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Edited by
B.V. SHETTY & V. SINGH



BOTANICAL SURVEY OF INDIA

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With contributions by

V. Singh, P. J. Parmar & R. P. Pandey



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Cover Photo : Adhatoda zeylanica Medic.—a medicinal plant.

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FOREWORD

Desert ecosystems present interesting aspects for research. Study of plant wealth with remarkable adaptive features to survive the ecological stresses in an arid and semi-arid state like Rajasthan is not only fascinating but is essential for several reasons.

The task of studying the plant resources and preparing a detailed flora of the state was taken up by the scientists of the Arid Zone Circle of the Botanical Survey of India since its start in 1972 at Jodhpur. Based on detailed surveys and study of the plants occurring in the state the flora has been prepared by Shri B.V. Shetty and Dr. V. Singh (Editors) with contributions made by Drs. V. Singh, P.J. Parmar and R.P. Pandey.

It was originally envisaged that the entire manuscript dealing over 2000 species with introduction, keys, up-to-date nomenclature, descriptions and notes on ecology and phenology etc. could be published in two volumes as stated in the foreword to the 1st volume published in 1987. The remaining manuscript meant for vol. 2 seemed rather unweildy for another volume, necessitating to split it into two, for easy handling during reference. Accordingly the vol. 2 was published in 1991.

With the publication of the third volume, the entire flora for the State is made available to students, teachers, researchers, and planners to appropriately use the knowledge on plant wealth in this large desert ecosystem in the country.

I like to congratulate the editors and contributors for completing the work and the Printing and Publication Section of the Survey for getting the flora published.

Calcutta
6th August, 1992.

B. D. SHARMA
Director
Botanical Survey of India



Plate 