *ca* 6 mm long, acute, chartaceous, hispid, 3-veined. Anthers 6, light yellow, *ca* 3.5 mm long. Caryopsis lanceolate, *ca* 5 mm long, awned.

Damoh, Rajnandgaon, Rewa. *Fl. & Fr.*: Oct. Dec.

52. IMPERATA Cirillo

Perennials, rhizomatous. Culms erect, few-noded. Leaves mostly basal; blades narrow and erect; ligules scarious. Inflorescence a narrow, often spiciform panicle; primary branches numerous, bearing very short, secondary racemes; rhachis not breaking at maturity, bearing paired, similar spikelets on slender pedicels. Spikelets lanceolate to oblong, terete, enveloped within long silky hairs from callus and glumes; callus very short, truncate. Glumes lanceolate to oblong, as long as the spikelet, membranous. Lower floret reduced to a lemma, lanceolate to oblong, shorter than the spikelet, hyaline. Upper floret bisexual. Lemma hyaline, lanceolate to oblong,

shorter than the spikelet, hyaline. Upper floret bisexual. Lemma hyaline, lanceolate to oblong, shorter than the spikelet, awnless. Palea broad, hyaline. Stamens 1-2. Caryopsis ellipsoid.

About 8 species; tropical and subtropical regions; one in M.P.

Imperata cylindrica (L.) P. Beauv. var. **major** (Nees) Hubb. *ex* Hubb. & Vaughan, Grass. Maur. 96. 1940; Bor, Grass. Burm. Ceyl. Ind. Pak. 170. 1960. *I. koenigii* (Retz.) P. Beauv. var. *major* Nees, Fl. Afr. Ill. Austral. 90. 1841.

Perennials. Rootstocks hard with extensive rhizomes. Culms 0.3-2 m tall. Leaves variable, scabrid on margins; sheaths loose, glabrous or pubescent, longer than internodes; ligules lacerate, dorsally silky. Inflorescence compact, cylindrical panicle. Spikelets 3-3.5 mm long, covered with long, white silky hairs, with purple stigma hanging at maturity. Lower glume *ca* 3 mm long. Lower lemma *ca* 1.6 mm long, epaleate. Anthers 2, pale yellow, *ca* 2 mm long. Caryopsis oblong, 1-1.25 mm long.

Common. Balaghat, Bastar, Bilaspur, Damoh, Jabalpur, Mandla, Raipur, Rajnandgaon, Rewa, Sidhi. *Fl. & Fr.*: Aug. Sept. and March April.

53. ISACHNE R. Br.

Annuals or perennials, often aquatic. Culms commonly ascending from a prostrate base. Leaf blades linear to lanceolate or ovate. Inflorescence an open or contracted panicle. Spikelets 2-flowered, with similar or dissimilar florets, the lower male or bisexual, the upper female or bisexual; rhachilla disarticulating below the florets. Glumes falling soon after the florets, subequal, two-third to as long as the spikelet, membranous. Lemmas elliptic-oblong to orbicular, obtuse, obscurely 5-7-nerved; lower lemma similar to the upper or larger and thinner; upper lemma chartaceous to thinly coriaceous. Stamens 3. Caryopsis ellipsoid to suborbicular, dorsally flattened.

About 75 species; tropical and subtropical regions especially tropical Asia; one in M.P.

Isachne globosa (Thunb.) Kuntze, Revis. Gen. Pl. 2: 778. 1891; Bor, Grass. Burm. Ceyl. Ind. Pak. 580. 1960; Ved Prakash and Jain, Fasc. Fl.

India 14: 22. 1984. *Milium globosum* Thunb., Fl. Jap. 49. 1784. *Isachne australis* R. Br., Prodr. 196. 1810; Hook.*f*., Fl. Brit. India 7: 24. 1896.

Annuals. Culms 20-60 cm tall, erect or ascending. Leaves 5-10 cm long, glabrous; sheaths loose, glabrous; ligule *ca* 2 mm long, a tuft of hairs. Inflorescence a contracted, 4-10 cm long panicle; branches capillary, scabrid. Spikelets 2-flowered, nearly globose, *ca* 2 mm long. Lower glume light green, ovate-obtuse, *ca* 1.8 mm long, hairy, 5-nerved; upper glume *ca* 1.7 mm long, broader, 9-nerved, scabrid. Lower floret male, *ca* 1.8 mm long, glabrous. Lemma 1.5-1.7 mm long, flat with inflexed edge. Palea membranous, similar to lemma. Anthers 3, dark brown, *ca* 1 mm long. Upper floret fertile, *ca* 1.5 mm long. Lemma *ca* 1.2 mm long. Caryopsis deep pink, *ca* 0.8 mm long.

Balaghat, Bastar, Bilaspur, Damoh, Raigarh, Sidhi, Surguja. *Fl.* & *Fr.*: Aug. Sept.

54. ISCHAEMUM L.

Perennials, sometimes annuals, often decumbent. Leaf blades linear; ligules membranous. Inflorescence of paired or digitate racemes or spikes, the former often interlocked back to back, terminal or axillary; internodes and pedicels dorsally compressed; callus obtuse, inserted into the concave tip of the internode. Sessile spikelets 2-flowered. Lower glume chartaceous to coriaceous, convex to concave, laterally 2-keeled, sometimes winged; upper glume awned or not. Lower floret male, with a palea. Upper lemma 2-fid, passing between the teeth into a glabrous awn (rarely awnless). Pedicellate spikelets as long as the sessile or much smaller, often asymmetrical. Caryopsis oblong to lanceolate, dorsally compressed.

About 60 species; tropical and subtropical regions; 4 in M.P.

1a. Ligules less than 4 mm long; lower glume of sessile spikelets without nodules or rugosities:

2a. Racemes or spikes 5-12; rhachis with tuft of hairs at joints ...1. *I. duthiei*

2b. Racemes or spikes less than 5; rhachis without tuft of hairs at joints:

3a. Leaves pubescent to villous; sessile spikelets 5-6 mm long; anthers *ca* 2 mm long ...2. *I. indicum*

3b. Leaves glabrous, glaucous; sessile spikelets 6.5-7.5 mm long; anthers 2.5-3 mm long ...3. *I. pilosum*

1b. Ligules 4-5 mm long; lower glume of sessile spikelets with nodules and rugosities ...4. *I. rugosum*

1. Ischaemum duthiei Stapf *ex* Bor in Kew Bull. 1950: 188. 1950; Bor, Grass. Burm. Ceyl. Ind. Pak. 178. 1960.

Perennials. Culms 50-80 cm tall, terete, glabrous, rooting at lower nodes. Leaves linear, acute at apex, glabrous on upper surface, pubescent on lower surface; sheaths terete, pubescent; ligules membranous. Inflorescence of subdigitate spikes; rhachis with tuft of hairs at joints. Sessile spikelets lanceolate, *ca* 5 mm long, awned. Both glumes equal to spikelet. Lemma hyaline, 4-5 mm long; awn 8-10 mm long. Pedicellate spikelets male, similar to sessile in structure, awnless. Anthers 3, brownish, 2-2.5 mm long. Caryopsis light brown, ellipsoid, *ca* 1.5 mm long; styles persistent.

Rare. Sidhi. *Fl. & Fr.*: Nov. Feb.

2. Ischaemum indicum (Houtt.) Merr. in J. Arnold Arb. 19: 320. 1838; Bor, Grass. Burm. Ceyl. Ind. Pak. 180. 1960. *Phleum indicum* Houtt., Nat. Hist. 11. 13: 198. t. 90. f. 2. 1782. *Ischaemum ciliare* Retz., Observ. Bot. 6: 36. 1791; Hook.*f.*, Fl. Brit. India 7: 133. 1896. *I. aristatum auct. non* L., 1753: Hook.*f.*, Fl. Brit. India 7: 126. 1896.

Perennials. Culms 30-60 cm tall, erect or decumbent. Leaves 10-20 cm long, pubescent; sheaths glabrous; ligules membranous, truncate. Inflorescence of 2-3 spikes. Sessile spikelets oblong-lanceolate, 5-6 mm long. Lower glume *ca* 5.2 mm long, glabrous; upper glume *ca* 5 mm long; keels scabrid; awn *ca* 2 mm long. Lower lemma hyaline, *ca* 4.2 mm long, glabrous. Palea linear-lanceolate, *ca* 2 mm long; keels scabrid. Anthers 3, yellow, *ca* 2 mm long. Upper lemma deeply notched, 3-nerved; awn *ca* 1.8 cm long. Caryopsis *ca* 1.5 mm long, with persistent style.

Common. Bastar, Bilaspur, Hoshangabad, Raipur, Sidhi. *Fl. & Fr.*: Aug. Dec.

3. Ischaemum pilosum (Klein *ex* Willd.) Wight in Madras Lit. Sci. J. 138. 1835; Bor, Grass. Burm. Ceyl. Ind. Pak. 183. 1960; Hook. *f.*, Fl. Brit. India 7: 130. 1896. *Andropogon pilosus* Klein *ex* Willd., Sp. Pl. 4: 920. 1806.

Perennials, rhizomatous. Culms 0.4-2 m tall, erect, glabrous. Leaves linear, glaucous; sheaths terete, glabrous; ligules membranous. Inflorescence of 3-5, subdigitate racemes. Spikelets paired; joints and callus densely hairy. Sessile spikelets lanceolate, 6.5-7.5 mm long, awned. Lower glume 5-6 mm long, 5-7-nerved; upper glume 6.5-7.2 mm long, 5-9-nerved, hairy. Lower lemma elliptic, 5-5.5 mm long. Palea nerveless. Anthers 3, yellow, *ca* 3.5 mm long. Upper lemma hyaline, 4.5-5 mm long, 3-nerved, with cleft at apex; awn 7-8 mm long. Caryopsis oblong, dorsally compressed.

Very rare. Madhya Pradesh (one specimen without any exact locality at CAL, coll. no. 792). *Fl. & Fr.*: Sept. Feb.

4. Ischaemum rugosum Salisb., Icon. Stirp. Rar. 1. t. 1. 1791; Hook. *f.*, Fl. Brit. India 7: 127. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 184. 1960.

Annuals or perennials. Culms 50-60 cm tall, erect or ascending. Leaves 10-20 cm long, hairy on margins; sheaths loose, rough; ligules 4-5 mm long, membranous. Inflorescence a paired raceme; joints and pedicels trigonous. Sessile spikelets ovate-oblong, 5.5-6 mm long; callus bearded. Lower glume slightly oblique, *ca* 5.5 mm long; upper glume *ca* 5.5 mm long; keel winged, ciliate. Lower lemma lanceolate, *ca* 4.5 mm long, acute; upper lemma with 1.5-2 cm long awn. Anthers 3, yellow, *ca* 2 mm long. Caryopsis brown, ovoid, *ca* 2 mm long.

Common. Bilaspur, Gwalior, Indore, Raigarh, Raipur, Sagar, Sidhi. *Fl. & Fr.*: Aug. Oct.

55. ISEILEMA Anderss.

Annuals or perennials. Leaf blades linear; ligules very short, membranous, ciliately fringed. Inflorescence of solitary raceme, embraced often tightly by sheathing spatheoles, and gathered into a rather open false panicle; racemes comprising of 2 homogamous pairs of spikelets forming

a sort of involucre, 1 sessile spikelet borne upon a short internode (rarely a second spikelet present) on 2 pedicellate spikelets, caducous below the homogamous spikelets at maturity, these and the sessile spikelet falling as a unit. Homogamous spikelets male or reduced to a sterile scale, often indurated, commonly all pedicellate. Sessile spikelets 2-flowered, lanceolate-elliptic, dorsally flattened. Lower glume cartilaginous, 2-dentate. Lower floret reduced to a hyaline lemma. Upper floret bisexual. Lemma stipitiform, entire or 2-dentate, bearing a glabrous awn. Palea small or absent. Pedicellate spikelets male or barren, lanceolate, awnless, caducous or not, without a callus, borne upon a filiform pedicel. Caryopsis oblong-ellipsoid, slightly dorsally compressed.

About 20 species; Indo-Malesia to Australia; 4 in M.P.

1a. Tubercles present on spathe and/or margins of the lower glume of involucral spikelets:

2a. Racemes in dense fascicles; bisexual spikelets longer than the involucral ones ...2. *I. holei*

2b. Racemes not in dense fascicles; bisexual spikelets as long as the involucral ones ...4. *I. prostratum*

1b. Tubercles absent on spathe and/or margins of the lower glume of involucral spikelets:

3a. Pedicels of involucral spikelets as broad as long; beak of lower glume of the sessile spikelets as long as or longer than the lower elliptic portion ...1. *I. anthephoroides*

3b. Pedicels of involucral spikelets longer than the breadth at the apex; beak of lower glume of the sessile spikelets shorter than the lower elliptic portion ...3. *I. laxum*

1. **Iseilema anthephoroides** Hack. in A. DC., Monogr. Phan. 6: 683. 1889; Hook. *f.*, Fl. Brit. India 7: 219. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 187. 1960.

Annuals. Culms 20-100 cm tall, tufted. Leaves flat, glabrous or sparsely hairy; sheaths compressed, glabrous; ligules lacerate. Inflorescence a narrow panicle; spathes with tubercle-based hairs. Involucral spikelets

lanceolate, 6.5-7 mm long, 3-5-nerved. Lemma absent. Pedicellate spikelets reduced to a long pedicel. Bisexual spikelets lanceolate, 6-6.5 mm long, awned. Lower glume 6-6.5 mm long, 2-fid; upper glume similar. Lower lemma empty; upper lemma reduced to 12-14 mm long awn. Anthers 3, yellow, *ca* 2.5 mm long. Caryopsis not seen.

Endemic to India. Rare. Indore. *Fl.* & *Fr.*: July - Dec.

2. Iseilema holei Haines, Bot. Bihar Orissa 5: 1055. 1924; Bor, Grass. Burm. Ceyl. Ind. Pak. 188. 1960.

Annuals. Culms 60-100 cm tall, tufted. Leaves linear, glabrous; sheaths glabrous; ligules membranous, hyaline. Inflorescence of racemes enclosed in spathes. Involucral spikelets lanceolate, *ca* 5 mm long, pedicellate. Lower glume 4-4.5 mm long, 5-nerved; upper glume similar, 3-nerved. Bisexual spikelets 4.5-5 mm long, glabrous, awned. Lower glume 4-5 mm long, membranous, 2-fid; upper glume similar, acute. Lower lemma absent; upper lemma reduced to 17-18 mm long awn. Palea nerveless. Anthers 3, yellow, 2-2.5 mm long. Caryopsis ellipsoid.

Endemic to India. Rare. (Locality not mentioned, coll. no. 2261). *Fl.* & *Fr.*: Oct. - Feb.

3. Iseilema laxum Hack. in A. DC., Monogr. Phan. 6: 682. 1889; Hook. *f.*, Fl. Brit. India 7: 218. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 188. 1960.

Perennials. Culms 70-90 cm tall, erect, densely tufted. Leaves 15-30 cm long, scabrid; sheaths glabrous; ligules hairy. Inflorescence of solitary raceme, 7-11 cm long. Sessile spikelets linear or lanceolate, 8-9 mm long; callus shortly bearded. Lower glume 8-9 mm long, chartaceous, 2-dentate, deeply grooved; upper glume cymbiform, 4-5 mm long; awn *ca* 1.5 cm long. Lower lemma hyaline, *ca* 6.3 mm long, ciliate; upper lemma bisexual, 2-lobed, *ca* 6.5 mm long; awn *ca* 3.5 cm long. Palea ciliate. Pedicellate spikelets 9.5-11 mm long, glabrous. Anthers 3, yellow, 2.5-3 mm long. Caryopsis *ca* 3.5 mm long.

Common. Balaghat, Bastar, Bilaspur, Damoh, Durg, Gwalior, Hoshangabad, Indore, Rewa, Satna, Sidhi, Tikamgarh. *Fl.* & *Fr.*: Oct. - Nov.

4. Iseilema prostratum (L.) Anders. in Nov. Act. Soc. Sci. Upsal. ser. 3, 2: 251. 1856; Bor, Grass. Burm. Ceyl. Ind. Pak. 188. 1960. *Andropogon prostratus* L., Mant. Pl. 304. 1771. *Iseilema wightii* Anders. in Nov. Act. Soc. Sci. Upsal. ser. 3, 2: 251. 1856; Hook. *f.*, Fl. Brit. India 7: 218. 1896.

Perennials. Culms 30-80 cm tall, erect or decumbent. Leaves 8-18 cm long, glaucous; sheaths smooth; ligules membranous. Inflorescence a panicle; spathe linear-lanceolate, 3-18 mm long, scarious on margins. Involucral spikelets 5-6 mm long. Lower glume *ca* 6 mm long, 5-ribbed on back; upper glume glabrous, 1-nerved on margins. Lower lemma absent; upper lemma male. Anthers 3, yellow, 1.5-2 mm long. Pedicellate spikelets similar to sessile spikelets, lanceolate, 2.5-3 mm long. Lower glume *ca* 2.5 mm long, acute, 4-nerved; upper glume elliptic-lanceolate. Lower lemma hyaline, linear, *ca* 2.5 mm long; upper lemma bisexual, epaleate. Anthers 3, brownish yellow, *ca* 3 mm long. Caryopsis brown, *ca* 2 mm long.

Common. Bastar, Bilaspur, Hoshangabad, Indore, Mandla, Rajnandgaon. *Fl. & Fr.*: Sept. - Jan.

56. JANSENELLA Bor

Annuals. Leaf blades thin, flat. Panicles small, compact. Spikelets with 2 large, thin, acuminate or awn-tipped glumes and 2 florets. Lower floret neuter. Lemma similar to the glumes in size, texture and shape. Upper floret bisexual, with a stout, twisted, flattened, geniculate awn arising between the setaceous lobes of a 2-fid apex, the base of the lobes beset with dense tufts of hair near the margins. Caryopsis with punctiform hilum.

A monotypic genus; India and Sri Lanka.

Jansenella griffithiana (C. Muell.) Bor in Kew Bull. 1955: 98. 1955 & Grass. Burm. Ceyl. Ind. Pak. 426. 1960. *Danthonia griffithiana* C. Muell. in Bot. Zeit. 14: 347. 1856. *Arundinella avenacea* Munro *ex* Thwaites, Enum. Pl. Zeyl. 362. 1864; Hook. *f.*, Fl. Brit. India 7: 69. 1896.

Annuals. Culms 15-40 cm tall, slender. Leaves ovate-lanceolate, 3-5 cm long; sheaths loose, glabrous; ligules lacerate. Inflorescence a compact, glabrous to hairy panicle. Spikelets 5-6 mm long, subsessile. Lower glume

ca 4 mm long, with arista, 3-5-nerved; upper glume 4.5-5 mm long, 3-5-nerved, both glumes awned. Lower floret male or neuter, awned. Upper floret bisexual. Lemma linear-oblong, *ca* 3 mm long; lateral awns triangular at base, median awn flattened, strongly twisted, twice as long as the spikelets. Anthers 3, yellow, 0.5-0.75 mm long.

Rare. In moist and swampy places. Bastar. *Fl. & Fr.*: Aug. Nov.

57. LEERSIA Sw., *nom. cons.*

Perennials. Rhizomes creeping. Culms up to 60 cm tall, slender, often geniculate and ascending. Leaf blades flat or convolute, often harshly scabrid on margins; ligules membranous. Panicles spreading, ovate or oblong. Spikelets shortly pedicellate and imbricate, 1-flowered, laterally compressed, falling entire from the pedicel. Glumes absent or represented by an obscure frill at the pedicel tip. Lemma cymbiform, chartaceous, usually 5-nerved, typically spinulose scabrid, muticous, rarely subulate-caudate or awned. Palea resembling the lemma but narrower and usually 3-nerved. Anthers (1-3-) 6. Stigmas 2.

About 17 species; tropical and subtropical regions; one in M.P.

Leersia hexandra Sw., Prodr. 21. 1788; Hook. *f.*, Fl. Brit. India 7: 94. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 599. 1960.

Perennials, aquatic. Culms 0.5-1.2m long; nodes hairy. Leaves flat, rigid, glaucous, serrulate along margins with retrorsely spinulose midrib; sheaths smooth or scabrous; ligules membranous. Inflorescence a terminal, contracted, 5-10 cm long panicle. Spikelets closely imbricate, compressed, 3-4 mm long. Glumes reduced to a rim. Lemma 3-4 mm long, cartilaginous, 5-nerved; keels rigidly ciliate. Palea shorter, 3-nerved; keels ciliate. Anthers 6, equalling the palea. Caryopsis almost equal to lemma, glabrous, enclosed by the lemma and palea.

Forming dense masses around the swamps or lakes in shallow water. Bastar, Bilaspur, Sidhi, Surguja. *Fl. & Fr.*: Sept. - Nov.

58. LEPTOCHLOA P. Beauv.

Annuals or perennials, tufted or rhizomatous. Leaf blades linear or lanceolate, usually flat; ligules short, membranous. Inflorescence open, of

several to numerous, slender, secund racemes scattered along a central axis. Spikelets 1 to several-flowered, laterally compressed, usually overlapping, 2-seriate, disarticulating between the florets. Glumes membranous, 1-nerved, keeled, usually shorter than the lemmas, subequal or unequal, persistent. Lemma membranous, 3-nerved, keeled, minutely hairy along the nerves and sometimes also on the back, acute or obtuse, entire or emarginate, awnless. Caryopsis various.

About 20 species; tropical and subtropical regions; 2 in M.P.

1a. Spikelets 4-6 mm long, 3-7-flowered; upper glume shorter than first floret ...1. *L. chinensis*

1b. Spikelets 1.8-2.5 mm long, usually 2-3-flowered; upper glume longer than the first floret ...2. *L. panicea*

1. Leptochloa chinensis (L.) Nees in Syll. Ratisb. 1: 4. 1824; Hook. *f.*, Fl. Brit. India 7: 299. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 516. 1960. *Poa chinensis* L., Sp. Pl. 69. 1753.

Annuals. Culms 40-90 cm tall, erect or geniculate, tufted; nodes glabrous. Leaves linear, glabrous; sheaths compressed; ligules lacerate. Inflorescence a loose panicle; branches alternate; rhachis stiff, scaberulous. Spikelets linear, 4-6 mm long, 3-7-flowered. Lower glume 1.25-1.5 mm long, membranous, 1-nerved; upper glume *ca* 1.5 mm long. Lemma *ca* 2 mm long, 3-nerved. Palea keels ciliolate. Anthers 3, *ca* 0.4 mm long. Caryopsis brown, obtusely trigonous, *ca* 1 mm long.

Bilaspur, Rewa, Surguja. *Fl. & Fr.*: Sept. - Feb.

2. Leptochloa panicea (Retz.) Ohwi in Bot. Mag. Tokyo 55: 311. 1941; Bor, Grass. Burm. Ceyl. Ind. Pak. 517. 1960. *Poa panicea* Retz., Observ. Bot. 3: 11. 1783. *Leptochloa filiformis auct. non* P. Beauv., 1812: Hook. *f.*, Fl. Brit. India 7: 298. 1896.

Annuals. Culms 25-60 cm tall, geniculate. Leaves linear-lanceolate, with tubercle-based hairs; sheaths glabrous or hairy along margins; ligules lacerate. Inflorescence a panicle of several, slender, ascending branches, often purplish. Spikelets usually 2-3-flowered, 1.8-2.5 mm long, overlapping. Lower glume lanceolate, 0.7-1.5 mm long, acute; upper glume narrowly oblong, 0.9-1.6 mm long, mucronate. Lemma elliptic or oblong, 0.8-1.2 mm

long, 3-nerved. Anthers very small, pinkish. Caryopsis broadly ellipsoid, trigonous, *ca* 0.5 mm long.

Rare. Damoh. *Fl. & Fr.*: July - Nov.

59. LOLIUM L.

Annuals or perennials. Leaf blades flat or rolled, often auriculate. Inflorescence a stiff, 2-sided spike, the spikelets alternate in opposite rows with one edge sunk in hollows in the continuous axis. Spikelets 3-12 (-22)-flowered, the uppermost floret reduced. Lower glume suppressed in all except the terminal spikelet; upper glume persistent, external, linear to oblong, 5-9-nerved, becoming hardened. Lemma rounded on the back, 5-9-nerved, awnless or with a straight awn from near the tip. Palea as long as the lemma.

About 8 species; Eurasia; one in M.P.

Lolium temulentum L., Sp. Pl. 83. 1753; Hook. *f.*, Fl. Brit. India 7: 364. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 546. 1960.

Annuals. Culms 15-60 cm tall, erect; nodes glabrous. Leaves 10-20 cm long, acute at apex; sheaths glabrous; ligules membranous, truncate. Inflorescence a solitary spike; rhachis flexuous. Spikelets alternate, elliptic or oblong, 5-15-flowered. Lower glume absent; upper glume elliptic-oblong, *ca* 9 mm long, 5-nerved; awn *ca* 1.5 mm long. Palea *ca* 6 mm long, winged, 2-keeled, serrulate along keels. Anthers 3, pale yellow, linear, 2-3 mm long. Caryopsis oblong, 4.5-5 mm long.

Rare. Damoh. *Fl. & Fr.*: Dec. May.

60. MANISURIS L.

Annuals, erect, slender. Leaves flat, cordate. Racemes small, terete, axillary and terminal, shortly pedunculate; rhachis green, fragile, glabrous with short, broad internodes, excavate opposite the sessile spikelets. Spikelets in dissimilar pairs, one globose, sessile, bisexual, the other ovate, pedicellate, male or neuter; pedicels adnate or closely appressed to the joint of the rhachis. Lower glume of sessile spikelet hard, globose, foveolate, coriaceous, at length crustaceous, with an oblong opening opposite the

rhachis; upper glume minute, oblong, coriaceous, 1-nerved, closing the orifice of the lower glume. Lower lemma orbicular, minute, hyaline, empty; upper lemma and its palea hyaline, broadly oblong. Anthers minute.

About 5 species; India; 2 in M.P.

1a. Lower glume of sessile spikelets awnless ...1. *M. clarkei*

1b. Lower glume of sessile spikelets with one or two divaricate awns ...2. *M. forficulata*

1. **Manisuris clarkei** (Hack.) Bor in Santapau, Fl. Khandala 357. 1953; Bor, Grass. Burm. Ceyl. Ind. Pak. 191. 1960. *Rottboellia clarkei* Hack. in Oest. Bot. Zeit. 41. 8. 1891; Hook. *f.*, Fl. Brit. India 7: 156. 1896.

Annuals. Culms 20-60 cm tall, erect; nodes with ring of hairs. Leaves linear-lanceolate, hairy; midrib prominent; sheaths compressed, ciliate; ligules lacerate. Inflorescence of solitary raceme supported by a spathe; rhachis very fragile; joints pyriform, shorter than the spikelet, ciliolate, with a broad cavity at the tip. Sessile spikelets 2.5-3 mm long, obtuse, closely imbricate. Lower glume 3-5-nerved, disk and hyaline wings ciliate at tip, scabrid and hairy below the middle; upper glume ovate, 2.5-3 mm long, subacute, membranous, glabrous, 1-nerved. Lemma shorter than upper glume, hyaline, nerveless. Palea hyaline, nerveless. Pedicellate spikelets sterile, each represented by an empty glume. Anthers 3, yellow, *ca* 1 mm long.

Endemic to India. Balaghat, Raigarh. *Fl. & Fr.*: Sept. Nov.

2. **Manisuris forficulata** C. Fisch. in Kew Bull. 1933: 355. 1933; Bor, Grass. Burm. Ceyl. Ind. Pak. 192. 1960. *Rottboellia divergens auct. non* Hack., 1889: Hook. *f.*, Fl. Brit. India 7: 155. 1896.

Annuals. Culms 10-25 cm tall, erect, slender; nodes with binate flowering branches. Leaves linear, acuminate at apex, hairy; sheaths loose, hairy; ligules membranous, obtuse. Inflorescence a solitary, 2-4 cm long raceme; peduncles filiform; joints of the rhachis shorter than the spikelets, subclavate. Sessile spikelets *ca* 6 mm long; awns 5-8 mm long. Lower glume coriaceous, with 5-7 transverse echinulate ridges below the middle, with cleft at apex; upper glume much shorter, *ca* 3 mm long, thinly membranous, 1-nerved. Lemma broadly ovate, 2.5-3 mm long, nerveless.

Endemic to India. Rare. Hoshangabad. *Fl. & Fr.*: Sept. Nov.

61. MELANOCENCHRIS Nees

Annuals or perennials. Leaf blades flat or convolute. Spikelets in shortly pedunculate, turbinate heads, secund and distant upon a tough flexuous rhachis; heads falling entire, formed of 5-8 spikelets, 2 fertile, others male or sterile, the latter reduced to lemmas only. Fertile spikelets 2-3-flowered, lowest floret fertile. Lower glume linear, 1-nerved with the nerve produced as scabrid awn, hairy on the back and at base; upper glume 3-nerved, with a broad hyaline wing on each side, the mid nerve produced as scabrid awn, hairy on the nerves and at the base, the wings sparsely covered with short clavate hairs. Lowest lemma ovate, broad, smooth or covered on the back with short clavate hairs, 3-nerved, narrow, cuspidate or 3-lobed at apex, the lobes aristate. Palea broadly elliptic, 2-cuspidate, 2-keeled, hairy on the back with short clavate hairs. Upper sterile florets reduced to lemmas. Caryopsis obovate-ellipsoid, somewhat depressed on the back.

About 3 species; N. E. tropical Africa to India and Sri Lanka; one in M.P.

Melanocenchris jacquemontii Jaub. & Spach, Ill. Pl. Orient. 4: 36. 1851; Bor, Grass. Burm. Ceyl. Ind. Pak. 473. 1960. *Gracilea royleana* Hook. *f.*, Fl. Brit. India 7: 284. 1896. **Fig. 57.**

Annuals. Culms 7-30 cm tall, densely tufted. Leaves 2.5-5 cm long, acute at apex, ciliate on margins, glabrous; sheaths glabrous; ligule a fringe of hairs. Inflorescence spicate, filiform, 1-5 cm long. Spikelets in clusters of threes, green or purple, 6-8.5 mm long (with awn). Involucral glumes 4; outer glumes *ca* 7 mm long, hairy below; awns retrorsely barbed; inner glumes 6-7 mm long. Palea as long as the glume, 2-dentate; rhachilla projected beyond palea. Inner floral glume stalked, distinctly 3-dentate at apex, scabrid on back. Anthers 3, pale yellow, *ca* 1 mm long. Caryopsis greyish brown, oblong, 1.5-2 mm long, polished.

Common. Balaghat, Bilaspur, Damoh, Hoshangabad, Indore, Jabalpur, Mandla, Sagar, Satna, Sidhi, Surguja. *Fl. & Fr.*: Sept. - Nov.

Fig. 57. Melanocenchris jacquemontii Jaub. & Spach

62. MICROSTEGIUM Nees

Perennials or sometimes annuals, rambling. Leaf blades linear to lanceolate, narrowed at the base and often with a short, false petiole; ligules short, scarious. Inflorescence terminal, comprising of up to 25 subdigitate racemes, rarely solitary or with a short common axis; racemes fragile (very rarely tough), seldom conspicuously hairy, bearing paired, similar spikelets; internodes and pedicels linear or rarely inflated. Spikelets dorsally compressed; callus obtuse. Lower glume herbaceous to cartilaginous, flat on the back with a median groove, acute or notched at apex, sharply inflexed on margins; upper glume acute or with a short awn-point. Lower floret male, reduced to a hyaline scale or suppressed (these variants often mixed in the same panicle). Upper lemma hyaline, linear to cordate, often minute, 2-dentate to 2-fid, with glabrous awn from the sinus. Palea small or absent. Stamens 3, rarely 2. Caryopsis narrowly ellipsoid to lanceolate, dorsally flattened.

About 17 species; tropical and subtropical regions of Old World especially Africa; 2 in M.P.

1a. Ligules less than 4 mm long; sessile spikelets 2.5-3.5 mm long; upper lemma very short; anthers 1.5-2 mm long ...1. *M. ciliatum*

1b. Ligules 4-9 mm long; sessile spikelets 4.5-5 mm long; upper lemma well developed; anthers *ca* 3 mm long ...2. *M. petiolare*

1. Microstegium ciliatum (Trin.) A. Camus in Ann. Soc. Linn. Lyon. n.s. 68: 201. 1921; Bor, Grass. Burm. Ceyl. Ind. Pak. 193. 1960. *Pollinia ciliata* Trin. in Mem. Acad. Sci. Pétersb. ser. 6, 2: 306. 1832; Hook. *f.*, Fl. Brit. India 7: 116. 1896.

Annuals or perennials. Culms up to 1.2 m tall, decumbent, rooting at lower nodes. Leaves lanceolate, glabrous, basal portion with bulbous-based hairs; sheaths tight, glabrous; ligules short, membranous. Spikelets in alternate pairs. Sessile spikelets 2.5-3.5 mm long, narrow, ciliate. Lower glume lanceolate, *ca* 3 mm long, dorsally grooved, keels scabrid, tips forked; upper glume equal to lower, 1-nerved, awned or mucronate. Lower floret male or neuter. Upper floret bisexual. Lemma *ca* 0.5 mm long, acute; awn 5-17 mm long. Anthers 3, yellow, 1.5-2 mm long.

Rare. Bilaspur. *Fl. & Fr.*: Sept. Dec.

2. **Microstegium petiolare** (Trin.) Bor in Ind. For. Rec. (Bot.) 1: 3, 87. 1938; Bor, Grass. Burm. Ceyl. Ind. Pak. 194. 1960. *Spodiopogon petiolaris* Trin. in Mem. Acad. Sci. Pétersb. ser. 6, 2: 301. 1832. *Ischaemum petiolare* Hack. in A. DC., Monogr. Phan. 6: 238. 1889; Hook. *f.*, Fl. Brit. India 7: 138. 1896.

Perennials. Culms 50-100 cm tall, decumbent, rooting at nodes. Leaves lanceolate, scabrid on margins, with tubercle-based hairs on both the surfaces; sheaths terete, ciliate; ligules 4-9 mm long, truncate, pubescent on back. Inflorescence of 8-20 racemes, simple or divided. Sessile spikelets 4.5-5 mm long. Lower glume equalling spikelets, dorsally grooved, dentate, 6-8-nerved; keels scabrid, ciliate; upper glume scabrid, 3-nerved. Lower floret male. Upper floret bisexual. Lemma ovate-oblong, 3-4.5 mm long, 2-lobed; awn 4-8 mm long from sinus. Anthers 3, yellow, *ca* 3 mm long.

Rare. Bastar. *Fl. & Fr.*: Sept. Dec.

63. MNESITHEA Kunth

Perennials. Leaf blades linear; ligules shortly membranous. Inflorescence a single raceme, terminal on the culm or from axillary branches; racemes fragile, cylindrical, with 2 sessile spikelets at each node, placed back to back, sunk into the internode and separated by a narrow pedicel; internodes thickened, squatly clavate; pedicels usually free. Sessile spikelets 2-flowered, falling entire, dorsally compressed; callus truncate with a prominent central peg. Lower glume coriaceous, broadly convex with the sides sharply inflexed and 2-keeled, smooth or sculptured, winged or not. Lower floret reduced to a hyaline lemma. Upper floret bisexual. Lemma entire, awnless. Pedicellate spikelets reduced to tiny scales or absent; pedicels linear.

About 5 species; Indo-Malesia; one in M.P.

Mnesithea laevis (Retz.) Kunth, Revis. Gramin. 1: 154. 1829; Bor, Grass. Burm. Ceyl. Ind. Pak. 197. 1960. *Rottboellia laevis* Retz., Observ. Bot. 3: 11. 1783. *R. perforata* Roxb., Pl. Coromandel 2: 43. t. 182. 1805; Hook. *f.*, Fl. Brit. India 7: 158. 1896.

Perennials. Culms 0.3-1.6 m tall, erect, tufted. Leaves 15-30 cm long, hairy at base; sheaths loose, glabrous; ligules membranous. Inflorescence a 8-20 cm long raceme. Sessile spikelets 3.5-4.5 mm long, glabrous. Lower glume *ca* 3.5 mm long, faintly 4-5-nerved; upper glume *ca* 4 mm long, 3-nerved. Lower lemma with faint marginal nerves. Palea absent. Upper lemma 3-nerved. Pedicellate spikelets reduced. Anthers 3, pinkish, *ca* 2 mm long. Caryopsis 1.5-2 mm long.

Rare. Balaghat, Damoh. *Fl. & Fr.*: Sept. Nov.

64. NARENGA Bor

Perennials. Culms tall, densely bearded at the nodes. Leaves long, flat, scabrid. Panicles narrow, dense; hairs shorter than the spikelets. Spikelets all alike, 2-nate, one sessile, the other pedicellate on the articulate fragile rhachis of panicled racemes, the pedicellate falling from their pedicels, the sessile ones together with the contiguous joint of the rhachis and pedicel. Florets 2, lower floret reduced to an empty lemma; upper bisexual. Glumes brown, shining, equal in length, coriaceous; lower glume flat on the back, laxly inflexed on margins, short haired on the margins; upper glume keeled, membranous at the top. Lemma hyaline; upper one truncate, awnless, paleate. Lodicules 2. Stamens 3. Stigmas laterally exserted.

Two species; N. E. India to Borneo; one in M.P.

Narenga porphyrocoma (Hance) Bor in Ind. For. 66: 268. 1940 & Grass. Burm. Ceyl. Ind. Pak. 198. 1960. *Eriochrysis porphyrocoma* Hance, J. Bot. 14: 294. 1876. *Saccharum narenga* Wallich *ex* Hook. *f.*, Fl. Brit. India 7: 120. 1896. *Eriochrysis narenga* Nees *ex* Steud., Syn. Pl. Glumac. 1: 411. 1854.

Perennials. Culms 2-2.5 m tall, rounded, silky below the panicle and on nodes. Leaves narrow at base, serrate, glabrous on upper surface with tubercle-based hairs; median nerves strong; sheaths scabrous with long hairs near throat or hairy all over; ligules ciliolate, membranous. Inflorescence narrow, dense, 30-45 cm long, woolly panicle, minutely scaberulous, bearded at nodes; primary branches 2-4-nate, glabrous; secondary branches alternate. Sessile spikelets 2.5-3 mm long, entire, short hairy on margins. Upper glume equal to lower, keeled, obtuse, ciliate on margins. Lower floret empty. Upper floret bisexual. Lemma 2-3 mm long,

nerveless, ciliate. Anthers 3, yellow, *ca* 1.5 mm long. Caryopsis blackish purple, *ca* 1 mm long.

Bilaspur, Hoshangabad, Sidhi, Surguja. *Fl. & Fr.*: Oct. - Jan.

65. OPHIUROS Gaertn. *f.*

Culms erect, striate, glabrous. Leaves glabrous; ligules very short, truncate. Inflorescence a false spike, solitary or fascicled at the summit of the branches of stem, cylindrical; rhachis very fragile, fused to the pedicel joints, very thick, semicylindrical, glabrous, excavated on one face; articulation straight or somewhat oblique. Sessile spikelets in the cavities of the rhachis, 2-flowered, rarely 1-flowered. Pedicellate spikelet at each node often reduced to a pedicel, adnate to the rhachis. Glumes glabrous; lower glume thick, coriaceous or cartilaginous, convex, smooth, obtuse, entire, narrowly and slightly inflexed on margins, very obscurely 7-nerved, spreading at anthesis; callus very narrow, annuliform, separated from the rest of glume by a deep channel; upper glume submembranous, concave, obscurely 2-nerved, inflexed on margins. Palea narrow or absent. Upper floret bisexual. Lemma hyaline, oblong-obtuse, nerveless or almost so. Palea narrow. Lodicules 2, cuneiform, truncate. Stamens 3. Caryopsis oblong or ovate-oblong, convex on both faces; embryo equalling 2/3rd of caryopsis.

About 7 species; N. E. tropical Africa and Indo-Malesia to Australia; 2 in M.P.

1a. Leaves linear, glabrous except at base; spikes corymbose ...1. *O. exaltatus*

1b. Leaves ensiform, hairy, with bulbous-based hairs on margins; spikes usually solitary ...2. *O. megaphyllus*

1. Ophiuros exaltatus (L.) Kuntze, Revis. Gen. Pl. 2: 780. 1891; Bor, Grass. Burm. Ceyl. Ind. Pak. 199. 1960. *Aegilops exaltata* L., Mant. Pl. 575. 1771. *Ophiuros corymbosus* Gaertn. *f.*, Fruct. 3: 4. t. 181. 1805; Hook. *f.*, Fl. Brit. India 7: 160. 1896.

Perennials, robust. Culms 0.6-1.2 m tall, glabrous, bulbous at base. Leaves 30-40 cm long, glabrous, hairy at base, minutely tubercled on margins; sheaths loose, glabrous; ligules membranous, truncate,

Inflorescence of 8-12 cm long, false spikes, fascicled in the axil of spathes. Spikelets 2-3.5 mm long, equalling the joint. Lower glume of sessile spikelets *ca* 3 mm long, glabrous, with many small pits; upper glume cymbiform, *ca* 3 mm long, obtuse. Lower lemma hyaline, *ca* 2 mm long, 2-nerved; upper lemma *ca* 2 mm long. Anthers 3, yellow, 1.5-2 mm long. Caryopsis slightly dorsally compressed, *ca* 1.5 mm long.

Common. Balaghat, Bilaspur, Damoh, Gwalior, Mandla, Sagar, Sidhi. *Fl. & Fr.*: Sept. Oct.

2. Ophiuros megaphyllus Stapf *ex* Haines, Bot. Bihar Orissa 1058. 1924 (3: 1106. 1961. repr. ed.); Bor, Grass. Burm. Ceyl. Ind. Pak. 199. 1960. *O. corymbosus auct. non* Gaertn. *f.*, 1805: Hook. *f.*, Fl. Brit. India 7: 160. 1896, *p.p.*

Perennials. Culms up to 3 m tall. Leaves ensiform, hairy, with bulbous-based hairs on margins, glabrescent with age; ligules membranous. Spikes usually solitary, terete, smooth arising from leaf-axils, up to 12.5 cm long. Spikelets up to 5 mm long. Lower glume convex, coriaceous, more or less seriately pitted on the back; upper glume cymbiform, membranous, faintly 3-nerved. Lower floret male. Palea elliptic, obtuse, hyaline. Upper floret bisexual. Palea elliptic-oblong, obtuse.

In association with *Capillipedium parviflorum*, *Cymbopogon martinii* and *Iseilema anthephoroides*. Balaghat (Kumar and Lal, 1984). *Fl. & Fr.*: Aug. - Sept.

66. OPLISMENUS P. Beauv., *nom. cons.*

Annuals or perennials. Culms slender, trailing or scrambling, often rooting from nodes; internodes mostly with a decurrent villous line adaxial to the subtending leaf. Leaf blades broadly linear to ovate, often minutely cross-veined. Inflorescence of racemes borne along a central axis; rhachis narrow, bearing paired spikelets. Spikelets lanceolate to oblong. Glumes subequal, 1/2 to 3/4th of spikelet, both or at least the lower awned; lower glume abaxial. Lower floret barren (rarely male), usually without a palea. Upper lemma subcoriaceous, with margins broadly clasping the sides of the palea. Caryopsis oblong.

About 9 species; tropical and subtropical regions; 2 in M.P.

1a. Leaves up to 4 cm long; awns barbellate, capillary, often flexuous ...1. *O. burmannii*

1b. Leaves 10 cm or more long; awns smooth, viscid, filiform, stiff ...2. *O. compositus*

1. Oplismenus burmannii (Retz.) P. Beauv., Ess. Agrostogr. 54, 168, 169. 1812; Hook. *f.*, Fl. Brit. India 7: 68. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 317. 1960. *Panicum burmannii* Retz., Observ. Bot. 3: 10. 1783.

Annuals. Culms 10-70 cm long, prostrate, slender, pubescent and rooting at nodes. Leaves thin, ovate to elliptic-lanceolate, softly pubescent; sheaths compressed, lower loose, hispid to softly pubescent; ligules hyaline, membranous, ciliate at tip. Inflorescence a panicle of 3-7 racemes, ascending; rhachis slender, trigonous, pilose with bristles. Spikelets elliptic-lanceolate, *ca* 3 mm long. Lower glume 1.5-2 mm long, 5-nerved, dorsally pubescent, ciliate on margins; awn 2.5-10 mm long, pubescent; upper glume similar to lower. Lower lemma empty; upper lemma whitish yellow, 2-2.5 mm long, 5-7-nerved, chartaceous. Anthers 3, yellow, *ca* 1 mm long. Caryopsis 2-2.5 mm long, convex on back; hilum about half the length of caryopsis.

Common on sandy soil in shady places throughout the state. *Fl. & Fr.*: July - Dec.

2. Oplismenus compositus (L.) P. Beauv., Ess. Agrostogr. 54, 168, 169. 1812; Hook. *f.*, Fl. Brit. India 7: 66. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 317. 1960. *Panicum compositum* L., Sp. Pl. 57. 1753.

Perennials. Culms up to 100 cm long, decumbent, branched, glabrous or hairy, rooting at base. Leaves lanceolate, rounded at base, minutely hairy to velvety below; sheaths markedly striate, densely ciliate along the margin; ligules short, ciliate. Inflorescence a panicle of 3-5, one-sided racemes, alternately arranged on trigonous rhachis; racemes 2.5-6 cm long; pedicels short, with bristles. Spikelets lanceolate, 4-5 mm long (excluding awn), acuminate. Glumes subequal, *ca* 3 mm long, thin, lanceolate to oblong: lower glume 5-nerved, awn *ca* 1.25 mm long; upper glume 7-9-nerved, awn 2.5-3 mm long. Lower floret barren, equalling the spikelets. Upper floret bisexual, oblong, *ca* 3 mm long, acute. Lemma and palea sub-coriaceous. Anthers 3, yellow, *ca* 1 mm long. Caryopsis dorsally compressed, 2.5-3 mm long.

Bastar, Bilaspur, Hoshangabad, Mandla, Raigarh, Rewa, Sidhi. *Fl. & Fr.*: July - Feb.

67. OROPETIUM Trin.

Perennials, rarely annuals, tufted. Leaf blades linear, flat or folded, sparsely to densely pilose or subglabrous. Inflorescence a single, slender, straight, curved or coiled, terminal spike; rhachis slender, spongy or herbaceous, with 1-4 (-8) spikelets. Spikelets embedded in hollows arranged alternately in 2 opposite, subopposite or adjacent ranks, 1-2-flowered. Lower glume adaxial, minutely hyaline, nerveless, rarely absent; upper glume abaxial, usually appressed to the rhachis, exceeding and covering the floret, lanceolate, herbaceous, tough, 1-3-nerved, acute to finely awned. Lemma elliptic, oblong or obovate, membranous, 1-3-nerved, keeled, 2-dentate and mucronate at apex, the mucro rarely awned. Caryopsis elliptic-oblong or obovate.

About 6 species; tropical regions of Old World; 3 in M.P.

1a. Perennials; spikes 4-10 cm long; spikelets 3-4 mm long ...1. *O. roxburghianum*

1b. Annuals; spikes up to 2 cm long; spikelets up to 2 mm long:

2a. Spikes much compressed; spikelets *ca* 2 mm long; lemma glabrous ...2. *O. thomaeum*

2b. Spikes terete or slightly compressed; spikelets 1-1.5 mm long; lemma hirsute ...3. *O. villosulum*

1. Oropetium roxburghianum (Steud.) S.M. Phillips in Kew Bull. 30: 469. 1975. *Lepturus roxburghianus* Steud., Syn. Pl. Glumac. 1: 357. 1854; Hook. *f.*, Fl. Brit. India 7: 365. 1896. *Tripogon roxburghianus* (Steud.) Bhide in J. Proc. Asiat. Soc. Beng. II. 7: 515. 1912. **Fig. 58.**

Perennials. Culms 10-25 cm tall, erect, tufted. Leaves filiform, glabrous with a few white hairs along the margins; sheaths compressed, glabrous; ligules membranous. Inflorescence spicate, usually purple. Spikelets 3-4 mm long, 1-2-flowered, sunken in the hollow of rhachis. Lower glume *ca* 0.75 mm long, 1-nerved, asymmetrical; upper glume *ca* 3 mm long, acute, coriaceous. Lemma *ca* 2.5 mm long, 3-nerved, hairy at base, 2-3-dentate.

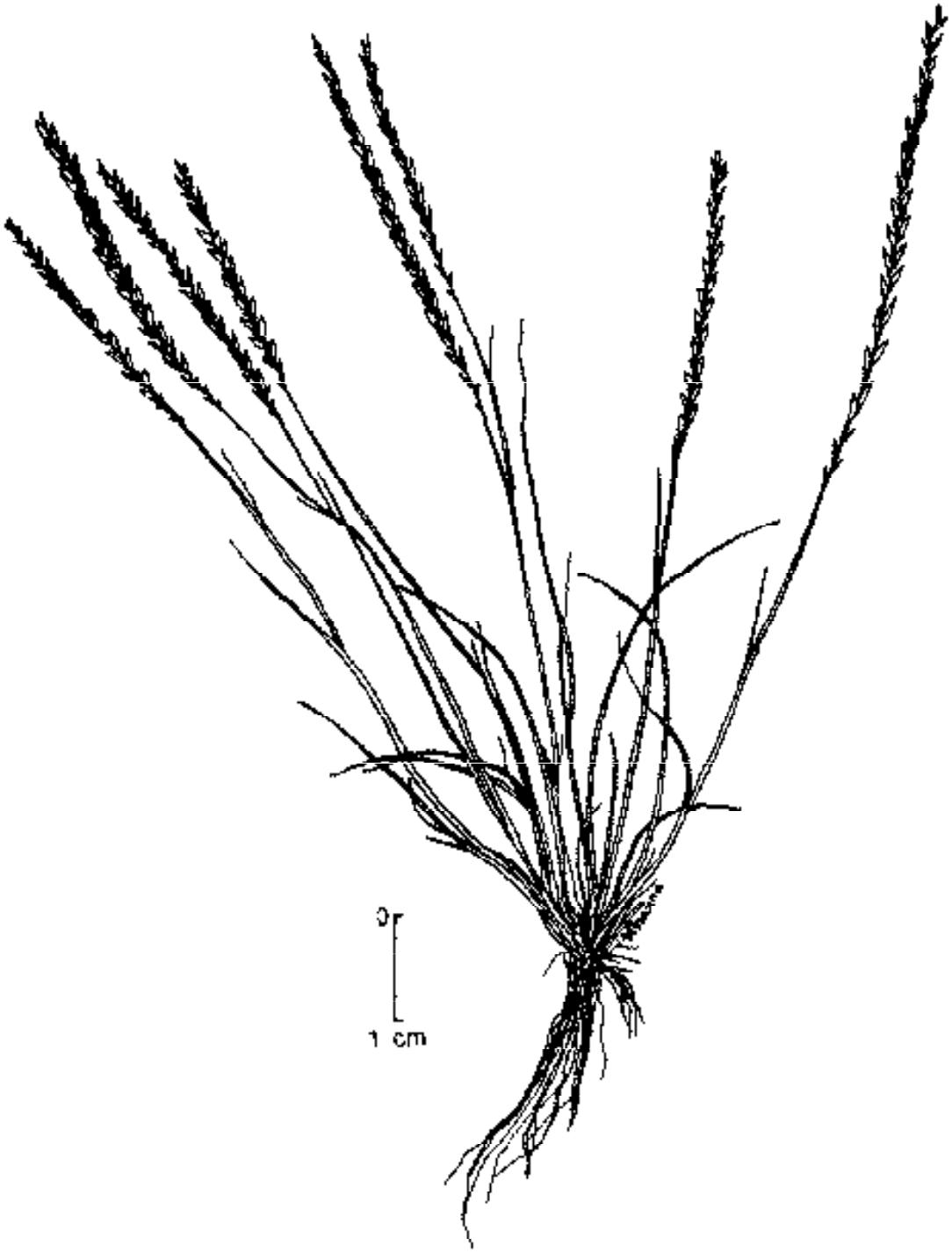

Fig. 58. Oropetium roxburghianum (Steud.) S.M. Phillips

Palea smooth. Anthers 3, yellow or purplish, 0.5-1 mm long. Caryopsis terete, *ca* 1 mm long.

Endemic to India. Rare. Hoshangabad, Rewa. *Fl. & Fr.*: Aug. - Nov.

2. Oropetium thomaeum (L. *f.*) Trin., Fund. Agrost. 98. t. 3. 1820; Hook. *f.*, Fl. Brit. India 7: 366. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 474. 1960. *Nardus thomaea* L. *f.*, Suppl. Pl. 105. 1782. **Fig. 59.**

Annuals. Culms 5-10 cm tall, densely tufted, branched. Leaves setaceous, acute at apex, glabrous or sparsely long hairy; sheaths compressed, spathaceous, glabrous; ligules lacerate. Inflorescence of spikes, enclosed in sheaths; rhachis 4-gonous. Spikelets sessile, sunken in the hollow of rhachis, 1-flowered, *ca* 2 mm long. Lower glume hyaline, *ca* 0.5 mm long, nerveless, lacerate at apex; upper glume *ca* 2 mm long, rigid, 3-nerved. Lemma cymbiform, 1-1.25 mm long. Anthers 3, yellow, very small. Caryopsis oblong, *ca* 0.5 mm long.

Not common. Gwalior, Rewa, Sidhi. *Fl. & Fr.*: July - Sept.

3. Oropetium villosulum Stapf *ex* Bor in Kew Bull. 1949: 571. 1950 & Grass. Burm. Ceyl. Ind. Pak. 474. 1960.

Annuals. Culms 5-10 cm tall, tufted, branched. Leaves setaceous, scabrid; sheaths compressed, spathaceous, glabrous; ligules short, membranous. Inflorescence of spikes enclosed in sheaths; rhachis 4-gonous. Spikelets 1-1.5 mm long, 1-flowered, sunken in the hollow rhachis. Lower glume 1-1.2 mm long, nerveless, truncate at apex; upper glume 2-2.5 mm long, 3-nerved, cuspidate. Lemma 1.5-1.7 mm long, 3-nerved, hirsute. Anthers 3, yellow, minute. Caryopsis oblong, *ca* 0.5 mm long.

Endemic to India. Rare. Bhopal. *Fl. & Fr.*: July - Sept.

68. ORYZA L.

Annuals or perennials. Leaf blades flat; ligules membranous. Panicles open or rather dense; branches numerous; racemes with shortly pedicellate spikelets. Spikelets 3-flowered, strongly laterally compressed, falling entire from the pedicel. Glumes absent or represented by obscure lips at the pedicel tip. Both lower florets represented only by narrow lemmas. Lemma

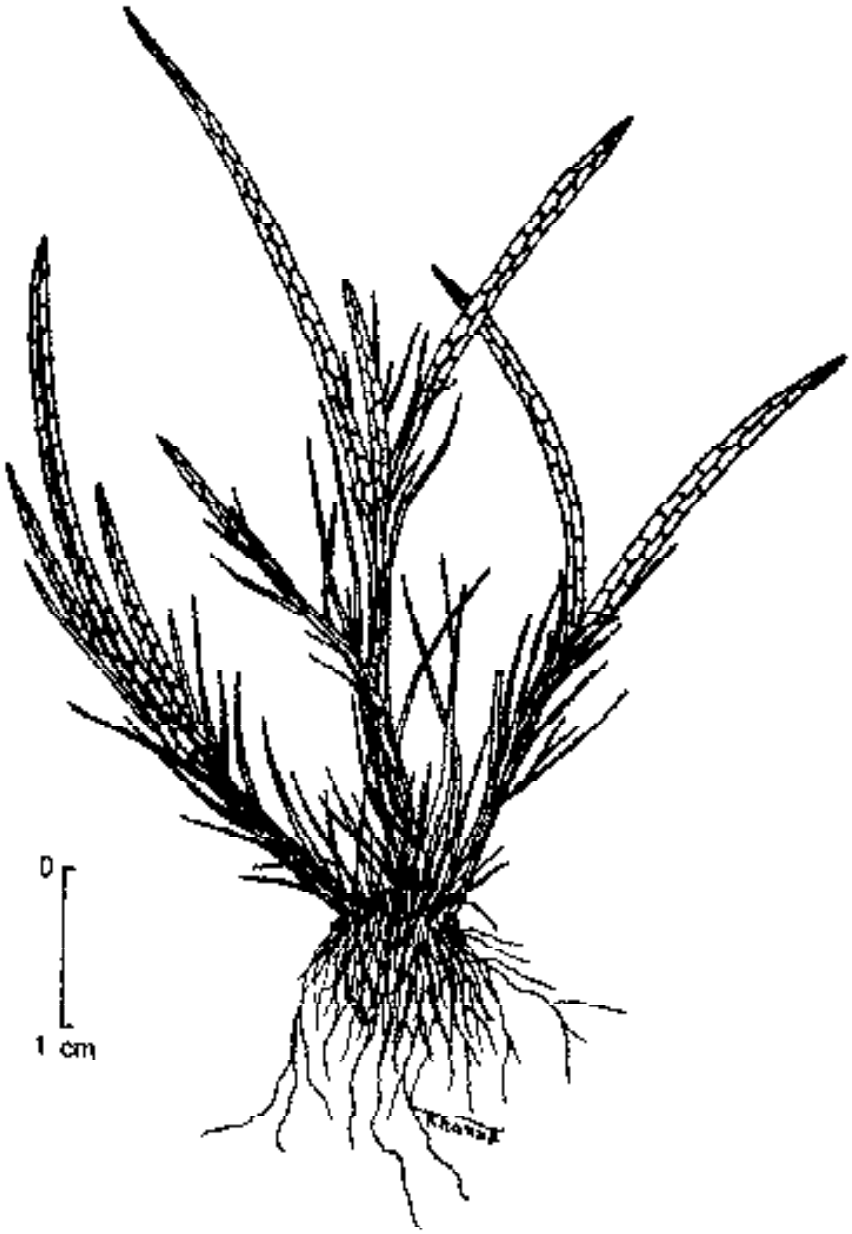

Fig. 59. Oropetium thomaeum (L. *f.*) Trin.

usually subulate or linear, much shorter than the spikelet. Upper floret fertile. Lemma coriaceous, strongly keeled, prominently 5-nerved, with or without an awn. Palea similar but narrower, keeled, 3-nerved. Stamens 3 or 6. Stigmas 2.

About 19 species; tropical regions; 4 in M.P.

1a. Spikelets up to 7 mm long, usually awnless:

2a. Spikelets absolutely glabrous, 6-7 mm long, persistent ...1. *O. glaberrima*

2b. Spikelets hispid, scaberulous, 4-5 mm long, caducous ...2. *O. minuta*

1b. Spikelets 8-12 mm long, awned:

3a. Spikelets caducous; anthers 6, *ca* 5 mm long ...3. *O. rufipogon*

3b. Spikelets persistent; anthers 3, *ca* 2 mm long ...4. *O. sativa*

1. Oryza glaberrima Steud., Syn. Pl. Glumac. 1: 3. 1854; Bor, Grass. Burm. Ceyl. Ind. Pak. 604. 1960.

Annuals. Culms 40-100 cm tall, erect, tufted. Leaves 20-50 cm long, scabrid; sheaths loose, glabrous; ligules of the lower leaves up to 6 mm long, rounded or truncate. Spikelets oblong or oblong-elliptic. Sterile lemma linear, flat, 6-7 mm long, membranous, glabrous, persistent, usually awnless, if awned, the awns smooth or scaberulous. Lemma and palea glabrous or sometimes hispid.

Cultivated rice. Native of W. tropical Africa, introduced in India. Sidhi, Surguja. *Fl. & Fr.*: Aug. - Oct.

2. Oryza minuta J. Presl *ex* K. Presl, Reliq. Haenk. 1: 208. 1830; Bor, Grass. Burm. Ceyl. Ind. Pak. 605. 1960. *O. latifolia auct. non* Desv., 1813: Hook. *f.*, Fl. Brit. India 7: 92. 1896.

Annuals. Culms up to 1.5 m tall, tufted. Leaves up to 50 cm long, *ca* 2 cm broad, scabrid; sheaths terete, glabrous, auricled; ligules membranous, *ca* 5 mm long. Inflorescence a terminal panicle; main branches widely spaced, lowest whorled, scaberulous and drooping. Spikelets many, dark brown or black when ripe, 4-5 mm long, articulate above the minute glumes. Glumes 1.5-2 mm long. Lemma linear-lanceolate or oblong, *ca* 1.6 mm

long, acuminate, rounded, 1-nerved, folded at mid nerve; awn *ca* 2 mm long. Palea hispid scaberulous, fitted to lemma, apiculate. Anthers 3, pale yellow or purplish. Stigma deep purple. Caryopsis red-brown, flat, *ca* 3.5 mm long.

Not common. Sidhi, Surguja. *Fl. & Fr.*: Aug. - Oct.

3. Oryza rufipogon Griff., Not. Pl. Asiat. 3: 5. 1851; Bor, Grass. Burm. Ceyl. Ind. Pak. 605. 1960.

Annuals. Culms 1-1.5 m tall, lower parts spongy. Leaves linear, acuminate at apex, scabrid on margins and veins; sheaths terete, loose, glabrous, auricled; ligules up to 1.7 cm long, splitting at tip. Inflorescence an exserted, compound panicle; main branches angular and scabrid. Spikelets 8-9 mm long, falling with age. Lemma I 1-nerved, *ca* 2.5 mm long; lemma II *ca* 2.4 mm long; lemma III *ca* 0.7 mm long, strongly folded above the mid nerve; awn *ca* 7 cm long, scabrid. Palea similar; awn *ca* 6 mm long. Anthers 6, yellow, *ca* 5 mm long. Caryopsis 4-5 mm long, similar to *Oryza sativa*.

Cultivated and also found as weed. Balaghat, Bilaspur, Indore, Jabalpur, Sidhi, Surguja. *Fl. & Fr.*: Sept. - Nov.

4. Oryza sativa L., Sp. Pl. 333. 1753; Hook. *f.*, Fl. Brit. India 7: 92. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 605. 1960.

Annuals. Culms 40-100 cm tall, erect, tufted. Leaves 20-50 cm long, scabrid; sheaths loose, glabrous; ligules 0.8-1 cm long, membranous, acute. Inflorescence a panicle; branches scabrid. Spikelets ovate-oblong, 8-12 mm long, laterally compressed. Glumes reduced. Lower lemma empty, scale like, epaleate, 1-nerved; upper lemma 5-6 mm long, chartaceous, scabrid, 5-nerved; awn *ca* 4 cm long, retrorsely barbed. Palea acute, similar to lemma, 3-nerved. Anthers 3, light yellow, *ca* 2 mm long. Caryopsis *ca* 5 mm long, shape and size variable in different varieties.

Cultivated. *Fl. & Fr.*: Usually Aug. - Nov.

69. PANICUM L.

Annuals or perennials. Leaf blades linear to ovate, rolled or flat; ligules lacerate, rarely membranous or absent. Inflorescence a panicle, usually

much branched, occasionally contracted about the primary branches. Spikelets usually ovate to elliptic. Glumes hyaline to membranous, usually the lower shorter than the upper. Lower floret male or sterile. Lemma usually resembling the upper glume, with or without a palea: upper lemma more or less equal to spikelet, crustaceous, clasping only the margins of the palea. Caryopsis more or less ellipsoid, dorsally compressed.

About 600 species; tropical and warm temperate regions; 9 in M.P.

1a. Leaf blades ovate-elliptic, amplexicaul; spikelets slightly gibbous ...1. *P. brevifolium*

1b. Leaf blades linear or linear-lanceolate, not amplexicaul; spikelets not gibbous, symmetrical:

2a. Lemma of the upper floret transversely rugose; nerves of the upper glume rugose; nerves of the upper glume and lower lemma obscure ...2. *P. maximum*

2b. Lemma of the upper floret quite smooth; nerves of the upper glume and lower lemma conspicuous:

3a. Leaf sheaths hairy; spikelets 4-5 mm long, sharply acute, persistent ...3. *P. miliaceum*

3b. Leaf sheaths glabrous or hairy only on margins; spikelets up to 3.5 mm long, not sharply acute, caducous:

4a. Plants dwarf; spikelets up to 1.75 mm long ...9. *P. walense*

4b. Plants relatively tall; spikelets more than 2 mm long:

5a. Spikelets narrowly lanceolate or elliptic-lanceolate, acute:

6a. Annuals; culms spongy, floating; leaf blades broad; spikelets narrowly lanceolate ...5. *P. paludosum*

6b. Perennials; culms tough, not floating; leaf blades narrow; spikelets elliptic-lanceolate to oblong ...7. *P. repens*

5b. Spikelets ovate or elliptic, mostly obtuse:

7a. Culms woody at base; lower glume 5-nerved, ciliate on margins ...4. *P. notatum*

7b. Culms not woody at base; lower glume 3 or 5-nerved, not ciliate:

8a. Ligules ciliate; upper glume 2-3.5 mm long, 11-13-nerved; anthers *ca* 1 mm long ...8. *P. sumatrense*

8b. Ligules lacerate; upper glume 1.5-2 mm long, 11-nerved; anthers *ca* 0.7 mm long ...6. *P. psilopodium*

1. Panicum brevifolium L., Sp. Pl. 59. 1753; Bor, Grass. Burm. Ceyl. Ind. Pak. 324. 1960. *P. ovalifolium* Poir. in Lam., Encycl. Suppl. 4: 279. 1816; Hook. *f.*, Fl. Brit. India 7: 44. 1896.

Annuals. Culms 20-50 cm tall, decumbent, rooting at nodes. Leaves ovate-elliptic; sheaths with long hairs at mouth; ligules membranous. Inflorescence a panicle, just exserted from sheath; main axis hairy; branches with axillary cushions. Spikelets 1.5-2 mm long, slightly gibbous, glabrous to hairy. Lower glume *ca* 1.5 mm long, acute, 3-5-nerved, hairy. Lower floret neuter. Upper floret bisexual, narrow, elliptic. Lemma *ca* 1.5 mm long, 5-nerved. Palea hyaline. Anthers 3, yellow, *ca* 0.5 mm long. Caryopsis narrowly ellipsoid, *ca* 1.5 mm long.

In moist and shady places. Bastar, Bilaspur, Sidhi. *Fl. & Fr.*: Sept. Feb.

2. Panicum maximum Jacq., Collectanea 1: 76. 1786; Hook. *f.*, Fl. Brit. India 7: 49. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 327. 1960.

Perennials, robust, with short rhizomes. Culms up to 2 m tall, glabrous to hairy. Leaves up to 60 x 2 cm, glabrous, scabrid on margins; sheaths glabrous; ligules hairy. Inflorescence a large, open, compound panicle. Spikelets green or with purple tinge, ellipsoid, 3-3.5 mm long. Lower glume *ca* 1.5 mm long; upper glume *ca* 3 mm long, acute, 5-nerved. Lower floret male; nerves obscure. Anthers 3, purple, *ca* 1.8 mm long. Upper floret bisexual. Lemma transversely rugose, 3-nerved. Caryopsis narrowly ellipsoid, *ca* 2.25 mm long.

Rare. Bilaspur, Indore, Sidhi. *Fl. & Fr.*: Sept. - Jan.

3. Panicum miliaceum L., Sp. Pl. 58. 1753; Hook. *f.*, Fl. Brit. India 7: 45. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 327. 1960. **Fig. 60.**

Annuals. Culms 40-70 cm tall, erect; nodes glabrous. Leaves linear-lanceolate, flat, sparsely hairy; sheaths terete, hispid; ligules hairy. Inflorescence an effuse panicle, about half the length of culm; branches long, scabrid. Spikelets elliptic or ovate-acute, 4-4.5 mm long. Lower glume ovate-acute, 2-3 mm long, 5-7-nerved; upper glume 4-4.5 mm long, convex, acuminate, 7-11-nerved. Lower floret empty. Lemma similar to upper glume. Upper floret bisexual. Lemma elliptic, 2.5-2.7 mm long, chartaceous, smooth, shining. Anthers 3, yellow or purple, *ca* 1.5 mm long. Caryopsis white, orbicular, plano-convex, *ca* 2.5 mm long.

Rare. Gwalior. *Fl. & Fr.*: Sept. - Dec.

4. Panicum notatum Retz., Observ. Bot. 4: 18. 1786; Bor, Grass. Burm. Ceyl. Ind. Pak. 701. 1960. *P. montanum* Roxb., Fl. Ind. (Carey & Wallich ed.) 1: 315. 1820; Hook. *f.*, Fl. Brit. India 7: 53. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 329. 1960.

Perennials. Culms up to 1.5 m tall, with woody base. Leaves linear - lanceolate, acuminate at apex, cordate at base, hairy on both the surfaces, scabrid on margins; sheaths hairy on margins; ligules hairy. Inflorescence a narrow panicle; branches slender. Spikelets numerous, ovate, 1.5-2.5 mm long. Lower glume ovate, 1-2 mm long, acute, 5-nerved, long ciliate on margins; upper glume ovate-acute, 2-2.5 mm long, glabrous, 5-nerved. Lower floret neuter. Lemma *ca* 2.2 mm long, 5-nerved, epaleate. Upper floret bisexual. Lemma cymbiform, *ca* 1.8 mm long, indurated; nerves obscure. Palea *ca* 1.7 mm long. Anthers 3, yellow, *ca* 0.8 mm long.

Common. Balaghat, Bastar, Bilaspur, Hoshangabad, Raigarh, Shivpuri, Sidhi, Surguja. *Fl. & Fr.*: Sept. - Feb.

5. Panicum paludosum Roxb., Fl. Ind. (Carey & Wallich ed.) 1: 310. 1820; Bor, Grass. Burm. Ceyl. Ind. Pak. 329. 1960. *P. proliferum auct. non* Lam., 1797: Hook. *f.*, Fl. Brit. India 7: 50. 1896.

Annuals. Culms 0.8-1.25 m tall, decumbent or creeping. Leaves 20-30 cm long, acuminate at apex; sheaths loose, glabrous; ligule a ring of hairs. Inflorescence an open panicle. Spikelets narrowly lanceolate, 3-3.5 mm long, acute. Lower glume suborbicular, *ca* 1 mm long, 3-5-nerved;

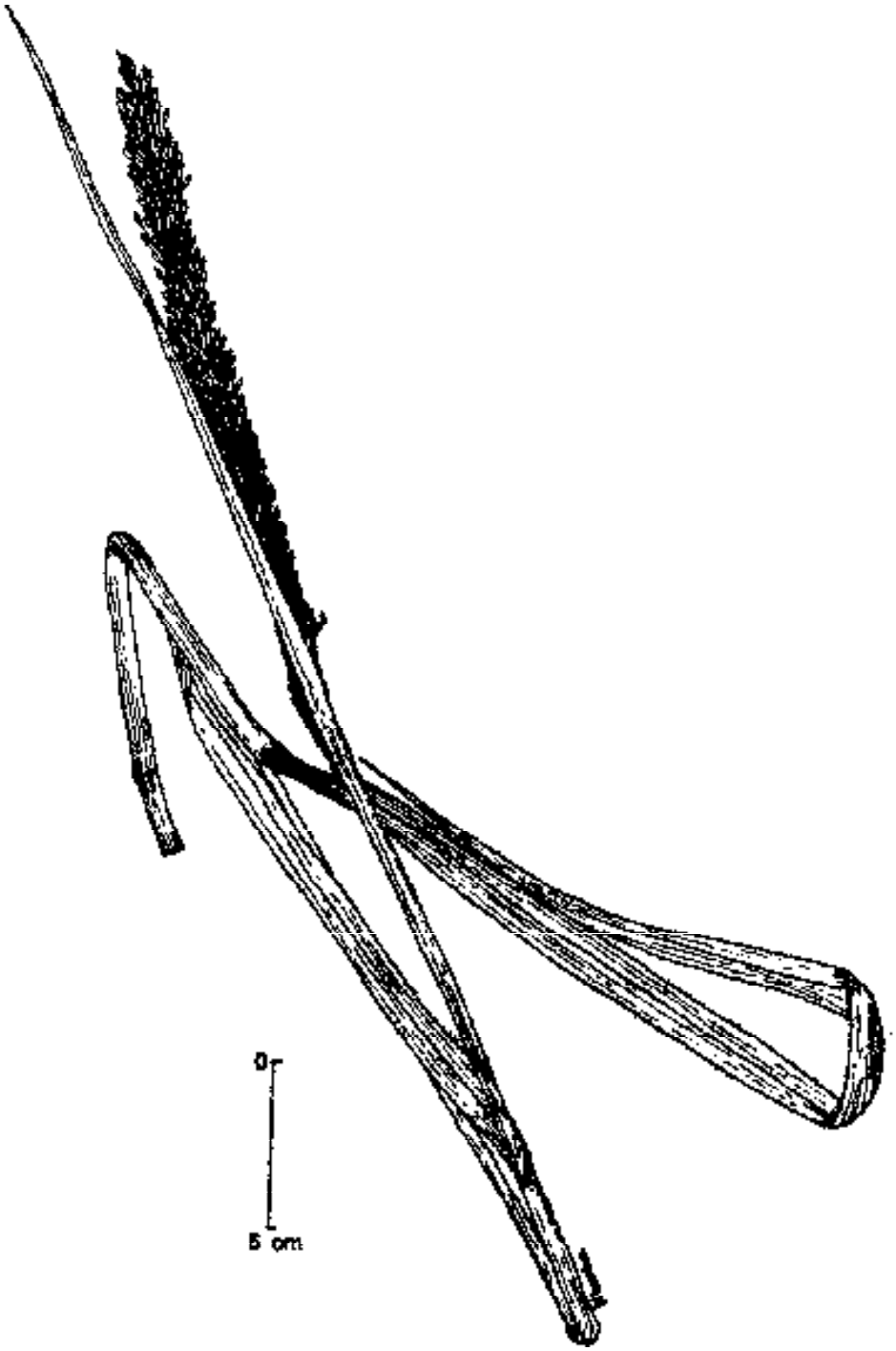

Fig. 60. Panicum miliaceum L.

upper glume ovate-lanceolate, *ca* 3.2 mm long, 9-nerved. Lower floret barren. Upper floret bisexual, narrowly elliptic, 2-2.5 mm long, acute. Lemma white, *ca* 2.2 mm long, shining. Anthers 3, purple, *ca* 1 mm long. Caryopsis ellipsoid, *ca* 1.8 mm long.

Common. Balaghat, Bilaspur, Damoh, Durg, Raigarh, Shivpuri, Sidhi, Surguja. *Fl. & Fr.*: Aug. Oct.

6. Panicum psilopodium Trin., Gram. Panic. 217. 1826; Hook. *f.*, Fl. Brit. India 7: 46. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 329. 1960.

Annuals. Culms 30-100 cm tall, erect, glabrous. Leaves 6-15 cm long, acuminate at apex; sheaths compressed, glabrous; ligules 1.5-2 mm long, lacerate. Inflorescence a lax panicle. Spikelets purplish, elliptic, 2.5-3 mm long. Lower glume ovate, 1-1.2 mm long, apiculate, 3-nerved; upper glume 1.5-2 mm long, membranous, 11-nerved. Lower floret barren. Lemma *ca* 2.5 mm long, 9-nerved. Upper floret bisexual. Lemma 1.2-1.7 mm long, obtuse or apiculate. Anthers 3, yellow or purple, *ca* 0.7 mm long. Caryopsis dark brown, ellipsoid, *ca* 1.5 mm long.

Common. Balaghat, Bilaspur, Damoh, Rajnandgaon, Shivpuri, Sidhi, Surguja. *Fl. & Fr.*: July - Nov.

7. Panicum repens L., Sp. Pl. ed. 2. 1: 87. 1762; Hook. *f.*, Fl. Brit. India 7: 49. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 330. 1960.

Perennials, rhizomatous. Culms 40-100 cm tall; nodes glabrous. Leaves linear-lanceolate, glabrous; sheaths ciliate at throat; ligules hairy. Inflorescence an open panicle; branches scabrid. Spikelets elliptic-lanceolate, 2.5-3 mm long, glabrous. Lower glume ovate to orbicular, 0.5-1 mm long; upper glume elliptic-lanceolate, 2.5-3 mm long, acute, membranous, glabrous, 5-9-nerved. Lower floret male. Upper floret bisexual. Lemma elliptic-oblong, 2.5-2.7 mm long, chartaceous, glabrous. Anthers 3, purple, 1-1.5 mm long. Caryopsis white, oblong, 2-2.5 mm long.

Bilaspur, Hoshangabad, Indore. *Fl. & Fr.*: Aug. Sept.

8. Panicum sumatrense Roth *ex* Roem. & Schult., Syst. Veg. 2: 434. 1817; Bor, Grass. Burm. Ceyl. Ind. Pak. 701. 1960. *P. miliare* Lam., Tabl. Encycl. 1: 173. 1791, *nomen superfl.*; Hook. *f.*, Fl. Brit. India 7: 46. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 329. 1960.

Annuals. Culms 30-100 cm tall, erect or geniculate. Leaves linear, flat, glabrous or sparsely hairy; sheaths loose, ciliate at mouth; ligules ciliate. Inflorescence a contracted panicle. Spikelets green or purple tinged, elliptic, 2-3.5 mm long, glabrous. Lower glume 0.7-1.5 mm long, acuminate, 3-5-nerved; upper glume ovate, 2-3.5 mm long, concave, 11-13-nerved. Lower floret neuter. Upper floret bisexual. Lemma 2-3 mm long, cartilaginous, shining. Anthers 3, purple, *ca* 1 mm long. Caryopsis cream-coloured, subglobose, *ca* 1.5 mm long.

Common throughout the state. *Fl. & Fr.*: July - Oct.

9. Panicum walense Mez in Engl., Bot. Jahrb. 34: 146. 1904, "*watense*"; Majumdar in Bull. Bot. Soc. Bengal 27: 47. f. 9. 1973. *P. humile* Nees *ex* Steud., Syn. Pl. Glumac. 1: 84. 1854, *non* Thunb. *ex* Trin., 1826; Hook. *f.*, Fl. Brit. India 7: 48. 1896. *P. austroasiaticum* Ohwi in Act. Phytotax. & Geobot. Kyoto 2(1): 45. 1942; Bor, Grass. Burm. Ceyl. Ind. Pak. 324. 1960. **Fig. 61.**

Annuals. Culms 15-45 cm tall, erect or ascending, tufted. Leaves 10-15 cm long; sheaths loose, glabrous; ligules ciliate. Inflorescence an open panicle. Spikelets greenish or purple tinged, 1.5-1.75 mm long, acute. Lower glume lanceolate, *ca* 1 mm long, 3-nerved; upper glume equalling spikelet, 3-nerved. Lower floret barren. Upper floret bisexual, *ca* 1.5 mm long. Lemma cymbiform, 1.2-1.5 mm long. Anthers 3, purplish, *ca* 1 mm long. Caryopsis whitish, ellipsoid, *ca* 1 mm long.

Rare. Damoh. *Fl. & Fr.* : Sept. Oct.

70. PASPALIDIUM Stapf

Annuals or perennials, often aquatic. Leaf blades linear; ligule a ciliate rim. Inflorescence of several racemes, spaced and appressed along a common axis; rhachis triquetrous or winged, usually ending in a point, bearing single imbricate spikelet. Spikelets ovate, dorsally compressed, glabrous. Lower glume abaxial, much shorter to spikelet; upper glume almost equal to spikelet. Lower floret male or barren. Lemma resembling the upper glume; upper lemma crustaceous, acute, clasping only the edges of the palea. Upper palea acute, reflexed at tip. Caryopsis ellipsoid, dorsally compressed.

About 27 species; tropical regions; 3 in M.P.

Fig. 61. Panicum walense Mez

1a. Annuals; spikes shorter than the internodes; upper lemma granular ...1. *P. flavidum*

1b. Perennials; spikes longer than the internodes; upper lemma not granular:

2a. Rhachis not produced; spikelets 2.5-3 mm long; upper glume equalling the upper lemma ...2. *P. geminatum*

2b. Rhachis produced into a sharp point; spikelets 1.5-2.5 mm long; upper glume half the length of upper lemma ...3. *P. punctatum*

1. Paspalidium flavidum (Retz.) A. Camus in Lecomte, Fl. Indo-Chine 7: 419. 1922; Bor, Grass. Burm. Ceyl. Ind. Pak. 333. 1960. *Panicum flavidum* Retz., Observ. Bot. 4: 15. 1786; Hook. *f.*, Fl. Brit. India 7: 28. 1896.

Annuals. Culms 20-70 cm tall; nodes glabrous. Leaves glabrous; sheaths compressed; ligules hairy, very short. Inflorescence of several spikes, alternate on axis, shorter than the internodes. Spikelets 2.5-3 mm long, 2-seriate, glabrous, acute. Lower glume 1.3-1.5 mm long, membranous; upper glume ovate, 2-2.2 mm long, membranous, 7-nerved. Lower floret empty. Upper floret bisexual. Lemma 2.2-2.5 mm long, mucronate, chartaceous, coriaceous. Anthers 3, yellow, *ca* 1 mm long. Caryopsis broadly ellipsoid, *ca* 1.5 mm long.

Common. Balaghat, Bilaspur, Hoshangabad, Indore, Raigarh, Raipur, Rewa, Sagar, Shivpuri, Sidhi, Surguja. *Fl. & Fr.*: July - Dec.

2. Paspalidium geminatum (Forssk.) Stapf in Prain, Fl. Trop. Afr. 9: 583. 1920; Bor, Grass. Burm. Ceyl. Ind. Pak. 333. 1960. *Panicum geminatum* Forssk., Fl. Aegypt.-Arab. 18. 1775. *P. paspaloides* Pers., Syn. Pl. 1: 81. 1805; Hook. *f.*, Fl. Brit. India 7: 30. 1896.

Perennials, stoloniferous. Culms 40-100 cm tall, Subcompressed, glabrous. Leaves glabrous; sheaths glabrous, compressed; ligules hairy. Inflorescence of several racemes appressed to rhachis, alternate, longer than internodes. Spikelets solitary, secund, ovate-acute, 2.5-3 mm long, glabrous. Lower glume hyaline, 0.5-0.7 mm long, nerveless; upper glume 1.8-2 mm long, convex, membranous, 5-nerved. Lower floret empty. Upper

floret bisexual. Lemma elliptic, 2-2.2 mm long, apiculate, coriaceous, 5-nerved. Anthers 3, yellow, 1-1.5 mm long. Caryopsis broadly ellipsoid, *ca* 2 mm long.

Gwalior, Morena, Raipur. *Fl. & Fr.*: July - Dec.

3. Paspalidium punctatum (Burm. *f.*) A. Camus in Lecomte, Fl. Indo-Chine 7: 419. 1922; Bor, Grass. Burm. Ceyl. Ind. Pak. 333. 1960. *Panicum punctatum* Burm. *f.*, Fl. Ind. 26. 1768; Hook. *f.*, Fl. Brit. India 7: 29. 1896. **Fig. 62.**

Perennials. Culms 0.6-1.25 m tall, basal portion spongy, floating, rooting at nodes. Leaves linear-acute, scabrid on margins; sheaths glabrous; ligule reduced to a ring of hairs. Inflorescence of several false spikes, distant and appressed to the rhachis. Spikelets imbricate, plano-convex, 1.5-2.5 mm long, glabrous. Lower glume 0.7-1.2 mm long, membranous, truncate. Upper floret bisexual. Lemma indurate, acuminate, cuspidate, finely punctate, transversely rugose. Palea similar, fitting into the lemma. Anthers 3, *ca* 1 mm long. Caryopsis orbicular, compressed.

Raipur, Satna, Shivpuri, Sidhi. *Fl. & Fr.*: Aug. - Dec.

71. PASPALUM L.

Annuals or perennials. Leaf blades linear to narrowly lanceolate, flat; ligules short, membranous. Inflorescence of racemes; racemes digitate or on an elongated axis, rarely solitary; rhachis flat, narrowly or broadly winged, bearing solitary or paired spikelets, with abaxial lower glume. Spikelets orbicular to oblong, mostly plano-convex. Lower glume suppressed, rarely represented by a minute scale; upper glume membranous, equal to spikelet, rarely shorter or absent. Lower floret barren, without palea, its lemma resembling the upper glume; upper lemma crustaceous, usually obtuse, clasping the edges of the palea. Caryopsis plano-convex.

About 250 species; tropical and subtropical regions; 5 in M.P.

1a. Spikelets up to 1.25 mm long, packed in 2 rows on the rhachis ...2. *P. compactum*

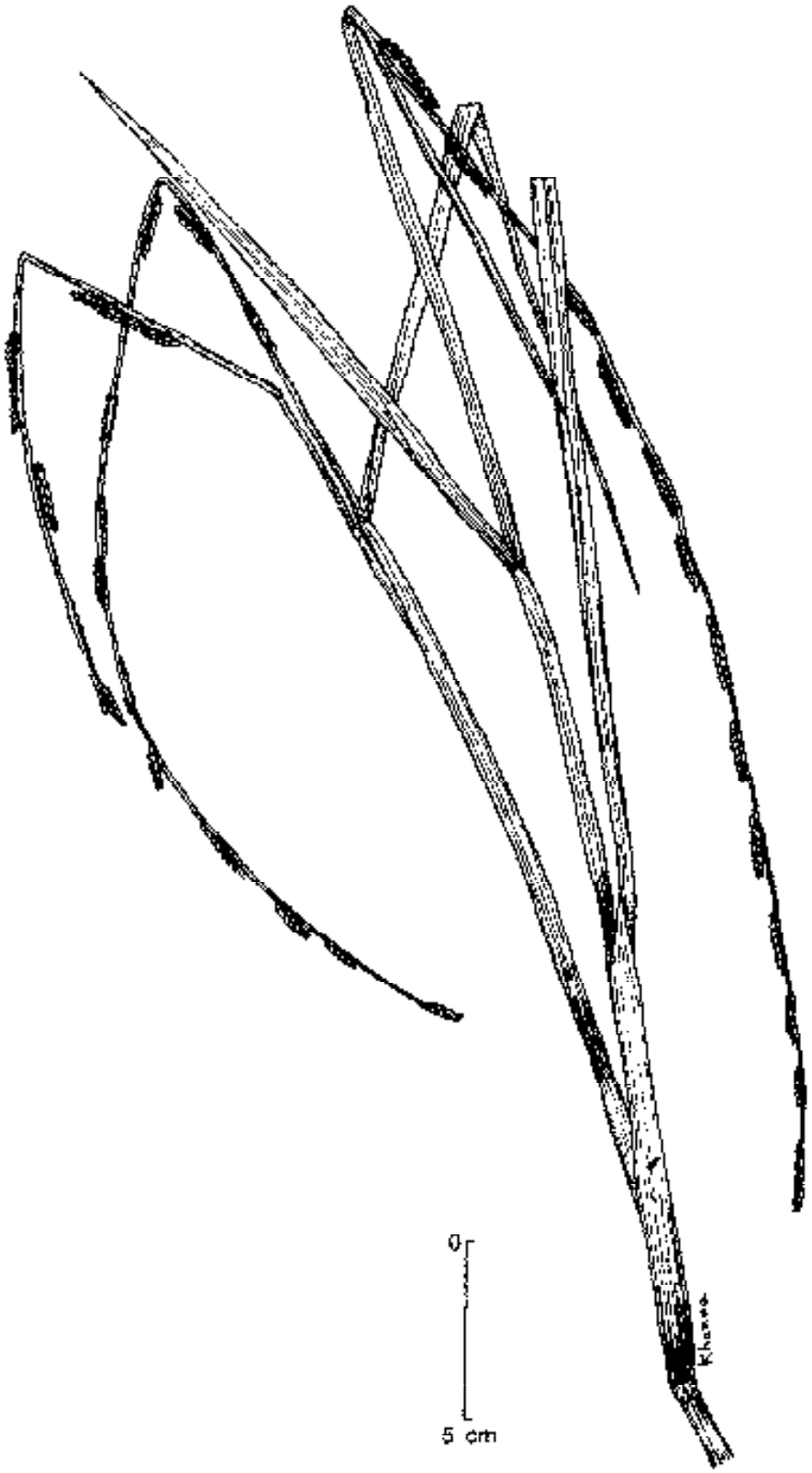

Fig. 62. Paspalidium punctatum (Burm. *f.*) A. Camus

1b. Spikelets 2 mm or more long, not so packed on the rhachis:

2a. Spikelets elliptic, acute; anthers purplish ...5. *P. vaginatum*

2b. Spikelets obovate or elliptic-ovate, obtuse; anthers yellow or cream-coloured:

3a. Lower lemma chartaceous or cartilaginous ...1. *P. cartilagineum*

3b. Lower lemma membranous:

4a. Perennials; lower lemma with short transverse wrinkles on back, slightly raised on margins, deep brown or olivaceous ...3. *P. plicatulum*

4b. Annuals; lower lemma otherwise ...4. *P. scrobiculatum*

1. Paspalum cartilagineum J. Presl *ex* K. Presl, Reliq. Haenk. 1: 216. 1830; Bor, Grass. Burm. Ceyl. Ind. Pak. 335. 1960.

Perennials. Culms 50-75 cm tall, erect; cataphylls hairy at rootstock. Leaf margins scabrid; sheaths loose, glabrous; ligules membranous. Inflorescence of 2-4 spikes; rhachis flattened, scabrid on margins. Spikelets *ca* 2 mm long. Lower glume absent; upper glume *ca* 2 mm long, obtuse, glabrous. Lower lemma *ca* 2 mm long, 5-nerved; upper lemma similar, *ca* 1.6 mm long. Anthers 3, yellow, 0.5-0.8 mm long. Caryopsis dark brown, plano-convex, 1.5-1.8 mm long, *ca* 1 mm wide.

Rare. Bilaspur. *Fl. & Fr.*: March - May.

Notes: Though Cope (1982) has merged this species under *P. scrobiculatum* L., nevertheless I agree with Bor (1960) that in Indian material indurated lower lemma is a good character to separate this species. Moreover, I would like to add the distinct flowering period, perennial habit and ecological habitats to support Bor's view. Further, *P. cartilagineum* is not cultivated.

2. Paspalum compactum Roth, Nov. Pl. Sp. 36. 1821, "*Paspalus compactus*"; Hook. *f.*, Fl. Brit. India 7: 12. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 336. 1960.

Annuals. Culms 15-30 cm tall, decumbent at base, rooting and branching at lower nodes, leafy to the top; nodes hairy. Leaves ovate-lanceolate, hirsute on margins; sheaths loose, striate, hairy; ligules hairy. Inflorescence a raceme of false spikes; rhachis up to 1 mm wide. Spikelets packed in two rows, pedicellate, ovate-lanceolate, plano convex. Lower glume absent; upper glume equal to spikelet, 5-nerved, hyaline on margins. Lower floret sterile. Upper floret bisexual. Lemma elliptic, *ca* 1 mm long, minutely punctate. Anthers 3, yellow, *ca* 0.5 mm long. Caryopsis ovoid, 0.5-0.8 mm long.

Rare. Surguja. *Fl. & Fr.*: Aug. Dec.

3. Paspalum plicatulum Michx., Fl. Bor.-Amer. 1: 45. 1803; Bor, Grass. Burm. Ceyl. Ind. Pak. 340. 1960. *P. plicatum* Pers., Syn. Pl. 1: 86. 1805, error for *plicatulum*. **Fig. 63.**

Perennials. Culms 50-100 cm tall, suberect, tufted, leafy. Leaves folded at base, flat above, 3-10 mm wide, pilose near base; sheaths pilose at throat; ligules membranous. Inflorescence of 3-10 racemes. Spikelets brown at maturity, obovate, 2.5-2.8 mm long. Fertile lemma transversely rugose, slightly raised on margins. Anthers 3, yellow, *ca* 0.8 mm long.

Introduced. Bilaspur. *Fl. & Fr.*: March - May.

4. Paspalum scrobiculatum L., Mant. Pl. 29. 1767; Hook. *f.*, Fl. Brit. India 7: 10. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 340. 1960. *Kodo. Kodra.*

Annuals. Culms 20-90 cm tall, erect or ascending, tufted. Leaves 6-18 cm long, acuminate at apex, glabrous, papillate on margins; sheaths compressed, glabrous; ligules *ca* 1 mm long, membranous. Inflorescence of 2-6 spikes, closely placed together; rhachis flattened, 2-2.5 mm wide. Spikelets in 2 rows, elliptic-ovate, 2.5-2.8 mm long. Lower glume absent; upper glume *ca* 2.5 mm long, membranous, 3-5-nerved. Lower lemma similar to upper glume. Upper floret bisexual. Lemma nearly rounded, stiff, shining, olivaceous, edges slightly inflexed. Anthers 3, cream-coloured, 0.8-1 mm long. Caryopsis pale, ovoid or globose, biconvex, 2-2.25 mm long.

Cultivated for grains. Balaghat, Bastar, Bilaspur, Durg, Hoshangabad, Mandla, Raigarh, Rajnandgaon, Shivpuri, Sidhi, Surguja. *Fl. & Fr.*: Aug. Sept.

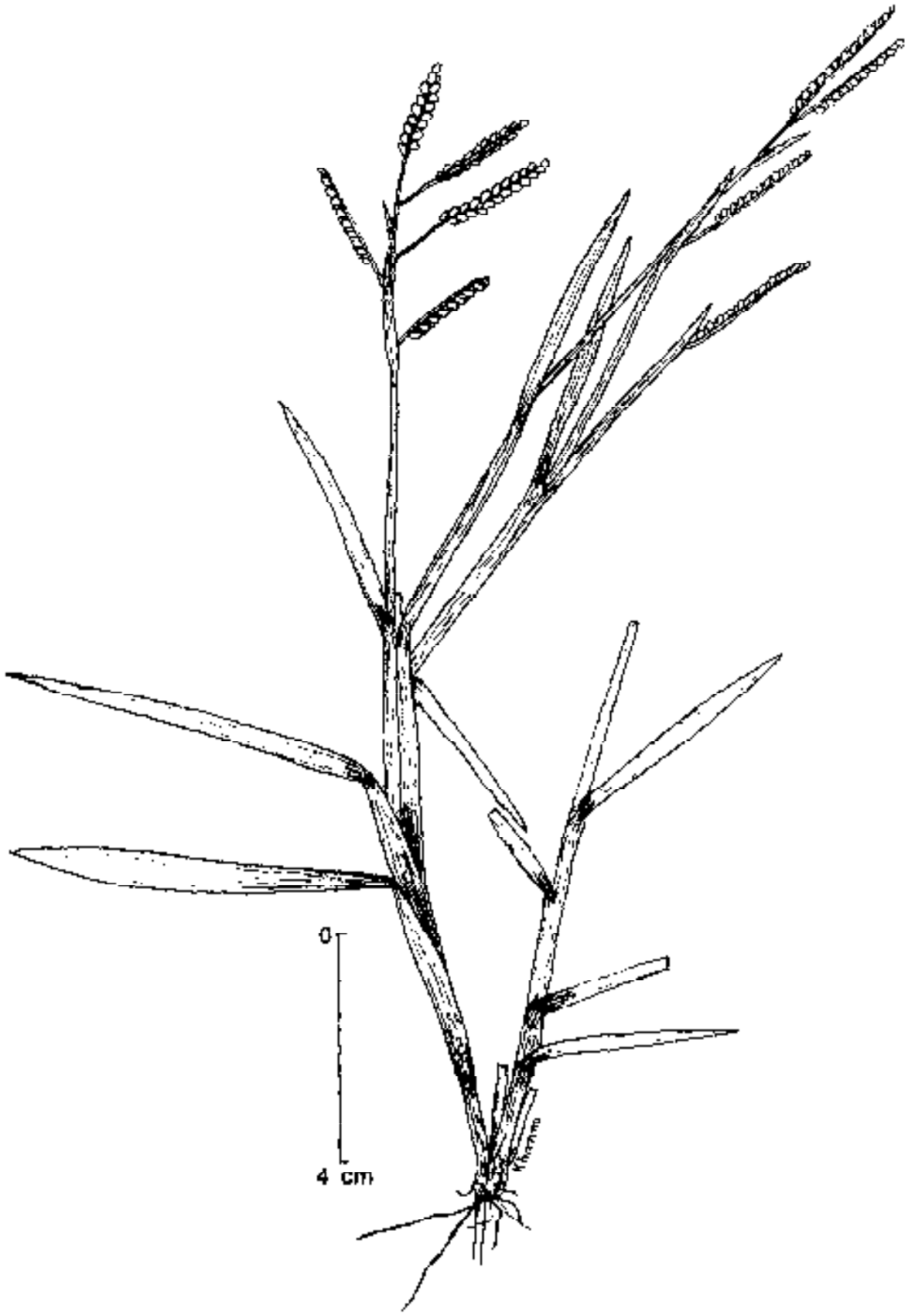

Fig. 63. Paspalum plicatulum Michx.

Notes : Leaves and stems are poisonous for animals. This species is quite distinct from any other species of the genus.

5. Paspalum vaginatum Sw., Prodr. 21. 1788; Bor, Grass. Burm. Ceyl. Ind. Pak. 341. 1960. *P. distichum* L., Syst. Nat. ed. 10. 2: 855. 1759; Hook. *f.*, Fl. Brit. India 7: 12. 1896.

Perennials, aquatic. Culms 1-1.5 m long, creeping, rooting at nodes. Leaves distichous, 5-10 cm long, acute at apex, glabrous; sheaths compressed, glaucous; ligules *ca* 1 mm long, membranous, truncate. Inflorescence of 2-3, one-sided spikes; rhachis flat, 1-1.5 mm wide. Spikelets solitary or 2-nate, elliptic, dorsally flat, 2.5-3.5 mm long, acute. Lower glume absent; upper glume ovate-acute, *ca* 3.5 mm long, 5-nerved. Lower lemma *ca* 3.5 mm long; upper lemma cymbiform, *ca* 2.8 mm long, hairy at tip. Anthers 3, purplish, *ca* 1 mm long. Caryopsis ellipsoid, 2.5-2.8 mm long.

Balaghat, Bilaspur, Gwalior, Shivpuri. *Fl. & Fr.*: Aug. Sept.

Notes : This species has extensive creeping rhizomes and stolons. It forms a turf and is able to grow in saline water, mud and low sandy coasts. It is an efficient sand binder in coastal areas and considered as good fodder grass.

72. PENNISETUM Rich. *ex* Pers.

Annuals or perennials. Leaf blades linear to lanceolate, flat or convolute; ligule a line of hairs, rarely membranous. Inflorescence a cylindrical to subglobose spike like panicle, terminal on culms and branches, rarely axillary and often gathered into a leafy false panicle, each spikelet or cluster of spikelets subtended by a caducous involucre of 1 to many, slender, free bristles; rhachis rounded or angular, with or without short peduncle stumps, occasionally the involucre shortly stipitate below the insertion of the bristles. Spikelets narrowly lanceolate to oblong, dorsally compressed, glabrous or almost so. Lower glume up to two-third the length of spikelet, sometimes suppressed; upper glume varying from very small to as long as the spikelet. Lower floret male or barren. Lemma of variable length, membranous; upper lemma as long as the spikelet, membranous or coriaceous, with margins covering more or less half the palea. Anther tips smooth or sometimes with a minute, tuft of hairs. Caryopsis oblong and dorsally compressed to subglobose.

About 70 species; tropical and subtropical regions; 6 in M.P.

1a. Rhachis ribs winged below the pedicels; lemmas dissimilar, lower often 3-lobed; upper floret readily disarticulating:

2a. Spikelets pedicellate, solitary or in groups of 2-3, usually hairy; lower glume about half the length of lower lemma ...3. *P. pedicellatum*

2b. Spikelets sessile, solitary, glabrous; lower glume minute ...4. *P. polystachyon*

1b. Rhachis ribs not winged; lemmas similar, lower not 3-lobed; upper floret not readily disarticulating:

3a. Anther cells bearded at the tip:

4a. Perennial wild grass; spikelets solitary, not gaping; bristles 10-18 mm long ...5. *P. purpureum*

4b. Annual cultivated grass; spikelets crowded, gaping and exposing the caryopsis; bristles 4-5 mm long ...6. *P. typhoides*

3b. Anther cells not bearded at the tip:

5a. Rhachis of the spikes villous or woolly; spikelets 6-6.5 mm long; inner bristles ciliate ...2. *P. orientale*

5b. Rhachis of the spikes glabrous, often scabrid; spikelets 7.5-8 mm long; bristles glabrous ...1. *P. hohenackeri*

1. Pennisetum hohenackeri Hochst. *ex* Steud., Syn. Pl. Glumac. 1: 103. 1854; Bor, Grass. Burm. Ceyl. Ind. Pak. 344. 1960. *P. alopecuros* Nees *ex* Steud., Syn. Pl. Glumac. 1: 102. 1854, *non* Jacq., 1844; Hook. *f.*, Fl. Brit. India 7: 84. 1896.

Perennials. Culms 40-100 cm tall, erect, glabrous. Leaves narrowly linear, scabrid on margins, pilose towards base; sheaths compressed, glabrous; ligules hairy. Inflorescence a spike; rhachis scabrid; pedicels hairy; bristles unequal, glabrous, free to the base. Spikelets linear-lanceolate, 7.5-8 mm long, glabrous. Lower glume hyaline, nerveless.

minute; upper glume hyaline, 3-3.2 mm long, 1-3-nerved. Lower floret empty, epaleate. Lemma 9-11-nerved. Upper floret bisexual, 6.2-7.5 mm long. Lemma 5-nerved. Anthers 3, yellow, 4-5 mm long. Caryopsis lanceolate, *ca* 1.5 mm long, awned.

Common. Balaghat, Bastar, Bilaspur, Hoshangabad, Indore, Rajnandgaon. *Fl. & Fr.*: Aug. Feb.

2. Pennisetum orientale Rich. in Pers., Syn. Pl. 1: 72. 1805; Hook. *f.*, Fl. Brit. India 7: 86. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 345. 1960.

Perennials, with stout rhizomes. Culms 60-100 cm tall: nodes glabrous. Leaves linear, flat, scabrid on margins, glabrous or pilose; sheaths smooth, bearded at mouth; ligules hairy. Inflorescence a spike; rhachis angular, hispid. Involucres unequal, bristly, antrorsely barbed. Spikelets 2-3, lanceolate, 6-6.5 mm long. Lower glume hyaline, 2.5-3 mm long; upper glume lanceolate, 4-4.5 mm long. Lower lemma empty; upper lemma fertile, ovate, *ca* 6 mm long, acuminate, 5-nerved. Anthers 3, yellow, *ca* 2 mm long. Caryopsis ellipsoid, *ca* 2 mm long.

Bilaspur, Hoshangabad, Raipur. *Fl. & Fr.*: Nov. - Jan.

3. Pennisetum pedicellatum Trin. in Mem. Acad. Sci. Pétersb. ser. 6, 3: 184. 1834; Hook. *f.*, Fl. Brit. India 7: 86. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 346. 1960.

Annuals. Culms 0.3-1.2 m tall; nodes glabrous or hispid, scabrid on margins; sheaths terete, usually glabrous; ligules membranous. Inflorescence of several spikes; rhachis angular. Involucres sessile; bristles free to the base, inner ones woolly. Spikelets solitary or in groups of 2-3, lanceolate, 5-6 mm long. Lower glume lanceolate, 2-3 mm long, hairy; upper glume oblong-lanceolate, 5-6 mm long, cuspidate to acuminate, hairy, 5-nerved. Lower lemma 4-5 mm long, pubescent, 3-dentate at apex. Palea hyaline, lacerate. Upper lemma elliptic, 3-3.5 mm long, chartaceous, ciliolate on margins. Stamens 3, yellow. Caryopsis lanceolate, 2.5-3 mm long.

Common. Balaghat, Bastar, Bilaspur, Hoshangabad, Indore, Jabalpur, Mandla, Raipur, Rajnandgaon, Satna, Sidhi. *Fl. & Fr.*: Aug. Dec.

4. Pennisetum polystachyon (L.) Schult., Syst. Veg. Mant. 2: 146. 1824; Bor, Grass. Burm. Ceyl. Ind. Pak. 346. 1960. *Panicum polystachyon* L., Syst. Nat. ed. 10. 2: 870. 1759.

Usually perennials, rarely annuals. Culms up to 2 m tall, glabrous. Leaves linear-lanceolate, 3-15 mm wide, hirsute behind ligule; sheaths glabrous or sparsely hairy; ligules hairy. Inflorescence a false, cylindrical, compact spike; branches angled, scaberulous. Involucres subsessile; bristles many, densely ciliate, one bristle stouter than the rest and up to 3 cm long. Spikelets solitary, 4-5 mm long, glabrous. Lower glume 0.5-1 mm long, acute, nerveless; upper glume oblong-elliptic, mucronate, 3-lobed, 5-7-nerved. Lower floret male or barren. Upper floret bisexual, 2-3 mm long, ciliate at apex. Anthers 3, yellow, 1.75-2 mm long, glabrous at tips. Caryopsis ellipsoid-oblong, *ca* 2 mm long.

Balaghat, Bilaspur, Indore, Sidhi. *Fl. & Fr.*: Sept. - Nov.

5. Pennisetum purpureum Schumach., Beskr. Guin. Pl. 44. 1827; Bor, Grass. Burm. Ceyl. Ind. Pak. 348. 1960. - *Elephant grass, Napier's fodder.*

Perennials with creeping rhizomes. Culms 2-3 m tall like sugarcane, tufted, hairy at nodes. Leaf blades linear, tapering at apex, sharp on margins, rough on both surfaces; sheaths terete, glabrous, hairy at mouth; ligules hairy. Inflorescence a dense, false, cylindrical spike. Spikelets surrounded with involucres, sessile, if in groups of 2-4 the lateral pedicellate, all lanceolate, acuminate, 5-7 mm long, bisexual or laterals male-neuter. Lower glume rudimentary or absent; upper glume ovate-lanceolate, 0.5-1 mm long. Lower floret male or barren. Upper floret bisexual or male in laterals. Lemma lanceolate, acuminate, usually 5-nerved. Palea 2-dentate. Anthers 3, purplish, 2-3 mm long, minutely penicillate. Styles united. Caryopsis ellipsoid, *ca* 2 mm long, aristate.

Introduced for fodder. Gwalior. *Fl. & Fr.*: Sept. Nov.

6. Pennisetum typhoides (Burm. *f.*) Stapf & Hubb. in Kew Bull. 1933: 271. 1933; Bor, Grass. Burm. Ceyl. Ind. Pak. 350. 1960. *Alopecurus typhoides* Burm. *f.*, Fl. Ind. 27. 1768. *Pennisetum typhoideum* Rich. in Pers., Syn. Pl. 1: 72. 1805; Hook. *f.*, Fl. Brit. India 7: 82. 1896.

Annuals. Culms 1-2.5 m tall, erect. Leaves 30-40 cm long, scabrid; sheaths terete, hairy above; ligule a ring of dirty white hairs. Inflorescence a compact, cylindrical, 15-30 cm long panicle; peduncle pubescent. Spikelets 2-4-nate, 1-2 imperfect ones, ovate-elliptic, 2.5-3 mm long; involucre bristles many, 4-5 mm long, cream-coloured or brownish; pedicels 3-3.5 mm long, white hairy. Lower glume orbicular, *ca* 0.5 mm long, ciliate; upper glume absent. Lower lemma *ca* 2.5 mm long, obtuse or truncate, mucronate, 3-nerved. Palea 2-3-dentate, ciliate at apex. Anthers 3, yellow, *ca* 3 mm long, hairy at apex. Upper lemma bisexual, *ca* 5 mm long, 5-nerved, ciliate. Caryopsis grey-coloured, 2-2.5 mm long.

Cultivated throughout the state. *Fl. & Fr.*: Sept. Oct.

73. PEROTIS Aiton

Annuals or sometimes perennials. Leaf blades flat, broadest at the base and subamplexicaul; ligule a short membranous rim. Inflorescence a delicate, bottle-brush like spike, the spikelets subsessile on the main axis. Spikelets single, all alike, linear-lanceolate, with or without a stipitate basal callus. Glumes subequal, lanceolate to narrowly lanceolate, membranous, 1-nerved, each tipped by a long, slender awn (that of the lower glume usually longer) tinged with violet. Lemma usually 1/3 to 1/2 of the spikelet, lanceolate, hyaline, 1-nerved. Stamens 3. Caryopsis linear-lanceolate, almost as long as the glumes at maturity.

About 10 species; tropical regions of Old World; one in M.P.

Perotis indica (L.) Kuntze, Revis. Gen. Pl. 2: 787. 1891; Bor, Grass. Burm. Ceyl. Ind. Pak. 611. 1960. *Anthoxanthum indicum* L., Sp. Pl. 28. 1753. *Perotis latifolia* Aiton, Hortus Kew. 1: 85. 1789; Hook. *f.*, Fl. Brit. India 7: 98. 1896. **Fig. 64.**

Annuals. Culms 40-50 cm tall, erect. Leaves narrowly ovate, 1-3.5 cm long, cordate at base, scabrid on margins; sheaths terete, glabrous; ligules membranous, truncate. Inflorescence a terminal spike. Spikelets 1.5-2.5 mm long, 2-awned, hispid. Lower glume lanceolate, *ca* 1.9 mm long, 1-nerved, awn *ca* 1 cm long; upper glume similar to lower, with *ca* 7.5 mm long awn. Lemma hyaline, lanceolate, *ca* 0.6 mm long, 1-nerved. Palea nerveless. Anthers yellow, *ca* 0.4 mm long. Caryopsis brown, terete, *ca* 1.4 mm long.

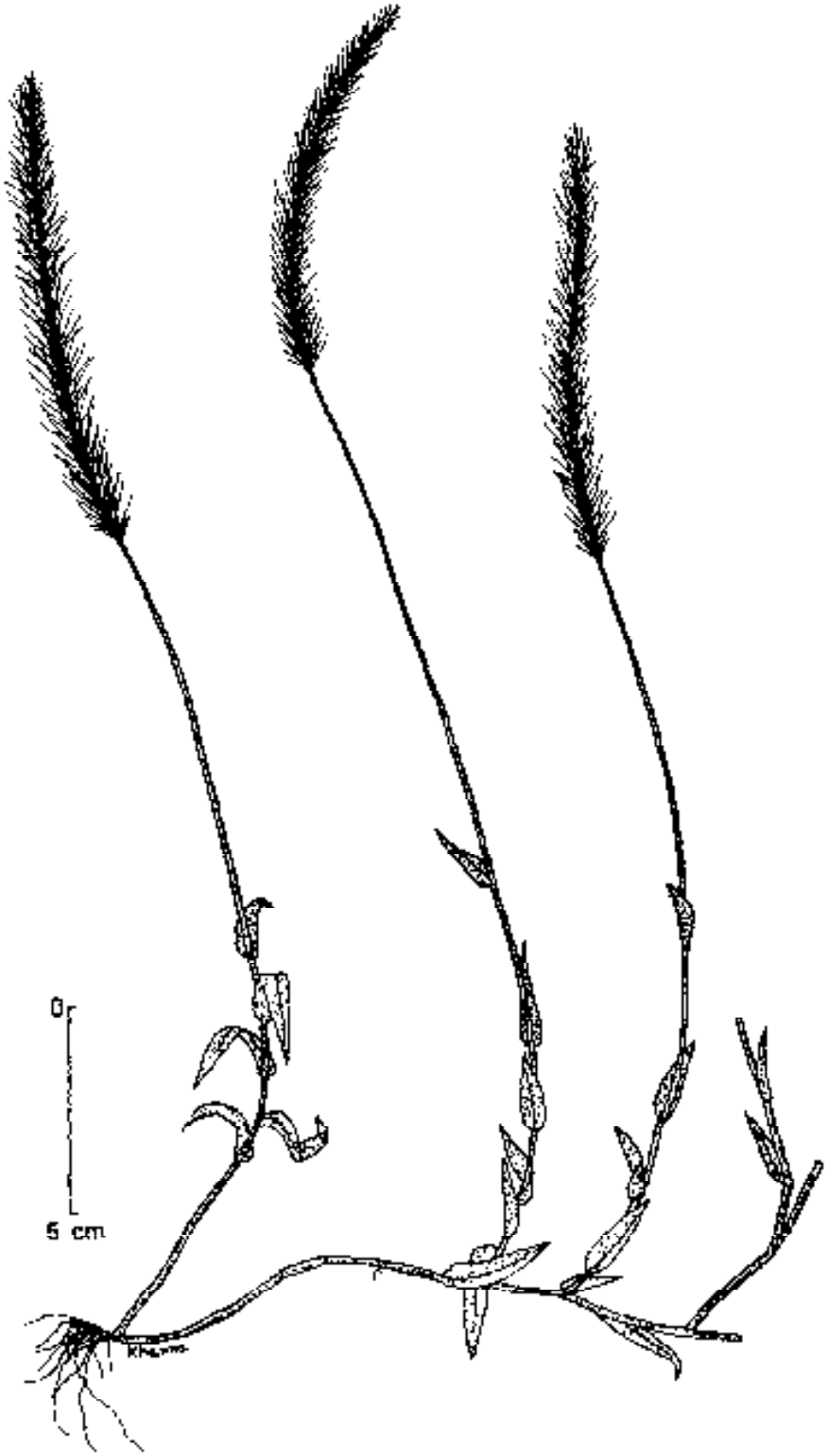

Fig. 64. Perotis indica (L.) Kuntze

Common. Balaghat, Bastar, Bilaspur, Hoshangabad, Raigarh, Sidhi, Surguja. *Fl. & Fr.*: Oct. Nov.

74. PHALARIS L.

Annuals or perennials. Leaf blades linear; ligules membranous. Inflorescence a contracted or spike like panicle. Spikelets all similar (rarely clusters of 6-7, of which only one fertile), bisexual, 3-flowered, with the 2 lower florets reduced, disarticulating above the glumes at maturity. Glumes subequal, cymbiform, usually glabrous, papery, keeled; keels often broadened into a wing, enclosing the florets. Sterile florets about 1/2 of the length of fertile lemma, subulate or chaffy, usually pubescent, sometimes one or both reduced to a fleshy scale at the base of the fertile floret. Fertile lemma glabrous or pubescent, often shiny, laterally compressed, indurated, awnless. Stamens 3.

About 15 species; Europe, N. Asia, America and Mediterranean region; one in M.P.

Phalaris minor Retz., Observ. Bot. 3: 8. 1783; Hook. *f.*, Fl. Brit. India 7: 221. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 616. 1960.

Annuals. Culms 50-80 cm tall, erect or decumbent. Leaves 20-25 cm long, glabrous; sheaths keeled, glabrous; ligules 5-10 mm long, truncate. Inflorescence cylindrical, 5-10 cm long panicle. Spikelets ellipsoid, acute, laterally compressed; pedicels *ca* 2 mm long. Glumes equal, 5-6 mm long, acute, 3-nerved; keels winged. Lowest lemma absent; middle lemma reduced; upper lemma fertile, ovate-acute, 2.8-3 mm long, 5-nerved. Palea lanceolate, ciliate at top. Anthers pale yellow, *ca* 1.5 mm long. Caryopsis ovoid, *ca* 2 mm long, apiculate.

Rare. Damoh. *Fl. & Fr.*: Jan. March.

75. PHRAGMITES Adans.

Perennials, aquatic or semiaquatic. Culms usually tall. Leaf blades linear to narrowly lanceolate, flat, caducous; ligule a ring of long or short hairs. Panicles large, dense, profusely branched, silky hairy, bearded at the base of the lowest branches. Spikelets 3-11-flowered, the lowest floret

male or barren, the following bisexual, the uppermost reduced; rhachilla bearded with long silky hairs. Glumes 3-5-nerved. Lemma narrow, rounded or slightly keeled on the back, glabrous; lowest lemma much longer than the glumes, 3-7-nerved, persistent; fertile lemma acuminate, 1-3-nerved. Stamens 3, or 2 in the lowest floret.

About 4 species; cosmopolitan; one in M.P.

Phragmites karka (Retz.) Trin. *ex* Steud., Nomencl. Bot. ed. 2. 2: 324. 1841; Hook. *f.*, Fl. Brit. India 7: 304. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 416. 1960. *Arundo karka* Retz., Observ. Bot. 4: 21. 1786.

Perennials, with extensive rhizomes. Culms 1-2 m tall, erect, fistular. Leaves 30-40 cm long, ventrally glabrous, dorsally rough; sheaths loose, hairy; ligules 2-3 mm long, membranous. Inflorescence a large, open panicle; rhachilla fragile, 4-7 mm long, with white hairs on joints. Spikelets 9-12 mm long; pedicels 1-6 mm long. Lower glume lanceolate, 3-4 mm long, 1-nerved; upper glume elliptic, 4-5.5 mm long, acute. Lower lemma empty; fertile lemma narrowly lanceolate, 8-10 mm long. Palea 2.5-3 mm long, ciliate at apex. Anthers 3, yellow, 2-2.5 mm long. Caryopsis purplish, narrowly ellipsoid, *ca* 1.5 mm long.

Common. Bilaspur, Gwalior, Hoshangabad, Raigarh, Raipur, Rajnandgaon, Sidhi, Surguja. *Fl. & Fr.*: Sept. - Nov.

76. POGONATHERUM P. Beauv.

Perennials, slender. Leaf blades linear; ligules hairy. Inflorescence a solitary raceme, exserted on a long, slender peduncle arising terminally and in the axils; racemes fragile, bearing paired spikelets; internodes and pedicels short, columnar. Spikelets 2-flowered, laterally compressed, falling entire; callus obtuse, long bearded. Lower glume obtuse, cartilaginous, rounded on the back; upper glume cymbiform, emarginate, with a long slender awn from the sinus. Lower floret male or reduced to a hyaline lemma or wanting. Upper floret bisexual. Lemma hyaline, shortly 2-fid, with a slender, glabrous awn from the sinus. Palea small. Stamens 1 or 2. Caryopsis ellipsoid.

About 3 species; India to Japan; 2 in M.P.

1a. Spikelets up to 2 mm long; callus hairs *ca* 2 mm long; lower floret absent or obsolete; upper floret with 1 stamen (rarely 2) ...1. *P. crinitum*

1b. Spikelets 2.5-3 mm long; callus hairs up to 1.5 mm long; lower floret present; upper floret with 2 stamens ...2. *P. paniceum*

1. Pogonatherum crinitum (Thunb.) Kunth, Enum. Pl. 1: 478. 1833; Hook. *f.*, Fl. Brit. India 7: 141. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 200. 1960. *Andropogon crinitum* Thunb., Fl. Jap. 40. t. 7. 1784.

Perennials. Culms 10-50 cm tall, slender. Leaves linear or linear-lanceolate. Racemes solitary, terminal. Sessile spikelets up to 2 mm long, more truncate and broader above. Upper glume longer than the lower, glabrous or shortly ciliate. Lower floret absent. Lemma of upper floret more dentate; awn 18-22 mm long. Palea 2/3rd the length of lemma. Anthers usually 1, rarely 2.

Bastar, Bilaspur, Raipur, Sidhi, Surguja. *Fl. & Fr.*: July - Oct.

Notes : This species resembles *P. paniceum* Hack. for which it is often mistaken. However, it is relatively more slender.

2. Pogonatherum paniceum (Lam.) Hack. in Allg. Bot. Zeit. 12: 178. 1906; Bor, Grass. Burm. Ceyl. Ind. Pak. 202. 1960. *Saccharum paniceum* Lam., Encycl. 1: 595. 1785. *Pogonatherum saccharoideum* P. Beauv., Ess. Agrostogr. 176, 177. 1812; Hook. *f.*, Fl. Brit. India 7: 141. 1896.

Perennials. Culms 10-50 cm tall, densely tufted; nodes shining. Leaves soft, rounded at base, tubercular scabrid; sheaths lax, smooth; ligules reduced, fimbriate. Inflorescence a solitary, terminal raceme, 1.5-3 cm long; joints and pedicels 1-1.5 mm long, trigonous, with white hairs on margins. Sessile spikelets linear-oblong, 2.5-3 mm long. Lower glume 2-3 mm long, truncate at top, membranous, convex on back, 2-3-nerved, ciliate below the apex; upper glume equalling spikelet, obtuse, membranous; keels hispid or scabrid, hairy at apex; awn 12-14 mm long. Lower floret male with 2 stamens, rarely bisexual. Upper floret bisexual. Lemma hyaline, 1.5-2.5 mm long, narrow, almost keeled, dentate, nerveless. Anthers 2, rarely 1, yellow. Caryopsis linear, *ca* 1.5 mm long.

Common in moist places. Bastar, Bilaspur, Hoshangabad, Raipur, Shahdol, Sidhi. *Fl. & Fr.*: July - Sept.

77. POLYPOGON Desf.

Annuals or perennials. Leaf blades linear, flat. Panicles contracted or spike like. Spikelets narrowly oblong to oblong, small, falling entire together with the pedicel or part of it; rhachilla not prolonged, disarticulating below the floret. Glumes subequal, narrow, entire, emarginate or 2-lobed at the tip, with a fine straight awn from the tip or between the lobes, 1-nerved, membranous, rough, keeled above. Lemma mostly broadly oblong, shorter than the glumes, truncate, thin, finely 5-nerved, usually awned from near the apex, with the very fine awn often caducous. Palea as long as the lemma or shorter.

About 10 species; subtropical and warm temperate regions; one in M.P.

Polypogon monspeliensis (L.) Desf., Fl. Atlant. 1: 67. 1798; Hook. *f.*, Fl. Brit. India 7: 245. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 403. 1960. *Alopecurus monspeliensis* L., Sp. Pl. 61. 1753.

Annuals. Culms 20-60 cm tall, usually decumbent. Leaves 4-10 cm long; sheaths loose, glabrous; ligules 5-7 mm long, lacerate. Inflorescence cylindrical, 5-10 x 1 cm panicle, usually interrupted. Spikelets linear-lanceolate, 1.2-2 mm long. Glumes nearly equal, lanceolate, 1.5-2 mm long, 2-dentate, with a scabrid, 4-7 mm long awn. Lemma oblong, 4-dentate, 5-nerved; awn *ca* 1 mm long. Anthers 3, light yellow, *ca* 0.5 mm long. Caryopsis ellipsoid, *ca* 1 mm long.

Common in moist and shady places. Bilaspur, Jabalpur, Mandla, Raigarh, Rewa, Sagar, Sidhi. *Fl. & Fr.*: Jan. - March.

78. PSEUDANTHISTIRIA (Hack.) Hook. *f.*

Annuals. Leaves narrow. Panicles leafy; branches slender, filiform, each bearing a single raceme covered by a proper spathe; racemes subumbellate, the umbel subtended by a common spathe; proper spathes lanceolate or linear-lanceolate, acuminate, keeled. Spikelets within spathe, one sessile, bisexual and other one pedicellate, male. Sessile spikelets with short callus. Lower glume truncate, chartaceous; upper glume similar to

lower. Lower lemma small, quadrate or nil; upper lemma reduced as an awn. Stamens 3; anthers linear. Lodicules cuneate. Caryopsis small.

About 4 species; India, S. China and Thailand; one in M.P.

Pseudanthistiria hispida Hook. *f.*, Fl. Brit. India 7: 219. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 203. 1960.

Annuals. Culms 30-75 cm tall, terete, branched. Leaves linear-lanceolate, hirsute, scabrid on margins; sheaths glabrous to hirsute; ligules membranous, truncate. Inflorescence a leafy panicle, with spathes; joints and callus hairy. Sessile spikelets lanceolate, *ca* 4 mm long, awned. Lower glume *ca* 4 mm long, truncate at apex, hairy on back, 7-nerved; upper glume similar to lower, 3-nerved. Upper lemma reduced as awn, 25-28 mm long. Anthers 3, yellow, 2-2.5 mm long. Caryopsis not seen.

Not common. East Nimar, Indore. *Fl. & Fr.*: Sept. Jan.

79. PSEUDOPOGONATHERUM A. Camus

Annuals, caespitose. Culms slender, glabrous. Leaves narrowly linear, rolled when dry. Inflorescence spiciform with numerous racemes, sometimes branching at the base; pedicels glabrous. Spikelets very small, 2-nate, often all pedicellate, rarely one pedicellate, the other sessile and remain attached to the pedicel, falling at maturity; rhachis not breaking up easily. Lower glume rounded on the back or almost so, involute or inflexed on margins; upper glume obtuse, often aristate or mucronate, glabrous. Lower floret barren. Lemma ovate-obtuse, membranous. Upper floret bisexual. Lemma stipitate, rarely linear and extremely narrow; awn often long, ciliate. Caryopsis linear.

Two species; tropical Asia; one in M.P.

Pseudopogonatherum contortum (Brongn.) A. Camus in Lecomte, Fl. Indo-Chine 7: 255. 1922; Bor, Grass. Burm. Ceyl. Ind. Pak. 204. 1960. *Pogonatherum contortum* Brongn. in Duperrey, Voy. Monde 90. t. 17. 1831. *Pollinia articulata* Trin. in Mem. Acad. Sci. Pétersb. ser. 6, 2: 273. 1832; Hook. *f.*, Fl. Brit. India 7: 109. 1896.

Annuals. Culms 20-60 cm tall, erect, tufted. Leaves convolute, 10-30 cm long, finely acuminate at apex; sheaths glabrous; ligules short, ciliate.

Inflorescence of 3-20 racemes, alternate or opposite, silky white. Spikelets lanceolate, 1.5-2.5 mm long. Lower glume *ca* 2 mm long, white hairy; upper glume ovate-lanceolate, *ca* 2 mm long, keeled, awns 0.7-1.5 mm long. Lower floret barren. Upper floret fertile. Lemma linear, *ca* 1.75 mm long, 1-nerved, entire or 2-fid; awn *ca* 3 cm long. Palea absent. Anthers 3, yellow, *ca* 0.5 mm long. Caryopsis pale yellow, linear, *ca* 1 mm long.

Bilaspur, Raigarh, Sidhi. *Fl. & Fr.*: Sept. - Oct.

80. PSEUDORAPHIS Griff.

Aquatic or marshy. Inflorescence a panicle. Spikelets narrow, shortly pedicellate on slender branches, the end of each branch produced into a slender bristle. Lower glume very short, obtuse, nerveless; upper glume long pointed, longer than the lamina of the lower floret. Lower floret male. Upper floret female. Upper lemma much shorter than lower lemma, hardly thickened. Palea hyaline. Caryopsis ovate-oblong or ellipsoid.

About 5 species; India to Japan and Australia; 2 in M.P.

1a. Leaf sheath not scabrid; spikelets 8-10 mm long, 1-3 on each branch ...1. *P. brunoniana*

1b. Leaf sheath scabrid along margins; spikelets 6-6.5 mm long, solitary ...2. *P. spinescens*

1. Pseudoraphis brunoniana Griff., Not. Pl. Asiat. 3: 29. 1851; Bor, Grass. Burm. Ceyl. Ind. Pak. 353. 1960. *Panicum brunonianum* Griff., Not. Pl. Asiat. 3: 29. 1851. *Chamaeraphis spinescens* Poir. var. *brunoniana* (Griff.) Hook. *f.*, Fl. Brit. India 7: 62. 1896.

Annuals. Culms 50-70 cm tall, erect or decumbent. Leaves ventrally glabrous, basal portion and dorsal surface scabrid; sheaths glabrous; ligules lacerate. Inflorescence a panicle; axis and branches angular, furrowed, scabrid-hispid. Spikelets 8-10 mm long including awn. Lower glume orbicular, 0.8-1 mm long; upper glume 8-10 mm long with awns. Fertile floret bisexual, linear-oblong, *ca* 2 mm long. Anthers 3, yellow, 1-1.5 mm long. Caryopsis white, ovate-oblong, 1-1.5 mm long.

Rare. Damoh. *Fl. & Fr.*: Sept. - Oct.

2. Pseudoraphis spinescens (R. Br.) Vickery in Proc. Roy. Soc. Queensl. 62: n. 7. 69. 1952; Bor, Grass. Burm. Ceyl. Ind. Pak. 353. 1960. *Panicum spinescens* R. Br., Prodr. 193. 1810. *Chamaeraphis spinescens* (R. Br.) Poir. in Lam., Encycl. Suppl. 2: 189. 1811; Hook. *f.*, Fl. Brit. India 7: 62. 1896.

Perennials. Culms 20-100 cm tall, floating, much branched and leafy. Leaves linear or lanceolate, flat; sheaths compressed, scabrid along margins; ligules short, hairy. Inflorescence a spreading panicle; branches simple; rhachis produced into 8-11 mm long bristle beyond the terminal spikelet. Spikelets solitary, subsecund, lanceolate, 6-6.5 mm long. Lower glume orbicular, *ca* 0.5 mm long; upper glume lanceolate, 6-6.5 mm long, 9-11-nerved. Lower lemma 4.5-4.7 mm long, acuminate, 5-7-nerved. Anthers 3, yellow, *ca* 1.5 mm long. Caryopsis ellipsoid, *ca* 2 mm long.

Rare. Dhar, Raipur, Sagar. *Fl. & Fr.*: Sept. - Jan.

81. PSEUDOSORGHUM A. Camus

Annuals. Culms decumbent or erect. Leaf blades linear or sublanceolate, flat, rigid, somewhat glaucous. Inflorescence a contracted panicle; primary branches solitary, erect, divided to the base, secondary sometimes verticillate; racemes spiciform, dense, sessile; rhachis fragile; joints and pedicels slender, without a translucent groove, hairy. Pedicellate spikelets different from the sessile in shape and sex, male or neuter, reduced; sessile spikelets much imbricate, lanceolate, dorsally compressed; callus small, hairy. Lower glume with ciliate keels; upper glume more or less keeled. Lemma in lower floret equalling the glumes, in upper floret much shorter with a slender awn. Palea equal to lemma, smaller or absent.

A monotypic genus; tropical Asia.

Pseudosorghum fasciculare (Roxb.) A. Camus in Bull. Mus. Hist. Nat. Paris 26: 662. 1920; Bor, Grass. Burm. Ceyl. Ind. Pak. 205. 1960. *Andropogon fascicularis* Roxb., Fl. Ind. (Carey & Wallich ed.) 1: 269. 1820; Hook. *f.*, Fl. Brit. India 7: 177. 1896.

Annuals. Culms 30-75 cm tall, terete, decumbent. Leaves lanceolate, flat; sheaths compressed, glabrous, sparsely hairy; ligules membranous, truncate. Inflorescence of racemes in pairs; peduncles one short and other long; joints and callus hairy. Sessile spikelets elliptic, *ca* 4 mm long, awned.

Lower glume lanceolate, *ca* 4 mm long, 7-nerved, shortly hispid; upper glume similar to lower. Lower lemma equal to glumes; upper lemma clefted into two acute lobes, with 18-20 mm long awn from sinus. Anthers 3, yellow, 1.2-1.5 mm long. Caryopsis lanceolate, *ca* 4 mm long.

Balaghat, Bastar, Bilaspur, Hoshangabad, Sidhi, Surguja. *Fl. & Fr.*: Sept. - Dec.

82. RHYNCHELYTRUM Nees

Annuals or perennials. Leaf blades flat or filiform; ligule a ciliate rim. Inflorescence a panicle with capillary branches. Spikelets symmetrical, laterally compressed, often silky hairy. Lower glume small; upper glume equal to the spikelet, firmly membranous to subcoriaceous, thinner towards the tip, glabrous below and sometimes tapering to a beak above, emarginate to 2-lobed (rarely entire), often awned from the sinus, 5-nerved. Lower floret usually male, with lemma similar to upper glume. Palea usually ciliate on the margins. Upper lemma smaller than the lower, often caducous, smooth, cartilaginous, laterally compressed and enfolding the palea. Caryopsis oblong-ellipsoid.

About 15 species; tropical Africa to S. E. Asia; 2 in M.P.

1a. Ligules hairy; pedicels of the spikelets with a few long hairs; spikelets 4-4.5 mm long ...1. *R. repens*

1b. Ligules obsolete; pedicels of the spikelets without long hairs; spikelets very variable, 5-12 mm long ...2. *R. villosum*

1. Rhynchelytrum repens (Willd.) Hubb. in Kew Bull. 1934: 110. 1934; Bor, Grass. Burm. Ceyl. Ind. Pak. 355. 1960. *Saccharum repens* Willd., Sp. Pl. 1: 322. 1797. *Tricholaena wightii* Nees & Arnott *ex* Steud., Syn. Pl. Glumac. 1: 93. 1854; Hook. *f.*, Fl. Brit. India 7: 65. 1896.

Annuals or perennials. Culms 20-50 cm tall, rooting at lower nodes. Leaves finely pubescent or glabrous; sheaths glabrous or pilose, long hairy at mouth; ligules hairy. Inflorescence a lax, white or pink panicle; branches capillary. Spikelets solitary or paired, 4-4.5 mm long, densely hairy, appressed when young. Lower glume 1-1.3 mm long, hairy at base, 1-nerved; upper glume equalling the spikelet, 5-nerved, hairs longer than glumes. Upper lemma *ca* 2.5 mm long, 3-nerved. Palea ciliate on keels. Anthers 3, *ca* 2 mm long. Caryopsis brownish, ellipsoid, *ca* 2.5 mm long.

Rare. Hoshangabad. *Fl. & Fr.*: July Feb.

Notes : The pink feathery panicle is a field character which distinguishes it from other grasses.

2. Rhynchelytrum villosum (Parl.) Chiov. in Ann. Inst. Bot. Roma 8: 310. 1908; Bor, Grass. Burm. Ceyl. Ind. Pak. 355. 1960. *Monachyron villosum* Parl. in Hook., Niger Fl. 191. 1849.

Annuals or short lived perennials. Culms 40-80 cm tall, tufted. Leaves linear, flat; sheaths glabrous or hairy; ligules obsolete. Inflorescence a narrow panicle; branches and pedicels capillary. Spikelets very variable, 5-12 mm long; callus with long hairs. Lower glume up to 3 mm long, obtuse, concave, spreading; upper glume and lower lemma shortly 2-lobed, awned or awnless, the former gibbous, tapering into a narrow, glabrous beak. Palea ciliate on keels. Anthers 3, purplish, *ca* 2 mm long.

Rare. Hoshangabad. *Fl. & Fr.*: Oct. Feb.

83. ROTTBOELLIA L. *f.*, *nom. cons.*

Annuals. Culms erect. Leaf blades flat; ligule a very short membrane. Inflorescence a single raceme, either terminal or aggregated into a spatheate false panicle; racemes cylindrical; internodes squately clavate, fused to the adjacent pedicel. Sessile spikelets sunk in the internode; callus truncate, with a prominent central peg. Lower glume coriaceous, broadly convex, 2-keeled, smooth, narrowly winged at the apex. Lower floret male with hyaline lemma and well developed palea. Upper lemma entire and awnless. Pedicellate spikelets herbaceous or scarious, a little smaller than the sessile; pedicels oblong, flattened, scarcely distinguishable from the internode. Caryopsis ovoid in face view, crescentic in side view.

About 3 species; tropical regions of Old World; one in M.P.

Rottboellia exaltata L. *f.*, Nov. Gram. Gen. 40. t. 1. 1779 & Suppl. Pl. 114. 1782; Hook. *f.*, Fl. Brit. India 7: 156. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 206. 1960. **Fig. 65.**

Annuals. Culms 1-1.5 m tall, erect, tufted, rhizomatous. Leaves 30-40 cm long, flat, with tubercle-based hairs on margins; sheaths tight,

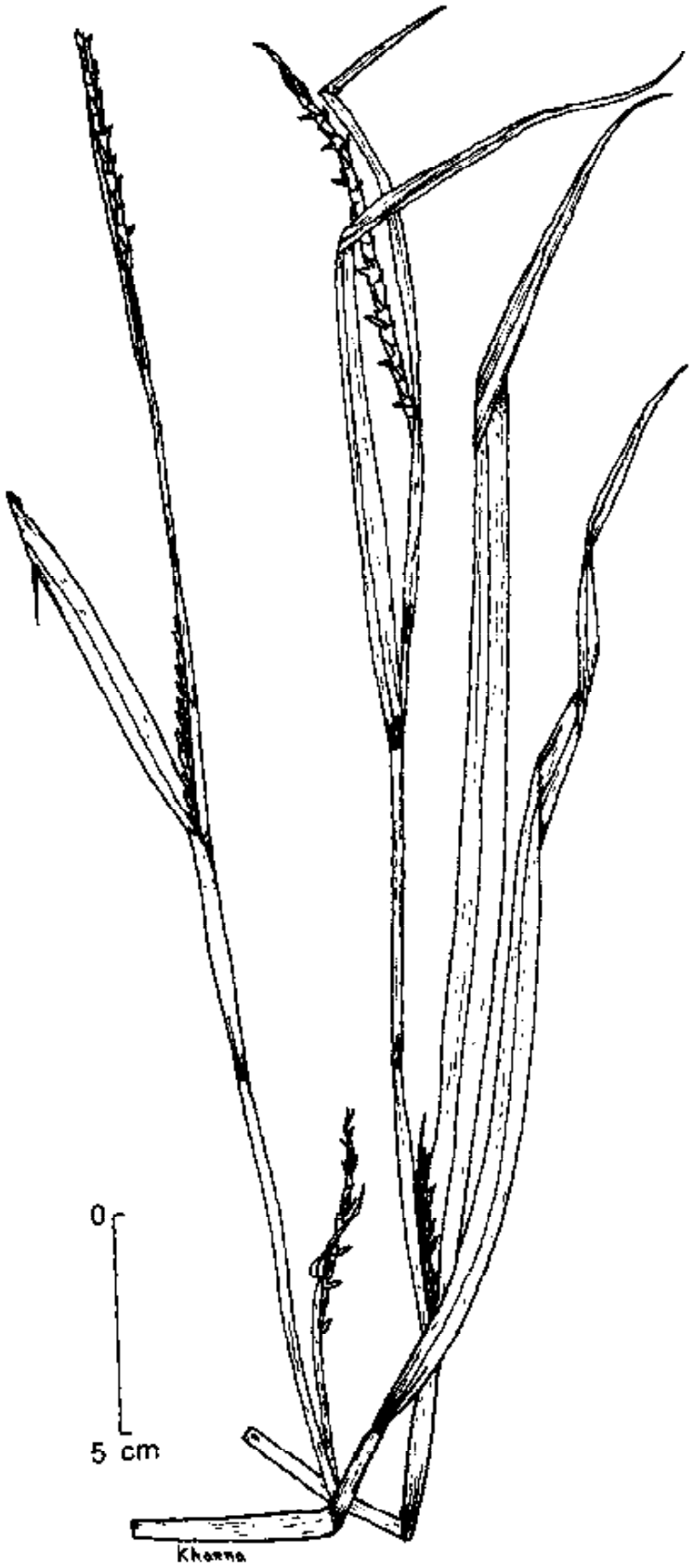

Fig. 65. Rottboellia exaltata L. *f.*

glabrous; ligules lacerate. Inflorescence of racemes; joints with rounded ends, *ca* 4.5 mm long. Sessile spikelets ovate-lanceolate, 5-6 mm long. Lower glume *ca* 5.5 mm long, with 9-10 faint nerves; upper glume *ca* 5.5 mm long, concave, sunken in the cavity of rhachis. Lower lemma lanceolate, acute, slightly folded on margins; upper lemma bisexual, 1.5-2 mm long, concave, acute. Anthers 3, yellow, *ca* 2 mm long. Caryopsis *ca* 3 mm long, gibbous, embryo end broader.

Balaghat, Hoshangabad, Indore, Rajnandgaon, Rewa, Sidhi, Surguja. *Fl. & Fr.*: Aug. Nov.

84. SACCHARUM L.

Perennials. Culms tall, solid. Leaf blades linear; ligules scarious or a line of hairs. Inflorescence large, plumose, often silvery, with many racemes crowded upon the primary panicle branches or borne directly on the main axis; racemes usually flexuous; rhachis fragile, bearing paired, similar spikelets, one sessile, the other pedicellate; internodes linear, slender, usually more than half the length of the sessile spikelet. Spikelets lanceolate, enveloped in long silky hairs from the callus; callus very short, truncate. Glumes equal, membranous or coriaceous; lower glume flat or rounded on the back. Lower floret reduced to a lemma, often lanceolate, shorter than the spikelet, hyaline. Upper floret bisexual. Lemma lanceolate, hyaline, awnless or with a straight awn, entire or rarely 2-lobed, sometimes reduced to a subulate vestige, small or suppressed. Stamens 2-3. Caryopsis subglobose to narrowly oblong.

About 30 species; tropical and subtropical regions; 3 in M.P.

1a. Rhachis very fragile; peduncle silvery white hairy below the panicle ...3. *S. spontaneum*

1b. Rhachis less fragile; peduncle not hairy below the panicle:

2a. Leaf sheath hairy at base, villous on margins; spikelets 4-6 mm long; lower glume of sessile spikelet with long hairs ...1. *S. bengalense*

2b. Leaf sheath pubescent towards throat, otherwise glabrous; spikelets 3.5-4 mm long; lower glume of sessile spikelet glabrous ...2. *S. officinarum*

1. **Saccharum bengalense** Retz., Observ. Bot. 5: 16. 1789; Bor, Grass. Burm. Ceyl. Ind. Pak. 211. 1960. *S. munja* Roxb., Fl. Ind. (Carey & Wallich ed.) 1: 250. 1820. *S. arundinaceum auct. non* Retz., 1786; Hook. *f.*, Fl. Brit. India 7: 119. 1896, *p.p.*

Perennials. Culms 2.5-3.6 m tall, in clumps; internodes solid and polished. Leaves mostly basal, *ca* 1 m long, scabrid on margins; sheaths hairy at base, villous on the margins; ligules lacerate. Inflorescence a purplish to cream-coloured, 30-90 cm long, plumose panicle. Spikelets 4-6 mm long, covered with hairs of callus and lower glumes. Sessile spikelets longer than the pedicels of pedicellate spikelets. Lower glume *ca* 5 mm long, with 2 strong lateral nerves, long hairy; upper glume equal to lower. Lower floret empty. Upper floret bisexual. Lemma hyaline, elliptic, ciliate, mucronate. Anthers 3, yellow or purplish, 2-2.5 mm long. Caryopsis cymbiform, *ca* 2 mm long.

Throughout the state. *Fl. & Fr.*: Oct. - Nov.

Notes : The plant is used as soil binder and grown as a fence around cultivated fields and gardens.

2. **Saccharum officinarum** L., Sp. Pl. 54. 1753; Hook. *f.*, Fl. Brit. India 7: 118. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 212. 1960.

Perennials. Culms 2-6 m tall, erect, glabrous, waxy below the nodes. Leaves linear, very long, acute at apex, scabrous on margins; sheaths pubescent towards throat; ligules ciliate. Inflorescence a large, pyramidal panicle; nodes bearded; rhachis breaking up at maturity; pedicels glabrous. Spikelets 3.5-4 mm long, covered with white silky hairs; callus with long hairs. Lower glume equalling spikelet, acute, margins inserted; upper glume similar to lower. Lower floret empty. Upper floret bisexual. Lemma awnless, reduced. Anthers 3, purplish, *ca* 2 mm long. Caryopsis purple, cylindrical, *ca* 1.5 mm long.

Cultivated. *Fl. & Fr.*: Feb. - April.

3. **Saccharum spontaneum** L., Mant. Pl. 183. 1771; Hook. *f.*, Fl. Brit. India 7: 118. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 214. 1960.

Perennials, with extensive rhizomes. Culms 1-3 m tall, erect, glabrous; nodes hairy. Leaves linear-lanceolate, 20-80 cm long, scabrid on margins;

sheaths auriculate, glabrous, hairy at throat; ligules hairy. Inflorescence a lax, silvery white panicle. Spikelets lanceolate, 3-6 mm long, sessile and pedicellate similar, 1-flowered, bisexual. Sessile spikelets 3.5-4 mm long. Lower glume *ca* 3.5 mm long, sharply acute, ciliate on margins, 2-nerved; upper glume *ca* 4 mm long, 1-keeled. Lower lemma oblong, *ca* 3 mm long, ciliate, epaleate; upper lemma bisexual, linear or elliptic, *ca* 3 mm long. Anthers 3, purple, *ca* 1 mm long. Caryopsis narrowly lanceolate, *ca* 3 mm long.

Common. Balaghat, Bastar, Bhopal, Bilaspur, Chhatarpur, Gwalior, Hoshangabad, Indore, Mandla, Panna, Rajnandgaon, Rewa, Sagar, Surguja. *Fl. & Fr.*: Sept. - Nov.

85. SACCIOLEPIS Nash

Annuals or perennials. Leaves thin, flat or involute. Inflorescence a narrow, spike like panicle (sometimes interrupted) with many short, terete branches. Spikelets nearly terete or laterally compressed, narrowed to the tip from swollen base. Glumes very unequal; upper glume strongly many-nerved, often concave near the base. Lower floret male or neuter. Lemma like the upper glume but always with a straight back. Palea small, thin. Upper floret bisexual, ellipsoid. Lemma stiff, pale and shining when mature. Palea similar. Caryopsis tightly enclosed by lemma and palea.

Notes : This genus is distinct from *Panicum* by spike like inflorescence, numerous prominent nerves on the upper glume and lower lemma.

About 38 species; tropical and subtropical regions especially Africa; 3 in M.P.

1a. Spikelets obliquely lanceolate, acute at tips:

2a. Culms slender, never spongy; spikelets *ca* 2.5 mm long, in continuous pseudo-spikes; lower glume half the length of spikelet ...1. *S. indica*

2b. Culms robust, spongy below; spikelets 4-5 mm long, in interrupted fascicles; lower glume less than half the length of spikelet ...2. *S. interrupta*

1b. Spikelets elliptic, blunt at tips ...3. *S. myosuroides*

1. Sacciolepis indica (L.) Chase in Proc. Biol. Soc. Wash. 1: 8. 1908; Bor, Grass. Burm. Ceyl. Ind. Pak. 357. 1960. *Aira indica* L., Sp. Pl. 1753, in '*Errata*'. *Panicum indicum* L., Mant. Pl. 184. 1771, *non* Mill., 1768; Hook. *f.*, Fl. Brit. India 7: 41. 1896.

Annuals. Culms 20-60 cm tall, slender, spreading. Leaves flat to involute, glabrous; sheaths slightly keeled, shorter than internode; ligules membranous. Inflorescence a spike like, 1-4 cm long panicle; pedicels discoid-tipped. Spikelets *ca* 2.5 mm long, glabrous or pilose near the summit. Lower glume ovate, 1/2-2/3 as long as the spikelet, 3-7-nerved; upper glume 7-11-nerved. Lower lemma empty; upper lemma pale yellow, narrowly ovate, about half of the spikelet, acute, shining. Anthers 3, purple, *ca* 0.7 mm long. Caryopsis ellipsoid, *ca* 0.8 mm long.

Common. Balaghat, Bastar, Bilaspur, Raigarh, Surguja. *Fl. & Fr.*: Aug. Dec.

2. Sacciolepis interrupta (Willd.) Stapf in Prain, Fl. Trop. Afr. 9: 757. 1920; Bor, Grass. Burm. Ceyl. Ind. Pak. 358. 1960. *Panicum interruptum* Willd., Sp. Pl. 1: 341. 1797; Hook. *f.*, Fl. Brit. India 7: 40. 1896.

Perennials. Culms creeping or floating with a swollen spongy rhizome; flowering culms 20-50 cm long; nodes glabrous. Leaves lanceolate, flat, rounded at base, glabrous; sheaths swollen, glabrous, purple; ligules membranous, truncate. Inflorescence a terminal spike like panicle, interrupted below; branches with 5-6 flowers, usually one fertile. Fertile spikelet *ca* 4 mm long, acute. Lower glume *ca* 1.2 mm long, muticous; upper glume elliptic-oblong, *ca* 4 mm long, 9-11-nerved, hyaline on margins. Lower lemma empty; upper lemma 2-2.5 mm long, chartaceous. Anthers 3, dark purple, *ca* 1.5 mm long. Caryopsis elliptic, dorsally compressed, 2-2.5 mm long.

Common. Balaghat, Bastar, Bilaspur, Raigarh, Rajnandgaon, Rewa, Sagar, Satna, Sidhi. *Fl. & Fr.*: Sept. - Dec.

3. Sacciolepis myosuroides (R. Br.) A. Camus in Lecomte, Fl. Indo-Chine 7: 460. 1922; Bor, Grass. Burm. Ceyl. Ind. Pak. 358. 1960. *Panicum myosuroides* R. Br., Prodr. 189. 1810; Hook. *f.*, Fl. Brit. India 7: 42. 1896.

Annuals. Culms 30-60 cm tall, terete, erect or decumbent, simple or branched. Leaves linear, narrow, usually glabrous, scabrid on margins; sheaths compressed, striate; ligules very short, membranous. Inflorescence a narrow, dense, cylindrical, 5-15 cm long panicle; rhachis scabrous; pedicels unequal. Spikelets often purple-tinged at tip, elliptic, 2-2.5 mm long. Lower glume ovate, *ca* 1 mm long, 3-nerved; upper glume elliptic, 2-2.2 mm long, 5-9-nerved. Lower lemma empty, 9-11-nerved; upper lemma white, ovate-oblong, *ca* 1 mm long, shining, 5-nerved. Anthers 3, purple, 0.5-0.8 mm long. Caryopsis ellipsoid-oblong, *ca* 1 mm long.

Common. Bastar, Betul, Bilaspur, Gwalior, Rajnandgaon, Raigarh, Sagar, Sidhi. *Fl. & Fr.*: Aug. Dec.

86. SCHIZACHYRIUM Nees

Annuals or perennials, often tall but sometimes delicate. Leaf blades linear, acute or obtuse at apex; ligules membranous or scarious. Inflorescence of single racemes usually arranged in a spatheate, false panicle, but sometimes solitary at the tip of the culm; racemes slender; internodes and pedicels linear to clavate. Sessile spikelets linear to lanceolate; callus obtuse, inserted into the crateriform and scariously rimmed tip of the internode. Lower glume thinly chartaceous to subcoriaceous, convex to concave on the back, 2-keeled (or at least sharply inflexed); keels more or less frontal, with several intercarinal nerves. Lower floret reduced to a hyaline lemma. Upper lemma hyaline, often stipitiform, shortly 2-lobed or deeply 2-fid (rarely entire), with a glabrous awn from the sinus (rarely awnless). Palea small or absent. Pedicellate spikelets male or barren, commonly smaller than the sessile. Caryopsis linear, subterete.

About 60 species; tropical regions; 3 in M.P.

1a. Culms slender; leaves up to 4 cm long, obtuse; joints of the raceme 2-3 mm long; lower glume of sessile spikelet *ca* 2.5 mm long ...1. *S. brevifolium*

1b. Culms robust; leaves much longer, acuminate; joints of the raceme more than 4 mm long; lower glume of sessile spikelet more than 4 mm long:

2a. Annuals; lower glume of sessile spikelet not rounded; fertile lemma *ca* 4 mm long; caryopsis *ca* 4 mm long ...2. *S. exile*

2b. Perennials; lower glume of sessile spikelet dorsally rounded; fertile lemma 5-5.6 mm long; caryopsis 1.5-2 mm long ...3. *S. sanguineum*

1. Schizachyrium brevifolium (Sw.) Nees *ex* Büse in Miq., Pl. Jungh. 359. 1854; Bor, Grass. Burm. Ceyl. Ind. Pak. 215. 1960. *Andropogon brevifolius* Sw., Prodr. 26. 1788; Hook. *f.*, Fl. Brit. India 7: 165. 1896.

Annuals. Culms 40-60 cm tall, decumbent, tufted, slender. Leaves linear, acute at apex; sheaths compressed, keeled, glabrous; ligule a shallow membrane. Inflorescence of a series of racemes. Spikelets in pairs. Sessile spikelets linear-lanceolate, *ca* 3 mm long. Lower glume 2-dentate, scaberulous on back; upper glume cymbiform, acute, 1-nerved, ciliolate. Lower floret represented by empty lemma. Upper floret bisexual, 2-dentate, *ca* 1.5 mm long; awns 8-16 mm long. Anthers 2, purple, *ca* 1.5 mm long. Caryopsis sublinear, *ca* 2 mm long, tapering upwards.

Common. Bilaspur, Raigarh, Rajnandgaon, Shivpuri, Sidhi, Surguja. *Fl. & Fr.*: Sept. - Jan.

2. Schizachyrium exile (Hochst.) Stapf in Prain, Fl. Trop. Afr. 9: 191. 1917; Bor, Grass. Burm. Ceyl. Ind. Pak. 216. 1960. *Andropogon exilis* Hochst. in Flora 27: 241. 1844.

Annuals. Culms 15-20 cm tall, erect, slightly compressed. Leaves linear, tapering at apex, glabrous; sheaths loose, glabrous; ligule a short membrane. Inflorescence of short racemes in the spathe. Sessile spikelets up to 8 mm long, with bearded callus. Glumes equal. Lower glume with long white hairs, scaberulous on keels; upper glume subulate, with long fine point at tips. Lower floret empty. Upper floret bisexual, 2-dentate, *ca* 4 mm long; awn 12-20 mm long. Anthers 2, linear, 1.25-2 mm long. Caryopsis linear, *ca* 4 mm long.

Bilaspur, Hoshangabad, Shivpuri, Sidhi. *Fl. & Fr.*: Oct. - Jan.

3. Schizachyrium sanguineum (Retz.) Alston, Handb. Fl. Ceylon 6: suppl. 334. 1931; Bor, Grass. Burm. Ceyl. Ind. Pak. 216. 1960. *Rottboellia sanguinea* Retz., Observ. Bot. 3: 25. 1783. *Andropogon hirtiflorus auct. non* Kunth, 1832: Hook. *f.*, Fl. Brit. India 7: 167. 1896.

Perennials. Culms 15-50 cm tall. Leaves 10-15 cm long, acute at apex; sheaths compressed, glabrous; ligules membranous. Inflorescence spatheate, of spike like racemes; internode of rhachis 6-8 mm long, 2-dentate at the tip. Sessile spikelets with oblique callus and stiff white hairs. Lower glume *ca* 7.2 mm long, 5-nerved, keeled; upper glume *ca* 7.4 mm long, 3-nerved. Lower floret barren. Upper lemma *ca* 5.2 mm long, with cleft; awn *ca* 2.2 cm long. Anthers 2, yellow, *ca* 2 mm long. Caryopsis cylindrical, 1.5-2 mm long.

Rare. Damoh. *Fl. & Fr.*: Sept. Nov.

87. SCHIZOSTACHYUM Nees

Shrubby bamboos. Culms slender, straight; sheaths auricled. Leaves various, shortly petiolate. Spikelets 2, in terminal globose heads, or a panicle of bracteate heads, 1-flowered, elongate; rhachilla produced beyond the flower. Empty glumes 2-3, broad, chaffy, many-nerved, usually long-awned. Floral glumes more membranous, convolute; awns shorter. Palea thin, many-nerved; keels 2, approximate. Lodicules 3, 3-5-nerved. Stamens 6, free; anthers long. Ovary ovoid, narrowed into a long thickened style, stipitate; stigmas 2-3, plumose. Caryopsis oblong, beaked; pericarp separable.

About 35 species; E. Asia; one in M.P.

Schizostachyum pergracile (Munro) R. Majumdar in Karthikeyan *et al.*, Fl. Ind. Enum. Monocot. 282. 1989. *Cephalostachyum pergracile* Munro in Trans. Linn. Soc. London 26: 141. 1868; Gamble in Hook. *f.*, Fl. Brit. India 7: 413. 1896.

Shrubby bamboos. Culms 10-12 m tall, 5-7 cm in diameter, erect, glaucous-green; internodes 30-45 cm long, walls very thin; culm sheaths ovate, cordate, 10-15 x 15-20 cm, covered with black, deciduous hairs on dorsal surface, with a wavy fringe bordering the top of sheath and ending to rounded auricle; the fringe and the auricle covered with white bristles;

ligules very narrow, entire. Leaves variable, linear-lanceolate, 15-35 cm broad; petioles short, scabrid; sheaths glabrous, auricled at mouth with cilia; ligules very narrow, entire. Panicles large, drooping. Spikelets supported by chaffy bracts, individual spikelet in bracteate clusters, 1.25-1.75 cm long; rhachis slender, wiry, 3-5 cm between clusters. Lemma ovate-lanceolate, 1-1.5 cm long, densely hairy, mucronate, many-nerved. Palea keels ciliate, deeply 2-fid at apex. Lodicules 2, narrow, lanceolate, ciliate. Anthers purple. Caryopsis ovate-oblong, 1-1.25 cm long, furrowed on one side, ending in a *ca* 1.25 cm long beak.

Bastar, Raipur. *Fl.* & *Fr.*: Rare.

88. SCHOENEFELDIA Kunth

Annuals or perennials. Leaf blades narrowly linear; ligule reduced to a hairy rim. Inflorescence of solitary, paired or digitate, slender, one-sided spikes. Spikelets 1-flowered, with or without an additional, vestigial floret. Glumes unequal, lanceolate, acute, mucronate or short-awned, membranous, 1-nerved, keeled. Fertile lemma shorter than the glumes, ovate-elliptic, laterally compressed, keeled, membranous, ciliate on the nerves, minutely 2-dentate, with a fine long flexuous awn from between the teeth. Caryopsis narrowly ellipsoid, rounded or flattened on the back.

Two species; tropical regions of Old World; one in M.P.

Schoenefeldia gracilis Kunth, Revis. Gramin. 1: 283. t. 53. 1830; Bor, Grass. Burm. Ceyl. Ind. Pak. 474. 1960. *S. pallida* Edgew. in J. Asiat. Soc. Bengal 21: 183. 1852. *Chloris pallida* (Edgew.) Hook. *f.*, Fl. Brit. India 7: 289. 1896.

Annuals. Culms 20-40 cm tall, slender. Leaves very narrow, attenuate at apex; sheaths glabrous; ligules of few hairs. Inflorescence of golden yellow, 3-5 spikes; rhachis flattened, serrulate. Spikelets one-flowered, one-sided, 1.8-2 mm long, subsessile. Glumes subequal, compressed, keeled; upper 2-fid with curved awn, *ca* 3 cm long. Fertile lemma shorter than glumes, ovate-elliptic, laterally compressed, ciliate on nerves, minutely 2-dentate, with a fine awn between the teeth. Anthers 3, enclosed in floret, *ca* 1 mm long. Caryopsis narrow, 2-2.5 mm long, acute, free from pericarp.

Rare. In dry sandy places. Shivpuri. *Fl.* & *Fr.*: Aug. Oct.

89. SEHIMA Forssk.

Annuals or perennials. Leaf blades linear; ligule a line of hairs. Inflorescence a solitary raceme, terminal on the culm, exserted from the sheath; internodes and pedicels thickened, narrowly oblong-cylindrical, ciliate. Sessile spikelets usually laterally compressed; callus obtuse and inserted into the concave tip of the internodes. Lower glume coriaceous, convex or concave and often medially grooved on the back, without a mid nerve, commonly 2-keeled, with a narrow membranous wing towards the apex, 2-dentate; upper glume cymbiform, laterally compressed, with an apical bristle. Lower floret male, with hyaline lemma and well developed palea. Upper lemma 2-dentate, passing between the teeth into an awn; awn puberulous to ciliate along the coils. Palea lanceolate, hyaline. Pedicellate spikelets male or barren, conspicuous, awnless. Caryopsis lanceolate-oblong, concave on one side.

About 5 species; tropical regions of Old World; 2 in M.P.

1a. Joints and pedicels hairy on both margins; lower glume of sessile spikelet grooved but without a slit ...1. *S. nervosum*

1b. Joints and pedicels glabrous or hairy on only one margin; lower glume of sessile spikelet with a deep, longitudinal, slit like groove ...2. *S. sulcatum*

1. **Sehima nervosum** (Rottl.) Stapf in Prain, Fl. Trop. Afr. 9: 36. 1917; Bor, Grass. Burm. Ceyl. Ind. Pak. 218. 1960. *Andropogon nervosus* Rottl. apud Willd. in Verh. Ges. Naturf. Freund. Berlin, Neve Schr. 4: 218. 1803. *Ischaemum laxum* R. Br., Prodr. 205. 1810; Hook. *f.*, Fl. Brit. India 7: 136. 1896. **Fig. 66.**

Perennials. Culms up to 90 cm tall, erect, tufted. Leaves linear, filiform at tips, rigid, scabrous; sheaths glabrous, striate; ligules hairy. Inflorescence a solitary raceme. Sessile spikelets linear-lanceolate, 6-8 mm long; callus shortly bearded. Lower glume 6-7 mm long, 2-dentate, deeply grooved on back; upper glume cymbiform, 5.5-6.5 mm long; arista *ca* 1.5 mm long. Lower floret male. Upper floret bisexual. Lemma deeply clefted into two lobes; awn *ca* 2.5 cm long. Anthers 3, yellow, 3-4 mm long. Pedicellate spikelets equal to the sessile ones. Caryopsis narrowly cylindrical, *ca* 2 mm long.

Fig. 66. Sehima nervosum (Rottl.) Stapf

Common. Bilaspur, Indore, Morena, Ratlam, Sagar, Sidhi, Surguja, Tikamgarh. *Fl. & Fr.*: Sept. - Jan.

2. Sehima sulcatum (Hack.) A. Camus in Bull. Mus. Hist. Nat. Paris 27: 373. 1921; Bor, Grass. Burm. Ceyl. Ind. Pak. 219. 1960. *Ischaemum sulcatum* Hack. in A. DC., Monogr. Phan. 6: 248. 1889; Hook. *f.*, Fl. Brit. India 7: 137. 1896.

Perennials. Culms 20-50 cm tall, tufted, slender. Leaves linear, glabrous; sheaths terete, glabrous; ligules ciliate. Inflorescence a terminal raceme. Sessile spikelets linear or lanceolate, 9-10 mm long, awned. Lower glume 8-9 mm long, deeply grooved, 6-nerved, 2-dentate; upper glume cymbiform, 3-5-nerved; awn 12-14 mm long. Lower lemma male; upper lemma *ca* 6 mm long, 2-dentate; awn from sinus 2-3.5 cm long. Anthers 3, yellow, 3-4 mm long. Pedicellate spikelets equal to sessile ones, awnless. Caryopsis oblong, *ca* 3 mm long.

Bilaspur, Shivpuri, Surguja. *Fl. & Fr.*: Aug. - Dec.

90. SETARIA P. Beauv., *nom. cons.*

Annuals or perennials. Leaf blades flat or folded, sometimes plicate; ligule usually a ciliate rim. Inflorescence an open or spike like panicle. Spikelets (or only the terminal) subtended by 1 or more bristles, oblong to ovate, more or less plano-convex, awnless; bristles persistent on the axis after the fall of spikelets. Glumes unequal; lower glume abaxial, generally much smaller, ovate from a clasping base. Lower floret male or barren, as long as the spikelet, herbaceous. Upper floret bisexual. Lemma crustaceous, strongly convex on the back, often rugose, clasping only the margins of the palea. Caryopsis oblong or ellipsoid.

About 125 species; tropical and subtropical regions; 8 in M.P.

1a. Leaf blades folded or flat; inflorescence a cylindrical, dense or lobed spiciform panicle:

2a. Bristles retrorsely barbed ...8. *S. verticillata*

2b. Bristles antrorsely barbed:

3a. Upper glume as long as the upper lemma, the latter quite smooth or minutely rugose ...5. *S. italica*

3b. Upper glume shorter than the upper lemma, the latter distinctly rugose:

4a. Inflorescence a cylindrical false spike; spikelets 2-3 mm long:

5a. Spikelets *ca* 3 mm long; upper lemma coarsely rugose, cymbiform, slightly keeled upwards, dorsally strongly curved in profile ...2. *S. glauca*

5b. Spikelets 2-2.5 mm long; upper lemma finely rugose, narrow, not keeled, dorsally gently curved ...7. *S. pumila*

4b. Inflorescence a narrow panicle; spikelets 1.8-2 mm long ...4. *S. intermedia*

1b. Leaf blades folded in fan-fashion between the longitudinal nerves; inflorescence a dense or rather loose, narrow or widely spreading panicle:

6a. Perennials; leaves plicate; spikelets *ca* 3.5 mm long ...6. *S. plicata*

6b. Annuals; leaves not plicate; spikelets *ca* 1 mm long:

7a. Branches of the panicle divided from the base and bearing short racemes; spikelets elliptic-acute; upper glume about half the length of upper lemma; lower floret male or barren ...1. *S. barbata*

7b. Branches of panicle simple from the base; spikelets abruptly acute; upper glume about the length of upper lemma; lower floret barren ...3. *S. homonyma*

1. Setaria barbata (Lam.) Kunth, Revis. Gramin. 1: 47. 1829; Bor. Grass. Burm. Ceyl. Ind. Pak. 360. 1960. *Panicum barbatum* Lam., Tabl. Encycl. 1: 171. 1791. *P. flavescens auct. non* Sw., 1788: Hook. *f.*, Fl. Brit. India 7: 56. 1896.

Annuals. Culms 1-1.5 m tall, decumbent, slender. Leaves thin, linear-lanceolate; sheaths with hairy margins; ligules obscure. Inflorescence a

loose, narrow panicle; bristles 5-10 mm long. Spikelets green, *ca* 2.5 mm long, subsessile. Upper glume 0.4-1.9 mm long, apiculate, 5-7-nerved. Lower lemma male, *ca* 1 mm long; upper lemma bisexual, elliptic, 0.8-1.9 mm long, acuminate, transversely rugose. Anthers 3, 0.5-0.7 mm long. Caryopsis *ca* 0.8 mm long, acuminate.

Rare. Hoshangabad. *Fl. & Fr.*: July Oct.

2. Setaria glauca (L.) P. Beauv., Ess. Agrostogr. 51: 169, 178. 1812; Hook. *f.*, Fl. Brit. India 7: 78. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 360. 1960. *Panicum glaucum* L., Sp. Pl. 56. 1753.

Annuals. Culms 30-60 cm tall, erect to geniculate. Leaves linear, tapering to slender point, rough on margins; sheaths keeled, glabrous; ligules ciliate. Inflorescence a dense, cylindrical, spike like panicle, yellow at maturity; axis densely pubescent; bristles 5-20 in a cluster, scabrous, very unequal, 6-10 mm long. Spikelets broadly elliptic, *ca* 3 mm long. Lower glume 1-1.3 mm long, 3-nerved; upper glume *ca* 1.5 mm long, 5-nerved. Lower floret male or barren. Anthers 3, *ca* 1.8 mm long. Upper floret cymbiform, convex on back, distinctly transversely rugose. Palea granular-punctate. Anthers 3, *ca* 1 mm long. Caryopsis rounded, ellipsoid, *ca* 2 mm long, plano-convex; hilum punctate; embryo more than half.

Common. Balaghat, Bastar, Bilaspur, Gwalior, Hoshangabad, Indore, Mandla, Raipur, Satna, Shivpuri, Sidhi. *Fl. & Fr.*: Aug. - Oct.

3. Setaria homonyma (Steud.) Chiov. in Nuovo Giorn. Bot. Ital. n.s. 26: 78. 1919; Bor, Grass. Burm. Ceyl. Ind. Pak. 361. 1960. *Panicum homonymum* Steud., Syn. Pl. Glumac. 1: 48. 1854; *P. rhachitrichum auct. non* Hochst., 1844: Hook. *f.*, Fl. Brit. India 7: 56. 1896.

Annuals. Culms 20-40 cm tall, erect, tufted; nodes pubescent. Leaves linear, rounded at base; sheaths villous on margins and mouth; ligules hairy. Inflorescence a pyramidal panicle; branches spreading; bristles twice the length of spikelets; pedicels hairy. Spikelets secund, dorsally compressed, *ca* 1 mm long. Lower glume minute, membranous, 1-3-nerved; upper glume *ca* 0.8 mm long, obtuse, 5-6-nerved. Lower lemma neuter; upper lemma bisexual, elliptic, 0.8-1 mm long, minutely rugose, rounded at tip. Anthers 3, yellow, *ca* 0.5 mm long. Caryopsis equal to lower lemma.

Not common. Bilaspur, Raigarh, Surguja. *Fl. & Fr.*: July - Sept.

4. Setaria intermedia Roem. & Schult., Syst. Veg. 2: 489. 1817; Hook. *f.*, Fl. Brit. India 7: 79. 1896. *Panicum tomentosum* Roxb., Fl. Ind. (Carey & Wallich ed.) 1: 303. 1820. *P. intermedium* (Roem. & Schult.) Roth, Nov. Pl. Sp. 47. 1821. *Setaria tomentosa* (Roxb.) Kunth, Revis. Gramin. 1: 47. 1829; Bor, Grass. Burm. Ceyl. Ind. Pak. 365. 1960.

Annuals. Culms 70-100 cm tall, erect; nodes glabrous. Leaves 15-30 cm long, acuminate at apex; sheaths ciliate; ligules lacerate. Inflorescence a panicle; rhachis scabrid; bristles 1-3, up to 7 cm long. Spikelets solitary or often in pairs, 1.8-2 mm long. Lower glume *ca* 0.7 mm long, apiculate, glabrous, 3-nerved; upper glume ovate-rounded, 1-1.2 mm long, shortly apiculate, 7-nerved. Lower lemma *ca* 1.5 mm long, empty; upper lemma transversely rugose. Anthers 3, yellow, *ca* 0.8 mm long. Caryopsis brown, *ca* 1.5 mm long, rugose.

In moist places. Bastar, Damoh, Sidhi. *Fl. & Fr.*: July - Dec.

5. Setaria italica (L.) P. Beauv., Ess. Agrostogr. 51: 170, 178. 1812; Hook. *f.*, Fl. Brit. India 7: 78. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 362. 1960. *Panicum italicum* L., Sp. Pl. 56. 1753.

Annuals. Culms *ca* 100 cm tall, erect or geniculate at base, scabrid below the panicle. Leaves flat, soft, retrorsely scabrid on margins; sheaths tight, glabrous, ciliate on margins; ligules densely ciliate. Inflorescence a condensed, 5-10 cm long panicle; branches spirally arranged. Spikelets persistent, broadly elliptic, 2.5-3.5 mm long. Lower glume *ca* 1 mm long; upper glume elliptic, 1.5-2 mm long, concave. Lower floret barren. Upper floret bisexual. Lemma reddish or yellow, crustaceous. Anthers 3, yellow, 2-2.5 mm long. Caryopsis light yellow, ellipsoid.

Cultivated throughout the state. *Fl. & Fr.*: July - Oct.

6. Setaria plicata (Lam.) T. Cooke, Fl. Bombay 2: 919. 1908; Bor, Grass. Burm. Ceyl. Ind. Pak. 364. 1960. *Panicum plicatum* Lam., Encycl. 4: 736. 1798; Hook. *f.*, Fl. Brit. India 7: 55. 1896.

Perennials. Culms 0.8-1.2 m tall, tufted. Leaves narrowly lanceolate, plicate; sheaths ciliate on margins, long hairy at mouth; ligules hairy.

Inflorescence a loose panicle. Spikelets ovate-oblong, *ca* 3.5 mm long, acute. Lower glume orbicular, 1-1.5 mm long; upper glume up to 3/4 of spikelet, obtuse, 5-7-nerved. Lower floret neuter. Upper floret fertile. Lemma narrowly ovate, *ca* 2.6 mm long, acute, transversely finely rugose. Anthers 3, yellow, *ca* 1.3 mm long. Caryopsis globose, *ca* 1.5 mm long.

Rare. Bastar. *Fl. & Fr.*: Aug. Jan.

7. Setaria pumila (Poir.) Roem. & Schult., Syst. Veg. 2: 891. 1817; Clayton in Tutin *et al.*, Fl. Eur. 5: 263. 1980. *Panicum pumilum* Poir. in Lam., Encycl. Suppl. 4. 273. 1816. *Setaria pallide-fusca* (Schumach.) Stapf & Hubb. in Kew Bull. 1930: 259. 1930; Bor, Grass. Burm. Ceyl. Ind. Pak. 363. 1960. *Panicum pallide-fuscum* Schumach., Beskr. Guin. Pl. 58. 1827. **Fig. 67.**

Annuals. Culms 50-60 cm tall, decumbent-ascending, glabrous. Leaves acute at apex, contracted at base; sheaths glabrous; ligules hairy. Inflorescence a panicle; rhachis pubescent. Spikelets ovate, 2-2.5 mm long, acute, 3-nerved. Upper glume 1.3-1.5 mm long, acute, 5-nerved. Lower lemma empty, 5-nerved. Anthers 3, rarely barren. Upper lemma transversely rugose, not keeled. Palea glandular. Anthers 3, yellow, *ca* 0.8 mm long. Caryopsis plano-convex, *ca* 1.5 mm long, rugose.

Common. Balaghat, Bastar, Bilaspur, Damoh, Hoshangabad, Raigarh, Raipur, Rewa, Sidhi. *Fl. & Fr.*: Aug. - Nov.

8. Setaria verticillata (L.) P. Beauv., Ess. Agrostogr. 51, 178. 1812; Hook. *f.*, Fl. Brit. India 7: 80. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 365. 1960. *Panicum verticillatum* L., Sp. Pl. ed. 2. 82. 1762.

Annuals, tufted. Culms 30-100 cm tall, erect or ascending. Leaves soft, rounded at base, sparsely pilose; sheaths glabrous; ligules hairy. Inflorescence spiciform, interrupted panicle; rhachis angular, scabrid. Spikelets broadly ovate, 2-2.5 mm long. Lower glume 0.8-1 mm long, 3-nerved; upper glume 2-2.2 mm long, acute, 3-7-nerved. Lower lemma empty; upper lemma broadly oblong, 1.8-2 mm long. Anthers 3, yellow, *ca* 1 mm long. Caryopsis *ca* 1.5 mm long, finely rugose.

Common. Bilaspur, Damoh, Gwalior, Indore, Raigarh, Rajnandgaon. Satna. *Fl. & Fr.*: Aug. Oct.

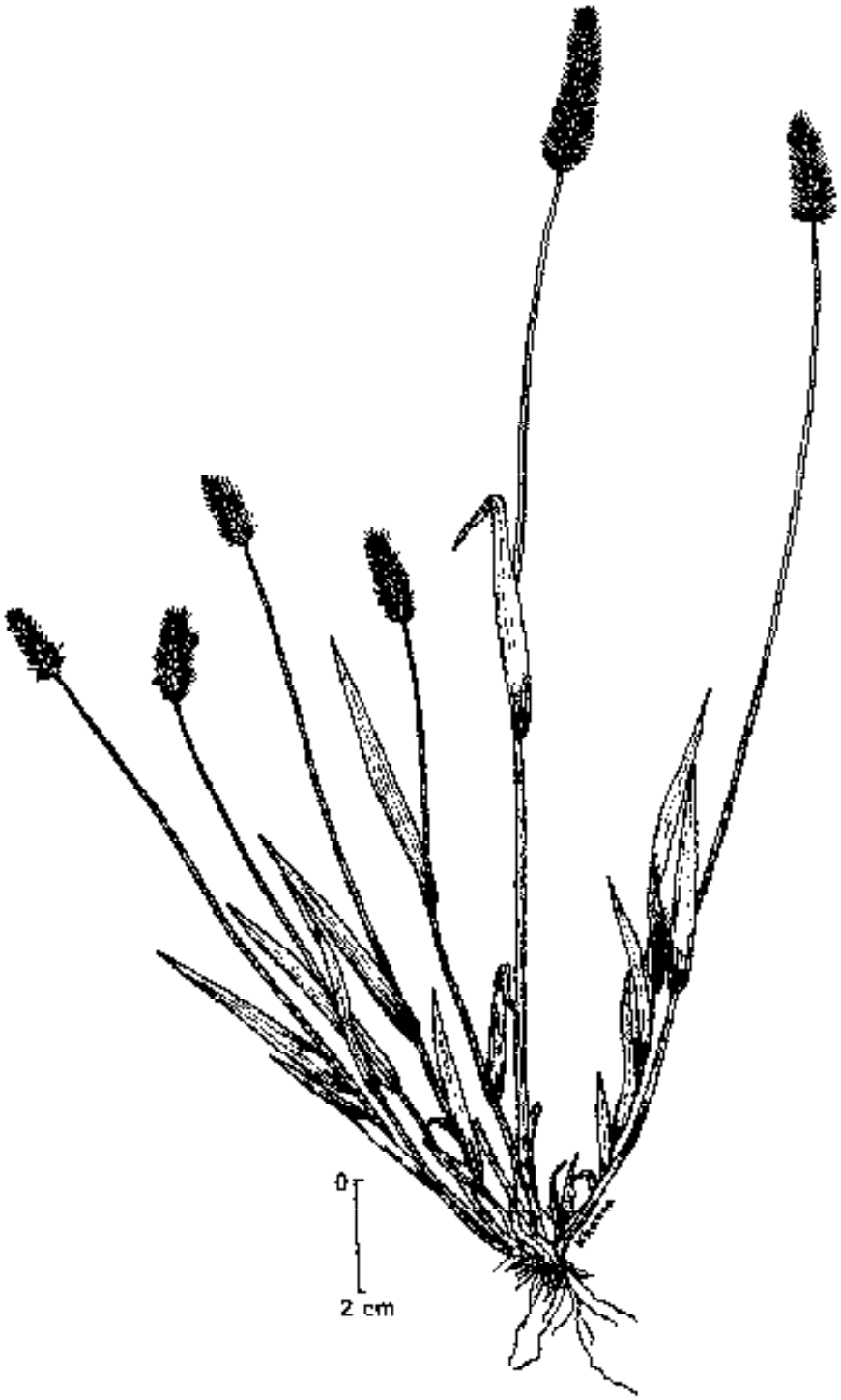

Fig. 67. Setaria pumila (Poir.) Roem. & Schult.

91. SORGHUM Moench, *nom. cons.*

Annuals or perennials, usually robust, with or without rhizomes. Leaf blades linear, often broad; ligules membranous or scarious, rarely a line of hairs. Inflorescence a large, terminal panicle, with tough, persistent branches bearing short, fragile (except in cultivated species) racemes; internodes and pedicels filiform. Sessile spikelets dorsally compressed; callus obtuse, rarely pungent. Lower glume more or less coriaceous, broadly convex across the back, becoming 2-keeled and narrowly winged near the tip. Lower floret reduced to a hyaline lemma. Upper lemma hyaline, 2-dentate, with a glabrous awn from the sinus, sometimes entire and muticous. Palea hyaline, often minute. Pedicellate spikelets male or barren, mostly linear-lanceolate to subulate, usually much narrower than the sessile spikelets, awnless. Caryopsis mostly obovoid, dorsally compressed.

About 24 species; subtropical regions of Old World and Mexico; 7 in M.P.

1a. Annuals:

2a. Culm nodes densely bearded with long silky hairs; spikelets 6-7 mm long, densely covered with golden brown or brown hairs ...4. *S. deccanense*

2b. Culm nodes glabrous; spikelets 5-5.5 mm long, not hairy as above:

3a. Lower glume of sessile spikelet 5-6 mm long; caryopsis *ca* 2 mm in diameter, white ...1. *S. bicolor*

3b. Lower glume of sessile spikelet *ca* 4.5 mm long, glabrous; caryopsis 4-4.5 mm long, ivory-yellow ...2. *S. cernuum* var. *yemense*

1b. Perennials:

4a. Ligules hairy; anthers purplish, *ca* 3 mm long; caryopsis obovate, 3-3.5 mm long ...3. *S. controversum*

4b. Ligules membranous; anthers yellow, 1-2.5 mm long; caryopsis otherwise:

5a. Plants with well developed rhizomes; nodes glabrous; pedicellate spikelet 4.5-5.5 mm long:

6a. Leaf blades 0.5-2 cm broad; panicles up to 25 cm long, *ca* 5 cm wide, with lower branches 5-8 cm long ...5. *S. halepense*

6b. Leaf blades 2-4 cm broad; panicles usually 25-55 cm long, 10-25 cm wide, with lower branches 10-25 cm long ...6. *S. miliaceum*

5b. Plants without rhizomes; nodes villous; pedicellate spikelet *ca* 3 mm long ...7. *S. nitidum*

1. Sorghum bicolor (L.) Moench, Methodus 207. 1794; Bor, Grass. Burm. Ceyl. Ind. Pak. 227. 1960. *Holcus bicolor* L., Mant. Pl. 301. 1771. *Andropogon bicolor* Roxb., Fl. Ind. (Carey & Wallich ed.) 1: 272. 1820.

Annuals. Culms up to 2 m tall, erect. Leaves linear, long, rounded at base; sheaths glabrous; ligules hard, rounded at apex, ciliate on margins. Inflorescence a large panicle; lower branches whorled. Spikelets paired, dissimilar. Sessile spikelets ovate, *ca* 6 mm long; callus hispid. Lower glume 5-6 mm long, 15-nerved; upper glume equalling the lower, coriaceous. Lower lemma *ca* 5 mm long, membranous, fringed on margins, keeled, 3-nerved; upper lemma ovate, ciliate on margins; awns *ca* 10 mm long. Anthers 3, yellow, *ca* 3 mm long. Pedicellate spikelets dark brown, linear-elliptic. Caryopsis polished, *ca* 2 mm in diameter.

Gwalior, Sidhi. *Fl. & Fr.*: Aug. - Oct.

2. Sorghum cernuum Host var. **yemense** (Koern.) Snowden in Kew Bull. 1935: 251. 1935; Bor, Grass. Burm. Ceyl. Ind. Pak. 231. 1960. *Andropogon sorghum* var. *yemensis* Koern. in Bull. Herb. Boiss. 2. App. 2: 11. 1894.

Annuals. Culm 1.5-2.5 m tall, erect. Leaves 20-40 cm long, glabrous; sheaths glabrous; ligules 3-4 mm long, membranous, hairy on margins. Inflorescence a loose panicle. Sessile spikelets elliptic, 5-5.5 mm long, acute. Lower glume ovate, *ca* 4.5 mm long, acute, glabrous; upper glume 5-5.2 mm long. Lower lemma *ca* 3 mm long, acute, 2-nerved, ciliate; upper lemma ovate, subacute. Pedicellate spikelets 5-5.5 mm long; pedicels hairy. Anthers 3, yellow, *ca* 3 mm long. Caryopsis ivory-yellow, 4-4.5 mm long.

Rare. Damoh. *Fl. & Fr.*: Sept. Dec.

3. Sorghum controversum (Steud.) Snowden in J. Linn. Soc. London (Bot.) 55: 210. 1955; Bor, Grass. Burm. Ceyl. Ind. Pak. 222. 1960. *Andropogon controversus* Steud., Syn. Pl. Glumac. 1: 391. 1854.

Perennials, rhizomatous. Culms 1-2 m tall, terete; nodes glabrous or pubescent. Leaves flat, glabrous; mid nerve prominent; sheaths terete, glabrous; ligules hairy. Inflorescence an effuse panicle. Sessile spikelets brownish, elliptic, 5-6 mm long, hairy, awned. Lower glume lanceolate, 5-5.5 mm long, dorsally hairy, 7-nerved. Lower lemma empty; upper lemma 4-4.5 mm long. Upper glume equal, cymbiform, 5-7-nerved. Lower lemma empty; upper lemma 4-4.5 mm long, ciliate, 1-nerved, clefted at apex; awns 1.5-2 cm long. Pedicellate spikelets linear-lanceolate, *ca* 6 mm long, hairy. Anthers 3, purplish, *ca* 3 mm long. Caryopsis obovate, 3-3.5 mm long.

Rare. Indore. *Fl. & Fr.*: Aug. Dec.

4. Sorghum deccanense Stapf in Bor, Grass. Burm. Ceyl. Ind. Pak. 245. 1960. *Andropogon purpureosericeus auct. non* Hochst. *ex* A. Rich., 1851: Hook. *f.*, Fl. Brit. India 7: 185. 1896.

Annuals. Culms 1-2 m tall, erect; nodes bearded. Leaves linear-lanceolate, hairy, scabrid on margins; sheaths glabrous; ligules hairy. Inflorescence a contracted panicle; rhachis glabrous, swollen at base. Sessile spikelets 6-7 mm long, densely hairy, awned. Lower glume *ca* 7 mm long, densely hairy, beaked at tip, minutely 2-dentate, 7-nerved, keeled; upper glume similar, 5-nerved, 2-dentate. Lower lemma empty, ciliate on margins; upper lemma hyaline, clefted at apex, ciliate on margins; awn *ca* 3 cm long. Anthers 3, purple, 3.5-4 mm long. Pedicellate spikelets male, slightly shorter than the sessile. Anthers 3. Caryopsis ellipsoid, *ca* 4 mm long.

Rare. Endemic in M.P. and Western India. Indore. *Fl. & Fr.*: Aug. Dec.

5. Sorghum halepense (L.) Pers., Syn. Pl. 1: 101. 1805; Bor, Grass Burm. Ceyl. Ind. Pak. 222. 1960. *Holcus halepensis* L., Sp. Pl. 1047 1753. *Andropogon halepensis* (L.) Brot., Fl. Lusit. 1: 89. 1804; Hook *f.*, Fl. Brit. India 7: 182. 1896.

Perennials, with strong rhizomes. Culms 1-2.5 m tall. Leaves acuminate at apex, scabrid on margins; sheaths glabrous; ligules 2-3 mm long, membranous. Inflorescence an effuse panicle; nodes hairy. Sessile spikelets elliptic, 4.5-5.5 mm long, acute. Lower glume *ca* 4.5 mm long, 5-11-nerved, ciliate on back; upper glume 4.5-5 mm long, 2-nerved, hairy on back. Lower lemma 4-5 mm long, ciliate; upper lemma ovate, *ca* 2 mm long. Anthers 3, yellow, *ca* 1.8 mm long. Pedicellate spikelets 4.5-5.5 mm long, empty. Caryopsis *ca* 4.4 mm long.

Bilaspur, Damoh, Gwalior, Hoshangabad, Morena, Sagar, Sidhi. *Fl.* & *Fr.*: July - Oct. and March - April.

6. Sorghum miliaceum (Roxb.) Snowden in J. Linn. Soc. London (Bot.) 55: 207. 1955; Bor, Grass. Burm. Ceyl. Ind. Pak. 223. 1960. *Andropogon miliaceus* Roxb., Fl. Ind. (Carey & Wallich ed.) 1: 276. 1820.

Perennials. Culms 1.5-2 m tall, erect, with creeping rootstocks. Leaves filiform; sheaths glabrous; ligules membranous. Inflorescence a large panicle; branches tomentose. Sessile spikelets elliptic, *ca* 5 mm long, acute. Lower glume *ca* 5 mm long, coriaceous, 2-dentate, hairy; upper glume *ca* 5 mm long, sharply acute woth ciliate keels. Lower lemma *ca* 4.5 mm long, ciliate on nerves, empty, epaleate; upper lemma broadly ovate, *ca* 3.5 mm long. Pedicellate spikelets *ca* 5 mm long; callus bearded. Anthers 3, yellow, *ca* 1 mm long. Caryopsis *ca* 1.2 mm long.

Common. Balaghat, Bilaspur, Damoh, Gwalior, Hoshangabad. *Fl.* & *Fr.*: Aug. - Nov.

7. Sorghum nitidum (Vahl) Pers., Syn. Pl. 1: 101. 1805; Bor, Grass. Burm. Ceyl. Ind. Pak. 245. 1960. *Holcus nitidus* Vahl, Symb. Bot. 2: 102. 1791. *Andropogon serratum* Thunb., Fl. Jap. 41. 1784; Hook. *f.*, Fl. Brit. India 7: 185. 1896.

Perennials. Culms 1-2.5 m tall, erect; nodes villous. Leaves up to 60 cm long, sparsely hairy or glabrous, scabrid on margins; midrib white; sheaths glabrous, with long hairs at mouth; ligules membranous, truncate, dorsally ciliate. Inflorescence an elongated panicle. Spikelets paired, dissimilar. Sessile spikelets elliptic-acute, *ca* 4 mm long. Lower glume dorsally flattened, brown hairy on keels, 5-7-nerved; upper glume similar

to the lower but glabrous and shining at the basal portion. Lower floret reduced, barren. Upper floret bisexual, hyaline, *ca* 2 mm long, ciliate on margins, awned or awnless. Anthers 3, yellow, 2-2.5 mm long. Pedicellate spikelets rudimentary, *ca* 3 mm long; callus densely hairy. Caryopsis brownish, *ca* 2 mm long.

Not common. Bilaspur, Hoshangabad, Mandla. *Fl. & Fr.*: Oct. - Dec.

92. SPODIOPOGON Trin.

Perennials, rarely annuals. Culms erect. Leaf blades linear, flat, usually narrowed at the base into a false petiole; ligules membranous or chartaceous, hairy on the back. Inflorescence an open or contracted panicle; axis elongated, bearing long, filiform, flexuous, whorled branches, bare in the lower one-third to two-thirds; racemes solitary at the end of the branches or several on short, filiform branchlets; rhachis of raceme fragile or tough, bearing paired, similar spikelets. Spikelets lanceolate to linear or lanceolate, each supported on a pedicel; callus very short, truncate, glabrous or shortly bearded. Glumes equal, as long as the spikelet, thinly coriaceous, with conspicuous nerves, awned or awnless; lower glume flattened on the back. Lower floret reduced to a hyaline, elliptic or broadly oblong lemma. Upper floret bisexual. Lemma hyaline, lanceolate, deeply 2-fid with a geniculate awn in the sinus. Palea small. Anthers 3. Caryopsis oblong to lanceolate.

About 8 species; Asia; 2 in M.P.

1a. Culms slender; sessile spikelets 3.5-4 mm long; lower glume 5-7-nerved, ciliate on margins; upper glume 7-nerved; awns 6-10 mm long ...1. *S. jainii*

1b. Culms stout; sessile spikelets 6-7 mm long; lower glume 7-9-nerved, not ciliate on margins; upper glume 9-13-nerved: awns 15-20 mm long ...2. *S. rhizophorus*

1. Spodiopogon jainii V.J. Nair, A.N. Singh & N.C. Nair in Curr. Sci. 50: 730. 1981.

Annuals. Culms slender, 50-60 cm long. Leaves flat, elliptic-lanceolate, 5-13 x 1.5-3 cm, acuminate at apex, sparsely villous; petioles 1-6 cm long;

sheaths 6-10 cm long, glabrous; ligules membranous. Panicles 8-10 cm long; rhachis jointed. Spikelets 1 sessile and 1-2 pedicellate together. Sessile spikelets 2-flowered. Lower glume broadly ovate, 3.5-4 x 1.5-1.8 mm, sparsely hairy, 5-7-nerved; upper glume broadly ovate, 3.8-4 x 1.8-2 mm, sparsely hairy, 7-nerved. Lower floret male; upper floret bisexual. Anthers 3. Pedicellate spikelets 2-flowered; pedicels ciliate on the margins. Lower glume ovate, *ca* 3 x 1.5 mm, sparsely hairy, 5-7-nerved; upper glume ovate, *ca* 3.5 x 1.75 mm, sparsely hairy, 7-nerved. Lower floret male; upper floret bisexual. Anthers 3.

Endemic. In rock crevices. Balaghat (Nair *et al.*, 1981). *Fl.* : Sept.

2. Spodiopogon rhizophorus (Steud.) Pilger in Engl. & Prantl, Nat. Pflanzenfam. ed. 2, 14e: 119. 1940; Bor, Grass. Burm. Ceyl. Ind. Pak. 246. 1960. *Andropogon rhizophorus* Steud., Syn. Pl. Glumac. 1: 381. 1854. *Spodiopogon albidus* Benth. in J. Linn. Soc. London (Bot.) 19: 66. 1881; Hook. *f.*, Fl. Brit. India 7: 108. 1896. **Fig. 68.**

Annuals or perennials. Culms 20-70 cm tall, decumbent, branched. Leaves linear-lanceolate, glabrous, petiolate; sheaths ciliate on margins; ligules chartaceous, obtuse. Inflorescence an oblong panicle; branches hairy at base; racemes silky; joints of rhachis flattened, *ca* 3 mm long. Sessile spikelets 5-5.5 mm long, hairy, awned. Lower glume equal to spikelet, pilose, 7-nerved; upper glume equal to the lower, cymbiform, with short arista. Lower lemma ovate, 3-3.25 mm long, nerveless; upper lemma 3.5-4 mm long, 2-lobed with *ca* 11 mm long awn. Anthers 3, *ca* 3 mm long. Pedicellate spikelets linear-lanceolate, slightly smaller than the sessile, awned. Caryopsis fusiform, *ca* 3 mm long.

Rare. Hoshangabad, Indore, Mandla. *Fl. & Fr.* : Aug. Dec.

93. SPOROBOLUS R. Br.

Annuals or perennials. Culms usually erect. Inflorescence an open or contracted panicle, rarely spiciform, exserted from the uppermost sheath; branches whorled or not. Spikelets small, fusiform, nearly always glabrous, awnless. Palea 2-nerved. Caryopsis elliptic-obovate, rounded or truncate at the tip, not beaked; pericarp commonly swelling and ejecting the seed when wetted.

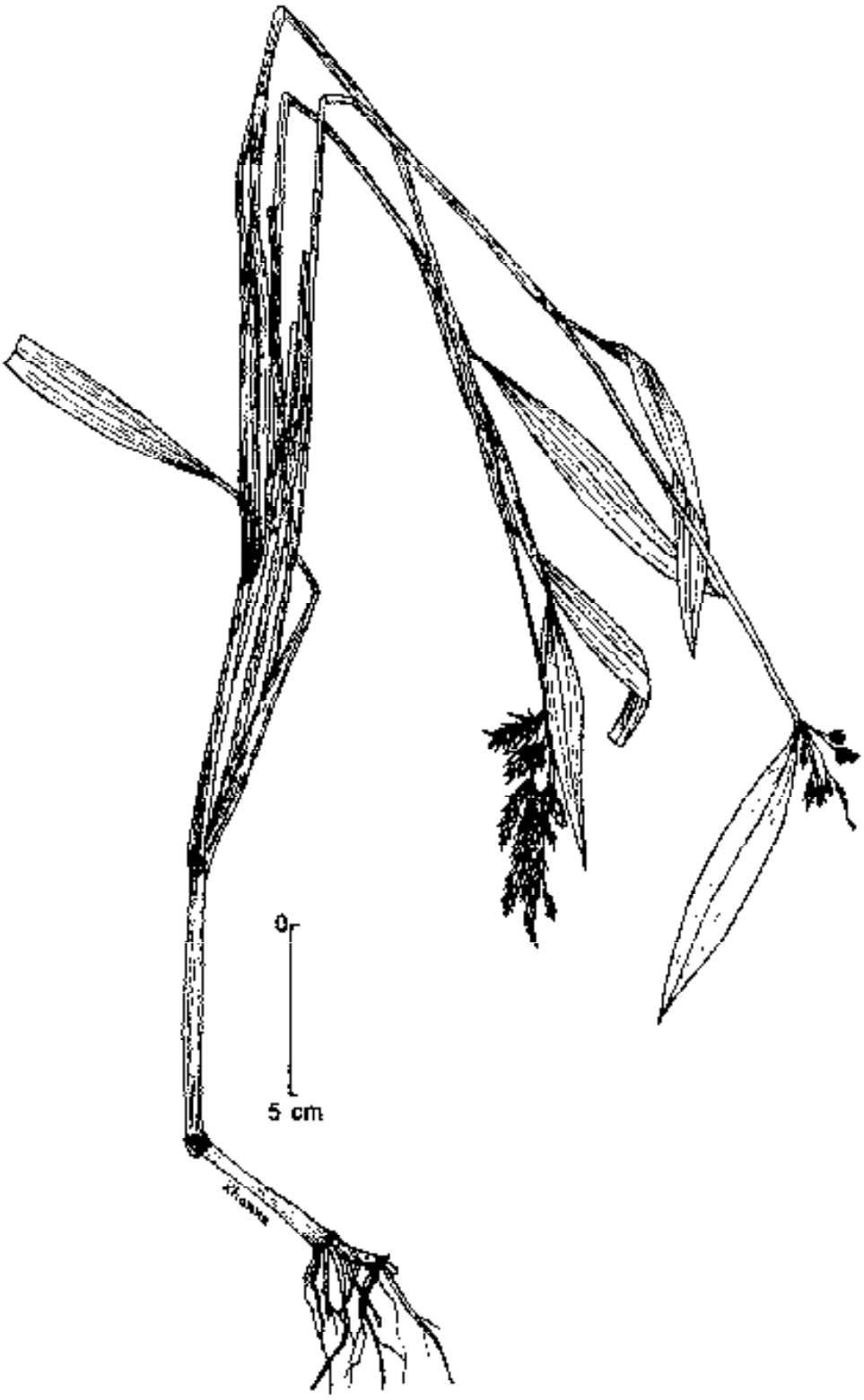

Fig. 68. Spodiopogon rhizophorus (Steud.) Pilger

About 100 species; America, Asia and Africa; 8 in M.P.

1a. Plants annuals, easy to uproot:

2a. Lower branches of the panicle alternate or subopposite; spikelets 0.8-1 mm long ...7. *S. tenuissimus*

2b. Lower branches of the panicle whorled; spikelets more than 1 mm long:

3a. Anthers 2; caryopsis quadrangular in section ...8. *S. tetragonus*

3b. Anthers 3; caryopsis not quadrangular in section:

4a. Spikelets 1.5-2 mm long; lower glume *ca* 2 mm long, 1-nerved ...1. *S. capillaris*

4b. Spikelets *ca* 1.2 mm long; lower glume *ca* 0.2 mm long, nerveless ...2. *S. coromandelianus*

1b. Plants perennials, hard to uproot:

5a. Panicles effuse; lower glume 0.3-0.4 mm long; anthers 2 ...3. *S. diander*

5b. Panicles contracted; lower glume more than 0.4 mm long; anthers 3:

6a. Roots very thick, covered with soft felt of root hairs; spikelets *ca* 2.5 mm long; caryopsis subglobose, slightly convex ...6. *S. marginatus*

6b. Roots not as above; spikelets less than 2 mm long; caryopsis otherwise:

7a. Leaf sheath longer than internodes; inflorescence usually interrupted; glumes minutely fringed; palea plicate in the middle ...5. *S. indicus*

7b. Leaf sheath equal to internodes; inflorescence not interrupted; glumes not fringed; palea not plicate ...4. *S. fertilis*

1. **Sporobolus capillaris** Miq. in Verh. Konink. Nederl. Inst. 3, 4: 37. 1851; Bor, Grass. Burm. Ceyl. Ind. Pak. 627. 1960.

Annuals. Culms 20-40 cm tall, erect, tufted. Leaves linear, hispid, bristly on margins; sheaths compressed; ligules hairy. Inflorescence an open panicle; branches scabrous; pedicels longer than spikelets. Spikelets greyish green, 1.5-2 mm long. Lower glume *ca* 1 mm long, 1-nerved; upper glume *ca* 2 mm long, acuminate, 1-nerved. Lemma ovate, similar and equalling the upper glume. Palea scabrid. Anthers 3, pinkish, *ca* 0.3 mm long. Caryopsis discoid, *ca* 0.8 mm long.

Balaghat, Hoshangabad, Raigarh, Sidhi. *Fl. & Fr.*: Aug. Dec.

2. **Sporobolus coromandelianus** (Retz.) Kunth, Revis. Gramin. 1: 68. 1829; Hook. *f.*, Fl. Brit. India 7: 252. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 627. 1960. *Agrostis coromandeliana* Retz., Observ. Bot. 4: 19. 1786

Annuals. Culms 15-40 cm tall. Leaves glabrous or pilose, papillate on margins; sheaths compressed, glabrous, hairy at mouth; ligules short, hairy. Inflorescence a panicle; branches capillary, whorled. Spikelets lanceolate, *ca* 1.2 mm long. Lower glume *ca* 0.2 mm long, nerveless; upper glume hyaline, *ca* 1 mm long, acute, 1-nerved. Lemma similar, equalling the upper glume. Anthers 3, yellow, *ca* 0.4 mm long. Caryopsis obovate, *ca* 0.6 mm long.

Rare. Gwalior, Hoshangabad. *Fl. & Fr.*: Aug. Dec.

3. **Sporobolus diander** (Retz.) P. Beauv., Ess. Agrostogr. 26, 147, 178. 1812; Hook. *f.*, Fl. Brit. India 7: 247. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 629. 1960. *Agrostis diandra* Retz., Observ. Bot. 5: 19. 1789.

Perennials. Culms 30-50 cm tall, tufted. Leaves linear, filiform; sheaths glabrous; ligules hairy. Inflorescence a purplish or greyish panicle. Spikelets 1.2-1.6 mm long, acute. Lower glume 0.3-0.4 mm long, nerveless; upper glume elliptic-ovate, 0.6-0.8 mm long, 1-nerved. Lemma lanceolate, *ca* 1.5 mm long, 1-nerved. Palea *ca* 1.2 mm long, nerveless. Anthers 2, purplish, *ca* 0.3 mm long. Caryopsis oblong-ovoid, 0.5-0.6 mm long.

Sidhi, Surguja. *Fl. & Fr.*: Sept. - Dec.

4. Sporobolus fertilis (Steud.) W.D. Clayton in Kew Bull. 19: 291. 1965. *Agrostis fertilis* Steud., Syn. Pl. Glumac. 1: 170. 1854. *Sporobolus indicus auct. non* (L.) R. Br., 1810: Hook. *f.*, Fl. Brit. India 7: 247. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 630. 1960.

Perennials. Culms 40-70 cm tall, tufted. Leaves linear, convolute, glabrous; sheaths compressed, glabrous; ligules hairy. Inflorescence a contracted panicle; branches short. Spikelets 1-flowered, lanceolate, 1.6-2 mm long. Lower glume *ca* 0.5 mm long, acute, nerveless; upper glume *ca* 1 mm long, 1-nerved. Lemma ovate, 1.5-2 mm long, 1-nerved. Palea subequal to lemma, 2-nerved. Anthers 3, *ca* 0.5 mm long. Caryopsis brownish, ellipsoid-obovate, 0.6-0.7 mm long.

In moist places. Bilaspur, Hoshangabad, Indore, Mandla, Sidhi, Surguja. *Fl. & Fr.*: Aug. Dec.

5. Sporobolus indicus (L.) R. Br., Prodr. 170. 1810. *Agrostis indica* L., Sp. Pl. 63. 1753.

Perennials. Culms 0.5-1.2 m tall, erect, tufted. Leaves mostly crowded near the base; sheaths longer than internodes, ribbed, glabrous; ligules minute, hairy. Inflorescence a contracted and usually interrupted panicle; branches very short. Spikelets pale green, 1.5-2 mm long. Glumes hyaline, unequal, minutely fringed; upper glume 1/3 of spikelet. Lemma *ca* 1 mm long, 1-nerved. Palea plicate in the middle. Anthers 3, purplish, *ca* 0.4 mm long. Caryopsis red-brown, obovoid, *ca* 0.5 mm long, adnate to pericarp.

Betul, Bilaspur, Hoshangabad, Raigarh. *Fl. & Fr.*: Sept. Oct.

6. Sporobolus marginatus Hochst. *ex* A. Rich., Tent. Fl. Abyss. 2: 397. 1850; Bor, Grass. Burm. Ceyl. Ind. Pak. 632. 1960. *S. arabicus* Boiss., Diagn. Pl. Orient. ser. 1, 13: 47. 1854; Hook. *f.*, Fl. Brit. India 7: 252. 1896.

Perennials. Roots thick, covered with soft felt of root hairs. Culms 20-60 cm tall, woody at base, stoloniferous. Leaves serrulate, ciliate; sheaths glabrous; ligules hairy. Inflorescence a panicle; branches capillary. Spikelets *ca* 2.5 mm long. Lower glume 0.5-0.8 mm long; upper glume *ca* 2.5 mm long, obtuse, 1-nerved. Lemma similar to upper glume. Anthers 3, yellow, *ca* 0.5 mm long. Caryopsis subglobose, 0.8 x 0.6 mm, slightly convex.

Rare. Gwalior. *Fl. & Fr.*: July Dec.

7. Sporobolus tenuissimus (Schrank) Kuntze, Revis. Gen. Pl. 3: 369. 1893; Bor, Grass. Burm. Ceyl. Ind. Pak. 633. 1960. *Panicum tenuissimum* Schrank in Denkschr. Bot. Ges. Regensb. 2: 26. 1822. *Sporobolus minutiflorus* (Trin.) Link, Hort. Berol. 1: 88. 1827; Hook. *f.*, Fl. Brit. India 7: 248. 1896. *Vilfa minutiflora* Trin., Gam. Unifl. Sesquifl. 158. 1824.

Annuals. Culms 15-50 cm tall, erect, slender. Leaves 4-20 cm long, finely acuminate at apex; sheaths glabrous; ligules minutely ciliate. Inflorescence a diffuse, delicate panicle. Spikelets 0.8-1 mm long. Lower glume 0.1-0.2 mm long, truncate; upper glume 0.3-0.5 mm long. Lemma ovate, *ca* 1 mm long. Anthers 3, dark brown, 0.1-0.2 mm long. Caryopsis *ca* 0.5 mm long, truncate.

Balaghat, Raigarh, Rewa, Sagar, Sidhi. *Fl. & Fr* : Aug. Sept.

8. Sporobolus tetragonus Bor in Kew Bull. 1949: 251. 1949; Bor, Grass. Burm. Ceyl. Ind. Pak. 633. 1960. *S. pulchellus auct. non* R. Br., 1810: Hook. *f.*, Fl. Brit. India 7: 252. 1896.

Annuals. Culms 20-70 cm tall, slender. Leaves narrowly lanceolate, papillate on margins; sheaths ciliate at mouth; ligules obscure. Inflorescence a narrow panicle; branches capillary, whorled. Spikelets greyish, *ca* 1.5 mm long, shortly pedicellate. Lower glume lanceolate, *ca* 0.8 mm long, acute; upper glume hyaline, *ca* 1.4 mm long, acute. Lemma similar to upper glume. Anthers 2, yellow, *ca* 0.5 mm long. Caryopsis reddish brown, lenticular, *ca* 1 mm long.

Rare. Sidhi. *Fl. & Fr.*: Aug. Oct.

94. TETRAPOGON Desf.

Annuals or perennials, tufted. Leaf blades linear, flat or folded, tapering, acute or obtuse at apex; sheaths glabrous, keeled and often flabellate; ligules membranous. Inflorescence terminal, solitary or a pair of dense, often ciliate or villous spikes. Spikelets 4-9 (-12)-flowered, subsessile, alternate in 2 rows on a tough rhachis. Glumes persistent, usually similar, ovate-lanceolate or the upper elliptic-oblong, acute, acuminate or

with short awn, membranous, glabrous, 1-nerved. Lowest 1-5 florets fertile. Lemma coriaceous, laterally compressed and keeled, usually ciliate on the lateral nerves and keel, entire or 2-dentate at the apex, ciliate. Palea ciliolate on the keels. Upper 4-6 florets sterile, reduced to glabrous, rarely ciliate, clavate, awned or awnless lemma. Caryopsis ovoid, obovate or oblong; pericarp always loose.

About 4 species; subtropical regions of Old World; one in M.P.

Tetrapogon tenellus (Roxb.) Chiov. in Ann. Inst. Bot. Roma 8: 352. 1908; Bor, Grass. Burm. Ceyl. Ind. Pak. 475. 1960. *Chloris tenella* Roxb., Fl. Ind. (Carey & Wallich ed.) 1: 330. 1820; Hook. *f.*, Fl. Brit. India 7: 290. 1896. **Fig. 69.**

Annuals. Culms 20-50 cm tall, erect or decumbent. Leaves glabrous or sparsely hairy; sheaths compressed, keeled, glabrous; ligules membranous. Inflorescence usually an erect spike. Spikelets 5-6 mm long, of 3-4 bisexual and 1-3 sterile florets above. Lower glume *ca* 3 mm long, 1-nerved, keeled; upper glume 4.5-5 mm long, with short awn. Lowest lemma 5-5.5 mm long, 3-nerved, hairy; callus crustaceous; awns 7-8 mm long. Palea keels ciliate. Other fertile lemmas relatively shorter with much short awns. Empty lemmas usually 2, obovate-cuneate, with short mucro. Anthers 3, yellow, *ca* 3 mm long. Caryopsis subtrigonous, 3-3.5 mm long.

Rare. Gwalior, Indore. *Fl. & Fr.*: July - Nov.

95. THELEPOGON Roth *ex* Roem. & Schult.

Annuals or perennials. Leaf blades broad; ligules shortly membranous. Inflorescence a terminal bunch of shortly pedunculate racemes; internodes thickened, clavate, glabrous. Sessile spikelets dorsally compressed; callus obtuse and fitting the concave top of the internode. Lower glume crustaceous, convex, without keels or wings; upper glume broadly convex across the back, wingless. Lower floret male, with hyaline lemma and well developed palea. Upper lemma 2-fid, passing between the teeth into a glabrous awn. Palea hyaline, lanceolate. Pedicellate spikelets absent, represented only by flattened, linear pedicels. Caryopsis cylindrical.

A monotypic genus; Ethiopia to India.

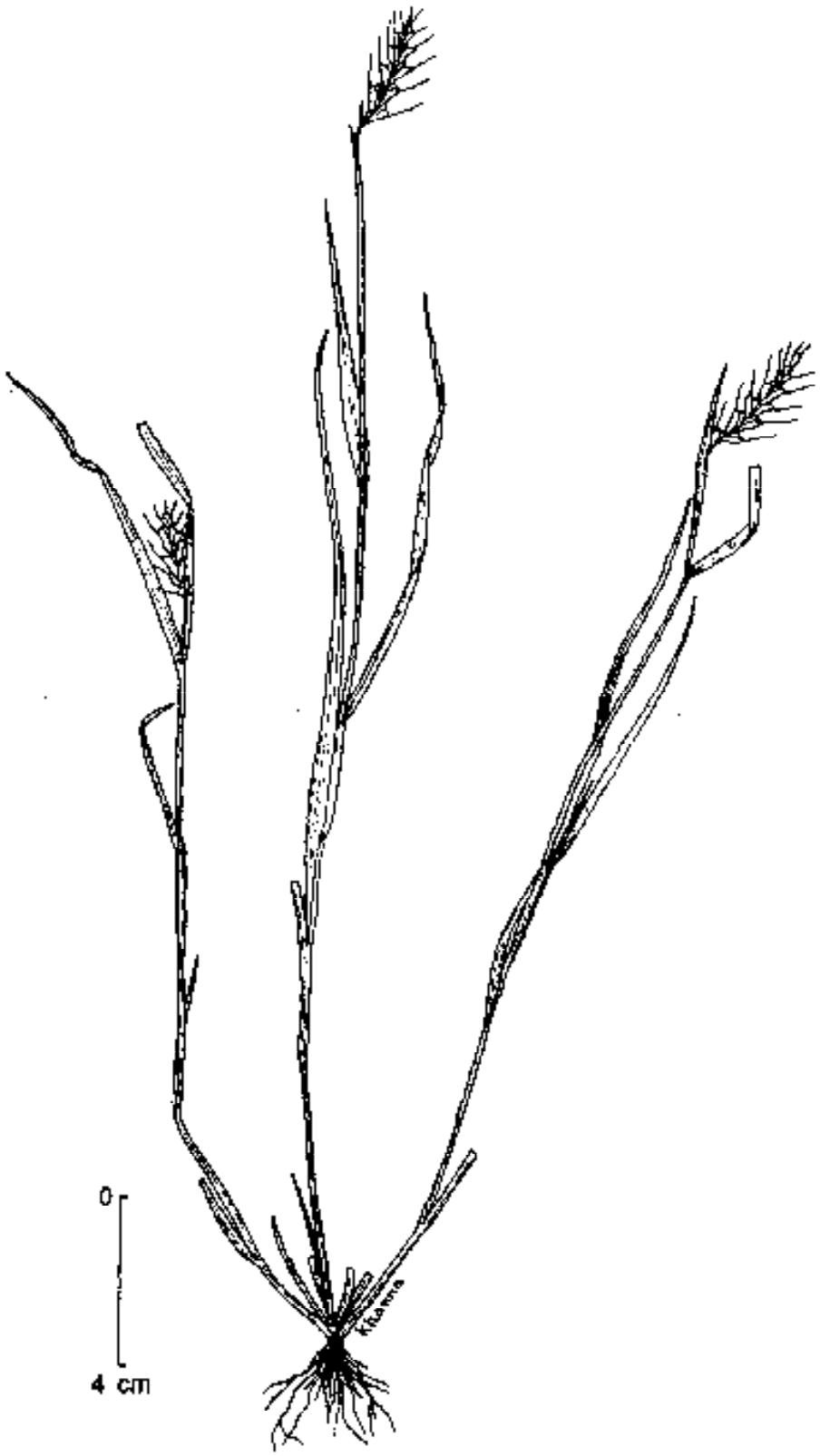

Fig. 69. Tetrapogon tenellus (Roxb.) Chiov.

Thelepogon elegans Roth *ex* Roem. & Schult., Syst. Veg. 2: 788. 1817; Hook. *f.*, Fl. Brit. India 7: 148. 1896; Bor. Grass. Burm. Ceyl. Ind. Pak. 247. 1960.

Perennials. Culms 20-60 cm tall, erect, stout. Leaves flat, hispid, scabrid and wavy on margins; sheaths terete, scabrid; ligules membranous. Inflorescence of 2 to several spikes; callus hairy. Sessile spikelets lanceolate, 6-7 mm long. Lower glume 5-6 mm long, beaked at apex, transversely rugose tubercled; upper glume cymbiform, 6-6.5 mm long, acuminate. Lower lemma elliptic, 2-nerved, ciliate. Anthers 3, yellow, 1.5-2 mm long. Upper lemma lanceolate, *ca* 5 mm long, 2-lobed; awn 20-25 mm long. Caryopsis cylindrical, *ca* 2 mm long.

Rare. Indore, Ratlam. *Fl. & Fr.*; Aug. Jan.

96. THEMEDA Forssk.

Annuals or perennials. Leaf blades linear; ligules very short or absent. Inflorescence of solitary raceme embraced by sheathing spatheoles; racemes single or in little bunches on flexuous peduncles and gathered into a leafy false panicle, comprising of 2, homogamous pairs of spikelets forming an involucre and 1-4 sessile spikelets with their pedicellate attendants, the sessile spikelets separately caducous; internodes linear. Homogamous spikelets all sessile, persistent. Sessile spikelets 2-flowered, falling entire, terete; callus obtuse to pungent. Lower glume coriaceous, rarely grooved, obtuse. Lower floret reduced to a hyaline lemma. Upper floret bisexual. Lemma stipitiform and passing directly into a puberulous or pubescent awn or hyaline and awnless. Palea small or absent. Pedicellate spikelets male or barren, narrowly lanceolate, awnless, with a long slender callus equalling the pedicel. Caryopsis lanceolate, channelled on one side.

About 19 species; tropical regions of Old World; 4 in M.P.

1a. Pairs of involucral spikelets inserted at different levels; involucral spikelets without tubercle-based hairs; anthers equalling the spikelet ...1. *T. caudata*

1b. Pairs of involucral spikelets inserted at the same level; involucral spikelets with tubercle-based hairs; anthers shorter than spikelets:

2a. Involucral spikelets more than 6 mm long; awns 4-6 cm long ...4. *T. triandra*

2b. Involucral spikelets less than 6 mm long; awns much shorter:

3a. Ligules absent; panicles very loosewith fan-shaped racemes ...2. *T. laxa*

3b. Ligules present; panicles dense, congested ...3. *T. quadrivalvis*

1. Themeda caudata (Nees) A. Camus in Lecomte, Fl. Indo-Chine 7: 364. 1922; Bor, Grass. Burm. Ceyl. Ind. Pak. 250. 1960. *Anthistiria caudata* Nees in Hook. & Arnott, Bot. Beechey Voy. 245. 1838. *A. gigantea* Cav. subsp. *caudata* (Nees) Hack. in A. DC., Monogr. Phan. 6: 676. 1889, *p.p.*; Hook. *f.*, Fl. Brit. India 7: 217. 1896.

Perennials. Culms 3-6 m tall, *ca* 1 cm in diameter, greenish yellow or pinkish. Leaves 1-1.5 m long, 5-15 mm broad, glabrous, scabrid on margins; sheaths very smooth, striate; ligules ciliate. Inflorescence a compound, false panicle interrupted by involucres; spathe and spatheoles foliaceous. Involucral spikelets *ca* 6.5 mm long, one empty, the other staminate. Lower glume scaberulous, 9-nerved; upper glume 3/4 of lower glume, 3-nerved. Anthers equal to spikelet. General racemes with 2 sessile and 2-3 pedicellate spikelets. Sessile spikelets *ca* 10 mm long; callus densely hairy. Lower glume *ca* 8 mm long, coriaceous, densely covered with golden hairs, 12-nerved; upper glume with hirsute keel. Lemma of lower floret 3/4 of the glume, empty. Upper floret bisexual. Lemma similar to lemma of lower floret; awns *ca* 4.5 mm long. Lodicules very large. Caryopsis brown, *ca* 3.5 mm long.

Rare. Bilaspur, Raigarh. *Fl.* & *Fr.*: Sept. - Nov.

2. Themeda laxa (Anderss.) A. Camus in Bull. Mus. Hist. Nat. Paris 26: 423. 1920; Bor, Grass. Burm. Ceyl. Ind. Pak. 251. 1960. *Anthistiria laxa* Anderss. in Nov. Act. Sci. Upsal. ser. 3, 2: 243. 1856; Hook. *f.*, Fl. Brit. India 7: 213. 1896.

Perennials. Culms 0.6-1.2 m tall, tufted, branched, leafy, glabrous. Leaves *ca* 15 cm long, glabrous, scabrid on margins; sheaths spatheolate; ligules absent. Inflorescence of fan-shaped clusters of racemes; spatheoles

2-3.5 mm long, acuminate. Involucral spikelets male or neuter, 5-6 mm long; callus glabrous. Lower glume narrow, spinously acute, tuberculate-hairy, 9-11-nerved; upper glume *ca* 5 mm long, ciliate. Lemma equal to glume. Sessile spikelets *ca* 4 mm long (including hairy callus). Lower glume truncate, 9-nerved; upper glume narrower. Lower lemma *ca* 3 mm long; upper lemma reduced to 3-3.5 mm long awn. Lodicules large. Pedicellate spikelets *ca* 2.5 mm long, very narrow, sharply acute. Anthers 3, yellow, *ca* 2 mm long. Caryopsis brown, 3-4 mm long.

Endemic to India. Balaghat, Bilaspur, Raigarh, Ratlam, Sidhi. *Fl. & Fr.*: July - Nov.

3. Themeda quadrivalvis (L.) Kuntze, Revis. Gen. Pl. 2: 794. 1891; Bor, Grass. Burm. Ceyl. Ind. Pak. 252. 1960. *Andropogon quadrivalvis* L. in J.A. Murray, Syst. Veg. ed. 13. 758. 1774. *Anthistiria ciliata* L. *f.* Suppl. Pl. 113. 1782; Hook. *f.*, Fl. Brit. India 7: 213. 1896.

Annuals. Culms 30-90 cm tall, erect or ascending. Leaves 15-30 cm long; sheaths loose, glabrous; ligules membranous. Inflorescence usually a dense panicle; spatheoles cymbiform, 1.7-2.5 cm long, acuminate. Involucral spikelets 4.5-5.5 mm long, sharply acute. Lower glume 4.2-5 mm long, with golden brown tubercled hairs; upper glume equal to the lower, 3-nerved, glabrous. Lemma hyaline, 1-nerved, epaleate. Sessile spikelets bisexual, *ca* 4.5 mm long; callus hairy. Lower glume *ca* 4 mm long, 6-7-nerved; upper glume similar. Upper lemma with *ca* 0.5 mm long awn. Anthers 3, yellow, *ca* 1.5 mm long. Caryopsis brown, subcylindrical, 5-6 mm long; callus hairy.

Common. Bastar, Bilaspur, Hoshangabad, Indore, Jabalpur, Raigarh, Ratlam, Seoni, Shivpuri, Sidhi. *Fl. & Fr.*: Sept. - Oct.

4. Themeda triandra Forssk., Fl. Aegypt.-Arab. 178. 1775; Bor, Grass. Burm. Ceyl. Ind. Pak. 254. 1960. *Anthistiria imberbis* Retz., Observ. Bot. 3: 11. 1783; Hook. *f.*, Fl. Brit. India 7: 211. 1896.

Perennials. Culms 70-100 cm tall, erect. Leaves 15-30 cm long, rounded at base; sheaths terete, glabrous; ligules *ca* 2 mm long, membranous, fringed. Inflorescence a panicle; spatheoles *ca* 3 cm long. Involucral spikelets 6.2-6.5 mm long, scarious on margins. Lower glume 6-6.2 mm long, acute, many-nerved; upper glume similar, 3-nerved. Lemma

hyaline, equalling glume. Anthers 3, yellow, 2-2.5 mm long; callus with brown hairs. Caryopsis 3-3.5 mm long, truncate at apex.

Common, preferably in moist places. Bastar, Bilaspur, Hoshangabad, Raipur, Rajnandgaon, Sagar, Surguja. *Fl. & Fr.*: Oct. - Nov.

97. THYSANOLAENA Nees

Shrubs, perennials. Culms reed like. Leaf blades very broad, firm and long; ligules cartilaginous, very short. Inflorescence a large, open panicle. Spikelets all alike, 2 (rarely 3) -flowered with the lower floret barren and reduced to the lemma, the upper bisexual; rhachilla tough, tardily disarticulating above the glumes and between the florets, produced beyond the upper floret and sometimes bearing a third male or rudimentary floret; pedicels fragile, breaking and allowing the spikelet to fall. Glumes hyaline, about half the lemmas, usually obtuse, nerveless or obscurely 1-nerved. Lower lemma equal to spikelet, acuminate, thinly membranous, 1-3-nerved. Palea absent. Upper lemma ovate, acute or mucronate, becoming slightly indurated, 3-nerved, ciliate on the margins with long straight hairs. Palea short, truncate. Caryopsis reddish brown, ovoid.

A monotypic genus; S. E. Asia.

Thysanolaena maxima (Roxb.) Kuntze, Revis. Gen. Pl. 2: 794. 1891; Bor, Grass. Burm. Ceyl. Ind. Pak. 650. 1960. *Agrostis maxima* Roxb., Fl. Ind. (Carey & Wallich ed.) 1: 319. 1820. *Thysanolaena agrostis* Nees in Edinb. New Phil. J. 18: 180. 1835; Hook. *f.*, Fl. Brit. India 7: 61. 1896.

Perennials. Culms 1-3 m tall, erect. Leaves 30-40 cm long, acuminate at apex; sheaths loose, glabrous; ligules membranous. Inflorescence a large panicle; branches filiform, glabrous. Spikelets numerous, 1-2-nate, green-yellow, minute, 2-flowered. Lower glume ovate, *ca* 0.5 mm long, acute; upper glume oblong-cuneate, *ca* 0.7 mm long. Lower lemma lanceolate, *ca* 1.8 mm long; upper lemma *ca* 1.4 mm long, 3-nerved. Anthers 2, yellowish, *ca* 0.7 mm long. Caryopsis reddish brown, ovoid, *ca* 0.5 mm long.

Common. Bastar, Bilaspur, Hoshangabad, Raigarh, Raipur, Rewa, Sidhi, Surguja. *Fl. & Fr.*: Nov. - May.

98. TRAGUS Haller, *nom. cons.*

Annuals or perennials. Leaf blades flat, pectinate-ciliate on margins; ligule a line of hairs. Inflorescence a stiff, dense, cylindrical, spike like raceme, spikelets in subsessile (rarely long pedunculate), caducous clusters, each cluster composed of 2-5 spikelets, these paired or sessile upon a very short rhachis. Spikelets lanceolate to ovate, awnless, those of a cluster all alike or the upper more or less reduced. Glumes dissimilar; lower glume (adaxial) a minute, hyaline scale or suppressed; upper glume equal to spikelet, nerves formed into prominent ribs bearing rows of short prickles, thin between the ribs. Lemma ovate, equal to glume, membranous, 3-nerved. Stamens 3. Caryopsis ellipsoid to oblong, slightly dorsally compressed.

About 7 species; tropical regions of Old World; one in M.P.

Tragus roxburghii Panigrahi in Kew Bull. 29: 496. 1974. *Lappago biflora* sensu Roxb., Fl. Ind. (Carey & Wallich ed.) 1: 284. 1820, *quoad descr., excl. typo. Tragus biflorus sensu* Schult., Syst. Veg. Mant. 2: 205. 1824, *quoad descr., excl. typo*; Bor, Grass. Burm. Ceyl. Ind. Pak. 682. 1960. *T. racemosus auct. non* Scop., 1777: Hook. *f.*, Fl. Brit. India 7: 97. 1896. **Fig. 70.**

Annuals, spreading. Culms 7-25 cm tall, tufted. Leaves ciliate on margins; sheaths glabrous, with few hairs at mouth; ligules membranous, truncate. Inflorescence a terminal raceme; rhachis pubescent. Burs on spikelets caducous. Spikelets 4-4.5 mm long, sessile. Lower glume minute, nerveless; upper glume equal to spikelet, 5-ribbed, with hooked spines. Lemma hyaline, 2-2.5 mm long, acute, 3-nerved. Anthers 3, yellow, *ca* 0.6 mm long. Caryopsis 1-1.5 mm long.

Rare. Indore, Sidhi, Surguja. *Fl. & Fr.*: July - Sept.

99. TRIPOGON Roem. & Schult.

Perennials, densely tufted, slender. Culms erect or pendulous, unbranched. Leaves mainly basal; blades narrow, usually filiform; ligules narrow, ciliate, membranous. Inflorescence a solitary, terminal, subsecund spike. Spikelets 2-seriate, overlapping, more or less appressed to the rhachis, 2 to many-flowered, linear to elliptic, laterally compressed,

Fig. 70. Tragus roxburghii Panigrahi

disarticulating between the florets. Glumes unequal, 1-nerved or rarely the upper 3-nerved, narrow, keeled, persistent, membranous, shorter than the lemmas or the upper glume exceeding the lower lemmas; lower glume often asymmetrical. Lemma membranous, glabrous, 3-nerved, rounded or obtusely keeled, 2-dentate or subentire at apex, sometimes with additional lobes between the teeth, mucronate or 1-3-awned. Palea usually winged and ciliolate along the margins; callus villous and sometimes bearded in front. Caryopsis narrow, trigonous to almost terete.

About 30 species; tropical regions of Old World; 3 in M.P.

1a. Upper glumes 2-fid; lemmas cleft into 4 lobes; median awn 2-3 mm long ...1. *T. bromoides*

1b. Upper glumes not 2-fid; lemmas cleft into 2 lobes; awns 1.5-2 mm long:

2a. Leaves 5-20 cm long; ligules short; spikelets 10-30-flowered; lower glume 4-5 mm long ...2. *T. jacquemontii*

2b. Leaves 30-60 cm long; ligules obsolete; spikelets 5-10-flowered; lower glume *ca* 1 mm long ...3. *T. lisboae*

1. Tripogon bromoides Roem. & Schult., Syst. Veg. 2: 600. 1817; Hook. *f.*, Fl. Brit. India 7: 287. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 521. 1960. *Triathera bromoides* Roth *ex* Roem. & Schult., Syst. Veg. 2: 600. 1817.

Perennials. Culms 25-60 cm tall, tufted. Leaves convolute, acuminate at apex; sheaths glabrous to pilose; ligules membranous. Inflorescence a raceme; rhachis stiff, flattened. Spikelets sessile, 5-10-flowered. Lower glume 2-2.5 mm long, 1-nerved; upper glume 3.5-4 mm long, shortly aristate. Lemma 6-7 mm long, 3-nerved, hairy at base, 4-lobed at apex; median awn 2-3 mm long, side ones 0.2-0.4 mm long. Anthers 3, yellow, very small. Caryopsis narrowly oblong, 1.5-2 mm long.

Endemic to India. Rare. Jabalpur. *Fl. & Fr.*: Aug. Dec.

2. Tripogon jacquemontii Stapf in Kew Bull. 1892: 85. 1892; Hook. *f.*, Fl. Brit. India 7: 286. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 522. 1960.

Perennials. Culms 20-80 cm tall, tufted. Leaves mostly basal, convolute, glabrous; sheaths glabrous, striate; ligules membranous. Inflorescence of racemes; rhachis flat, glabrous. Spikelets 6-20 mm long, 10-30-flowered. Lower glumes 4-5 mm long, membranous, 1-nerved, notched at apex; upper glume similar except mucronate. Lemma 4.5-5.5 mm long (awn 1.5-2 mm), 3-nerved, 2-lobed. Anthers 3, yellow, *ca* 0.5 mm long. Caryopsis brown, oblong, 1.5-2 mm long.

Betul, Hoshangabad, Indore, Rewa, Sagar. *Fl. & Fr.*: Aug. Dec.

3. Tripogon lisboae Stapf in Kew Bull. 1892: 84. 1892; Hook. *f.*, Fl. Brit. India 7: 286. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 522. 1960.

Perennials. Culms 20-75 cm tall, tufted. Leaves glabrous; sheaths compressed; ligules obsolete. Inflorescence of spikes (6-10); rhachis stout. Spikelets 4-10 mm long, 5-10-flowered, crowded. Lower glume hyaline, lanceolate, *ca* 1 mm long, obtusely dentate on one side; upper glume 3-3.5 mm long, coriaceous, apiculate. Lemma *ca* 3.5 mm long, membranous, bearded at base; awn *ca* 2 mm long. Keels of palea scabrid. Anthers 3, yellow, *ca* 0.8 mm long. Caryopsis terete, glabrous.

Very rare. Hoshangabad. *Fl. & Fr.*: Oct. Dec.

100. TRITICUM L.

Annuals. Leaf blades flat. Inflorescence a distichous spike. Spikelets solitary at the nodes of the tough or fragile rhachis, laterally compressed, 2-6(-9)-flowered. Upper 1 or 2 florets usually sterile. Glumes subequal, chartaceous or rarely membranous, asymmetrical, keeled, truncate, 1-2-dentate or awned. Lemma coriaceous, keeled towards the tip, scabrid awned or awnless. Palea membranous, 2-keeled.

About 20 species; Europe, W. Asia and Mediterranean region; one in M.P.

Triticum aestivum L., Sp. Pl. 85. 1753; Bor, Grass. Burm. Ceyl. Ind. Pak. 679. 1960. *T. vulgare* Vill., Hist. Pl. Dauphine 2: 153. 1787; Hook. *f.*, Fl. Brit. India 7: 367. 1896.

Annuals. Culms 30-75 cm tall, erect, glabrous. Leaves linear, soft, glabrous; sheaths terete, glabrous; ligules membranous. Inflorescence a

spike; rhachis compressed, ciliate. Spikelets laterally compressed, 0.8-1.2 mm long, 3-5-flowered. Glumes ovate, 8.5-10 mm long, awned. Lemma ovate, 1-1.3 cm long, 5-nerved; awn 5-8 cm long. Palea ciliate at top. Anthers 3, yellow, *ca* 3.5 mm long. Caryopsis ellipsoid, 8-9 mm long, with longitudinal groove on ventral side.

Cultivated throughout the state. *Fl. & Fr.*: Jan. - April.

101. UROCHLOA P. Beauv.

Annuals or perennials. Leaf blades linear to lanceolate; ligule represented by a line of hairs. Inflorescence of racemes borne upon a short common axis; rhachis more or less triquetrous, rarely ribbon like, bearing single or paired spikelets, with abaxial lower glume. Spikelets lanceolate to ovate, plano-convex, cuspidate to acuminate. Lower glume mostly shorter than the spikelet; upper glume equal to spikelet, usually membranous. Lower floret male or sterile. Lemma resembling the upper glume. Palea almost equal to lemma, usually hyaline. Upper lemma coriaceous to crustaceous, usually much shorter than the spikelet, obtusely rounded at the tip and mucronate, margins covering the edge of palea. Upper palea obtuse. Caryopsis broadly ellipsoid to subrotundate, strongly flattened.

About 11 species; tropical regions of Old world; one in M.P.

Urochloa panicoides P. Beauv., Ess. Agrostogr. 53. t. 11. 1812; Bor, Grass. Burm. Ceyl. Ind. Pak. 372. 1960. *Panicum javanicum* Poir. in Lam., Encycl. Suppl. 4. 274. 1816; Hook. *f.*, Fl. Brit. India 7: 35. 1896.
Fig. 71.

Annuals. Culms 30-60 cm tall, tufted. Leaves finely hirsute with tubercle-based hairs; sheaths loose, hairy upwards; ligules hairy. Inflorescence of 4-10 racemes; rhachis *ca* 1 mm broad. Spikelets 2-seriate, ovate to elliptic, 4-5 mm long, acuminate. Lower glume 1.5-2 mm long, glabrous, 5-nerved; upper glume similar to lower, 9-11-nerved. Lower floret male or barren. Lemma equal to upper glume, 5-7-nerved. Anthers 3, yellow, *ca* 2 mm long. Caryopsis yellowish, ellipsoid or oblong, compressed, *ca* 2 mm long.

Balaghat, Bhopal, Indore, Sidhi. *Fl. & Fr.*: July - Dec.

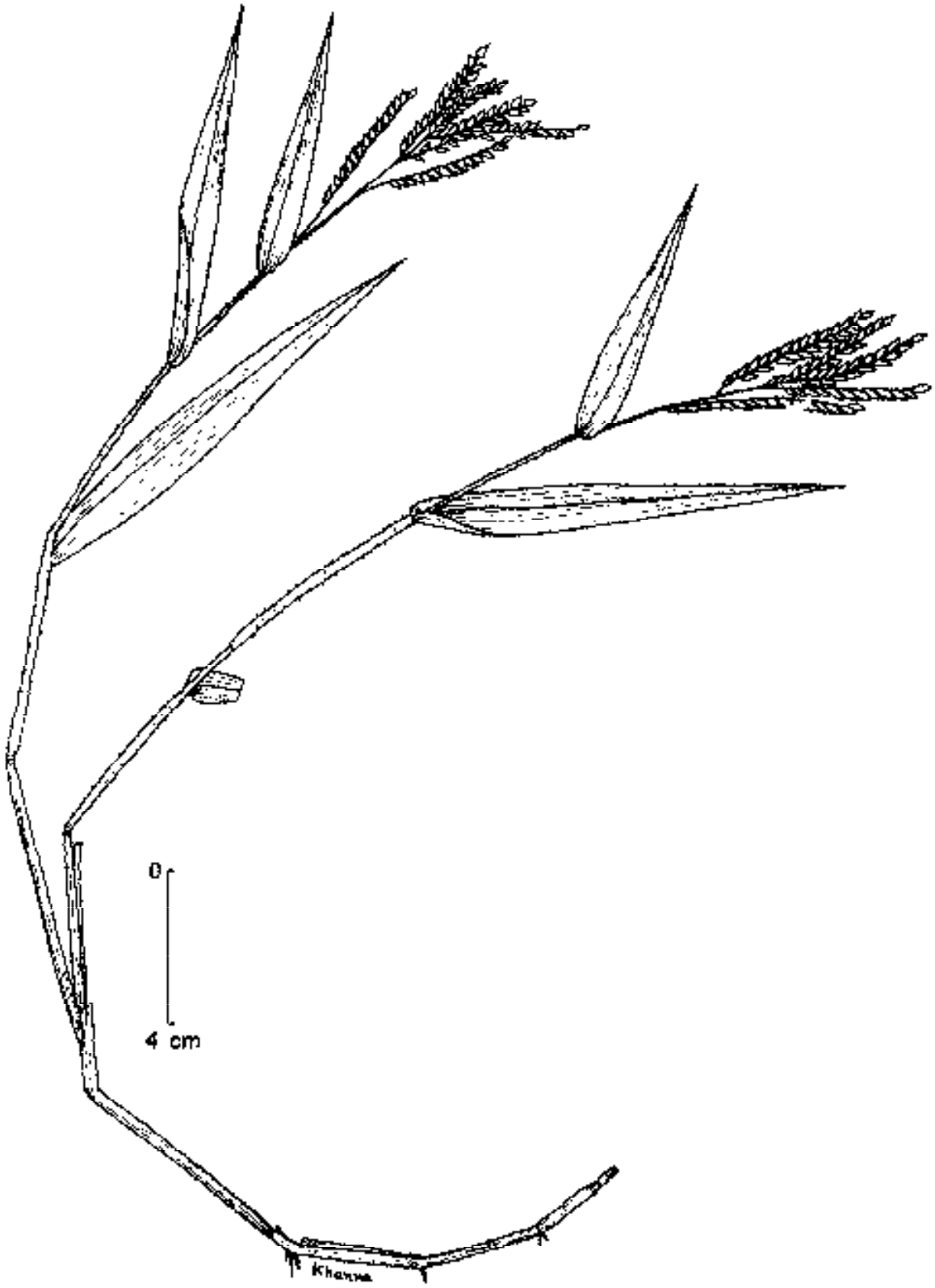

Fig. 71. Urochloa panicoides P. Beauv.

102. VETIVERIA Bory

Perennials, tufted, forming large clumps from stout rhizomes. Leaf blades linear, firm to hard; basal sheaths laterally compressed and keeled; ligule a short membrane or a line of hairs. Inflorescence a terminal panicle with whorls of numerous slender, fragile racemes, composed of several to many spikelets; internodes and pedicels linear. Sessile spikelets linear to lanceolate, laterally compressed; callus rounded and more or less truncate or oblique and pungent. Lower glume coriaceous to chartaceous, rounded on the back, spinulose; upper glume with or without an awn. Lower floret reduced to a hyaline lemma. Upper lemma hyaline, 2-dentate, with a glabrous geniculate awn from the sinus; awn sometimes reduced or absent. Palea minute. Pedicellate spikelets male, similar to the sessile but smaller. Caryopsis oblong.

Two species; tropical regions of Old World; both in M.P.

1a. Roots not aromatic; joints and pedicels with basal tuft of hairs; callus of sessile spikelets bearded; lower glume *ca* 5 mm long, with a row of marginal tubercles ...1. *V. lawsonii*

1b. Roots aromatic; joints and pedicels glabrous; callus of sessile spikelets glabrous; lower glume *ca* 3.8 mm long, muricate ...2. *V. zizanioides*

1. Vetiveria lawsonii (Hook. *f.*) Blatt. & McCann in J. Bombay Nat. Hist. Soc. 32: 409. 1928; Bor, Grass. Burm. Ceyl. Ind. Pak. 258. 1960. *Andropogon lawsonii* Hook. *f.*, Fl. Brit. India 7: 187. 1896, "*lawsoni*".

Perennials. Rhizomes woody. Culms 0.25-1.7 m tall, tufted. Leaves up to 50 cm long, glabrous or bristly; sheaths keeled; ligules membranous, minute. Inflorescence a whorled panicle. Sessile spikelets linear-lanceolate, *ca* 6 mm long, polished, awned. Lower glume linear, *ca* 5 mm long, glabrous, muriculate; upper glume equalling the lower, cymbiform, with 9-10 mm long arista. Lower floret empty. Upper floret bisexual. Lemma 4-4.5 mm long, 2-lobed; awn 2.5-3 cm long. Palea hyaline, nerveless. Anthers 3, yellow, *ca* 3 mm long. Caryopsis *ca* 4 mm long, broader towards base.

Gwalior, Sagar, Shivpuri, Sidhi. *Fl. & Fr.*: Aug. - Nov.

2. Vetiveria zizanioides (L.) Nash in Small, Fl. South-East U. S. 67. 1903; Bor, Grass. Burm. Ceyl. Ind. Pak. 258. 1960. *Phalaris zizanioides* L., Mant. Pl. 183. 1771. *Andropogon squarrosus* L. *f.*, Suppl. Pl. 433. 1782 (*nom. conf.*); Hook. *f.*, Fl. Brit. India 7: 186. 1896.

Perennials, tufted. Roots fibrous, aromatic. Culms up to 1.5 m tall, with rhizomatous rootstock. Leaves 30-70 cm long, scabrid on margins; sheaths glabrous; ligules minute. Inflorescence a contracted panicle. Spikelets in pairs. Sessile spikelets lanceolate, acute. Lower glume *ca* 3.8 mm long, muriculate on back, 5-nerved; upper glume *ca* 4.2 mm long, concave, spinulose, awnless. Lower lemma *ca* 3.6 mm long, empty; upper lemma *ca* 3 mm long, 3-nerved, mucronate. Anthers 3, orange-yellow, *ca* 2.2 mm long. Caryopsis *ca* 2 mm long, broader at base.

Common. Balaghat, Bastar, Bilaspur, Damoh, Gwalior, Hoshangabad, Raipur, Rewa, Sagar, Surguja. *Fl. & Fr.*: Aug. Nov.

103. ZEA L.

Annuals, stout, tall. Leaves up to 1 m long with variable width. Males and seed-bearing inflorescence borne separately. Male inflorescence a terminal panicle. Spikelets in pairs, one sessile, the other pedicellate on a continuous rhachis. Glumes thin, strongly nerved. Lower floret male or neuter, with lemma and palea. Upper floret male, with lemma and palea. Stamens 3. Seed-bearing inflorescence in the axil of one of the leaves and surrounded by sheathing bracts, consisting of a thick spongy axis bearing paired spikelets in longitudinal rows. Spikelets with 2 glumes. Lower floret neuter. Lemma present. Palea small or absent. Upper floret fertile. Lemma and palea present. Stigma very long, silky. Grains large and growing much beyond the glumes.

About 4 species; C. America; one in M.P.

Zea mays L., Sp. Pl. 971. 1753; Hook. *f.*, Fl. Brit. India 7: 102. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 270. 1960.

Annuals, monoecious. Culms 1-2 m tall, erect, glabrous. Leaves 25-90 x 5-10 cm, glabrous; sheaths terete; ligules 2-6 mm long, membranous. Male inflorescence a terminal panicle; rhachis pubescent. Spikelets in pairs, up to 12 mm long. Anthers 3, yellow, *ca* 5 mm long. Female inflorescence

a spadix, enclosed in large bracts. Spikelets in several rows along the axis (variable with varieties). Lower floret brown. Palea present or absent. Caryopsis of variable colour (pale yellow, purple, white), subglobose or dorsally flattened, *ca* 8 mm in diameter.

Cultivated throughout the state. *Fl. & Fr.*: July - Sept.

GYMNOSPERMS

(R.D. Dixit)

Key to the Families

1a. Stems short, usually unbranched; leaf-bases persistent; leaves palm like, pinnate, aggregated in terminal crown ...1. *Cycadaceae*

1b. Stems long, branched; leaf-bases not persistent; leaves not as above:

2a. Leaves needle like or reduced to scales; flowers without conspicuous perianth; seeds in the form of woody cone:

3a. Leaves opposite or whorled, small, usually scale like; ovules erect ...2. *Cupressaceae*

3b. Leaves spirally arranged, long, needle like; ovules inverted ...4. *Pinaceae*

2b. Leaves well developed, flat, never needle like; flowers with conspicuous perianth; seeds not in woody cones ...3. *Gnetaceae*

1. CYCADACEAE

One genus with about 20 species; E. Africa to Japan and Australia; 3 species in M.P.

CYCAS L.

Shrubs to medium-sized trees, dioecious, hardy, evergreen. Stems usually simple. Leaves spirally arranged in terminal crowns, pinnate;

leaflets numerous, linear-oblong, entire, coriaceous, lower ones often reduced to spines, midrib distinct. Male cones shortly peduncled, erect, composed of many, thickened, flat, imbricate microsporophylls with 1-celled microsporangium grouped into 3-5. Megasporophylls numerous, entire to pectinate, apical ones appressed into cone, finally spreading, tomentose; ovules 1-4 in notches on either side of the axis below blade. Seeds naked, ellipsoid or globose, sessile, endospermous.

1a. Margins of leaflets revolute ...2. *C. revolute*

1b. Margins of leaflets flat:

2a. Leaflets green, usually 80-100 pairs in each leaf; male cones brown, not fragrant; microsporophylls obovate; megasporophylls rhombiform ...1. *C. circinalis*

2b. Leaflets dark green, usually 50-70 pairs in each leaf; male cones orange-coloured, strongly fragrant, microsporophylls cuneiform; megasporophylls ovate to ovate-lanceolate ...3. *C. rumphii*

1. Cycas circinalis L., Sp. Pl. 1188. 1753; Dyer in Hook. *f.*, Fl. Brit. India 5: 656. 1888; Raizada & Sahni in Indian For. Rec. (Bot.) 5 (2): 95. 1958; Pant & Mehra, Gymnospermous Plants Cycas 26. 1962. - *Jangali-madan-mast-kaphul.*

Stems thick, erect, up to 3 m high, unbranched. Leaves palm like, 1.5-3 m long; leaflets green, 80-100 pairs, linear-lanceolate, subfalcate, 20-30 x 0.5-1 cm, acuminate at apex, flat on margins; petioles with short spines near the base. Male cones cylindrical-ovoid, 30-40 cm long, shortly peduncled; microsporophylls brown at maturity, obovate, with up to 1.5 cm long tip. Megasporophylls 15-30 cm long, brown tomentose, long peduncled, with 6-12 ovules. Seeds pale reddish yellow, ovoid, ca 3 cm long.

Planted in gardens. Bhopal, Indore, Jabalpur.

The stem pith yields rich starch used as source of sago. The pounded dried seeds are used for stomach diseases, flatulence, blood and skin diseases.

2. Cycas revoluta Thunb., Fl. Jap. 229. 1784; Pant & Mehra, Gymnospermous Plants Cycas 25. 1962. *Sago Cycas.*

Stems thick, 1-1.5 m high, unbranched, covered with old leaf bases. Leaves 0.6-1.2 m long; leaflets dark green, linear, narrow, rigid, 10-16 x 0.5-0.6 cm, strongly revolute on margins; petioles thick, quadrangular, with short spines. Male cones erect, cylindrical or ovoid-oblong, somewhat lax, 10-30 cm long, shortly peduncled; microsporophylls narrowly lanceolate-cuneiform, 2-3.5 cm long, acuminate. Megasporophylls in the axil of upper leaves, shallowly pinnatisect, 10-20 cm long, brownish tomentose, with 4-6 ovules on the margins. Seeds bright orange or yellow, flattened, 1.5-3.5 cm long.

Planted in gardens. Bhopal, Hoshangabad, Indore.

3. Cycas rumphii Miq. in Bull. Sci. Phys. Nat. Neerl. 45. 1839; Dyer in Hook. *f.*, Fl. Brit. India 5: 657. 1888; Raizada & Sahni in Indian For. Rec. (Bot.) 5(2): 97. 1958; Pant & Mehra, Gymnospermous Plants Cycas 28. 1962.

Stems 2-3 m high, simple, rarely forked. Leaves 1-2 m long; leaflets dark green, 50-70 pairs, linear-lanceolate, subfalcate, 25-36 x 1.2-1.8 cm, acuminate at apex, coriaceous, flat on margins; petioles broad at the base, thorny. Male cones orange-coloured, 25-30 cm long, strongly fragrant; microsporophylls cuneiform, up to 2 cm long, acuminate with upcurved acumen. Megasporophylls ovate to ovate-lanceolate, 20-23 x 1-1.2 cm, villous, with 6-10 ovules in notches, with small teeth on margin above. Seeds orange-coloured, ellipsoid, 5-7 x 2-2.5 cm.

Planted in gardens. Hoshangabad, Jabalpur.

2. CUPRESSACEAE

About 17 genera and 113 species; cosmopolitan; 2 genera and 2 species in M.P.

1a. Trees, xerophytic; leaves much reduced, scale like ...1. *Cupressus*

1b. Shrubs, not xerophytic; leaves not much reduced ...2. *Thuja*

1. CUPRESSUS L.

Trees, monoecious, profusely branched from the base; branchlets slender, 4-angled. Leaves opposite, small, scale like, contiguous, appressedly imbricate. Male cones terminal, subsessile. Female cones with 3-6 series of woody, peltate, thin or fleshy ovuliferous scales. Seeds small, winged.

About 13 species, Northern hemisphere; one in M.P.

Cupressus torulosa D. Don, Prodr. Fl. Nepal. 55. 1825; Hook. *f.*, Fl. Brit. India 5: 645. 1888.

Trees, more than 13 m high, profusely branched giving pyramidal shape; branches spreading; tips pendulous. Leaves triangular ovate, obtuse. Cones subsessile, erect; ovuliferous scales umbonate, rugose. Seeds orbicular, narrowly winged.

Planted. Hoshangabad, Surguja.

2. THUJA L.

Shrubs, monoecious, profusely branched giving pyramidal shape; branches short, flattened. Leaves opposite, decussate. Male cones ovoid. Female cones globose or ovoid-oblong, bearing 8-12 ovuliferous scales; 2-3 middle pairs of ovuliferous scales fertile. Seeds winged or wingless.

About 5 species; E. Asia and N. America; one in M.P.

Thuja orientalis L., Sp. Pl. 1002. 1753; Raizada & Sahni in Indian For. Rec. (Bot.) 5(2): 144, t. 13, f. 3. 1960. - *Jhaav, Sara.*

Shrubs, 3-5 m high, profusely branched; branches flabellate, flattened. Leaves dark green, appressed to stem, contiguous, fragrant when crushed. Male cones terminal on the leafy branch; scales small, drying brown. Female cones axillary, globose, 5-7 mm across, bearing 8-12 hooked ovuliferous scales, drying brown.

Planted in gardens. Betul, Bhopal, Hoshangabad, Indore, Jabalpur.

3. GNETACEAE

One genus with about 28 species; tropical regions especially Indo-Malesia, Amazonia and tropical W. Africa; one species in M.P.

GNETUM L.

Climbing shrubs or erect trees, evergreen, dioecious. Leaves opposite, with reticulate venation. Flowers whorled in the axils of cup-shaped bracts of axillary or terminal, solitary or panicled spikes, often surrounded by jointed hairs. Male flowers in 3-6 rings above each collar, with a single ring of imperfect female flowers or abortive ovules above the males; each male flower represented by a stalk bearing 2 unilocular anthers, stalk enclosed by a sheath like perianth. Female flowers in a single ring above each collar; ovules ovoid. Fruits drupaceous.

Gnetum ula Brongn. in Duperr. Voy. Conquille 7: 12. 1829; Bharadwaja in J. Indian Bot. Soc. 36: 415. 1957; Maheshwari & Vasil, Gnetum 9. 1961. *G. scandens auct. non* Roxb., 1832: Brandis, For. Fl. N. W. India 502. 1874; Hook. *f.*, Fl. Brit. India 5: 642. 1888, *p.p.*

Lofty woody climbers. Branches slender; nodes swollen, glabrous. Leaves ovate-oblong or elliptic, 10-15 x 7-10 cm, obtusely cuspidate at apex, cuneate at base, dark green to blackish at maturity, subcoriaceous, glabrous; pedicels 1-1.5 cm long. Male bracts imbricate; female ones interrupted. Fruiting spikes 7-25 cm long. Fruits oblong, 2.5-3 x 1.3-1.5 cm, obtuse, fleshy, longitudinally wrinkled when dry; epicarp thick, fleshy, fibrous; mesocarp thin, woody; endocarp chartaceous. Seeds oblong, *ca* 2 cm long.

Extremely rare. In semi-evergreen forests. Bastar.

4. PINACEAE

About 9 genera and 194 species; N. temperate regions, S. and C. America, West Indies, Sumatra and Java; one species in M.P.

PINUS L.

Lofty trees, monoecious. Stems with two types of branches, the long shoots and dwarf shoots or brachyblasts. Leaves needle like, 1-5, spirally

arranged on dwarf shoots. Male cones in clusters (catkins), each cone arising in the axil of a scale leaf and surrounded by several bracts; microsporophylls spirally arranged, with upturned apices, bearing microsporangia on abaxial side. Female cones terminal on long shoots, each cone with 80-90 megasporophylls or ovuliferous scales; megasporophylls spirally arranged, woody, with 2 ovules.

About 93 species; N. temperate regions, S. and C. America, Sumatra and Java; one in M.P.

Pinus longifolia Roxb., Fl. Ind. 3: 651. 1832; Hook. *f.*, Fl. Brit. India 5: 652. 1888. *P. roxburghii* Sargent in Silva N. Amer. 2: 9. 1897; Raizada & Sahni in Indian For. Rec. 5(2): 117. 1958. *Chir pine.*

Large trees, up to 30 m high, rarely stunted. Main trunk thick, bearing thick bark, 2-3 cm traversed by deep irregular fissures into irregular plates; branches whorled. Leaves in bundles of 3, obscurely triquetrous, bright green, 15-40 cm long, needle like, falling after 3-4 years; sheaths fimbriate, persistent ones bearing 1-2.5 cm long bud scale at the base. Male cones cylindrical, 1-1.5 cm long. Female cones solitary or in 2-5 clusters, mature ones ovoid, 10-20 x 7-15 cm; ovuliferous scales woody, with a pyramidal pointed or curved beak. Seeds winged.

Planted in lawns and along roadsides. Balaghat, Hoshangabad, Shahdol, Surguja.

Wood is used for house construction, railway sleepers, furniture and packing cases.

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MADHYA PRADESH
MALWA
BHOPAL
JABALPUR
INDORE
RAIPUR
BASTAR
0
100
200
300
400 Km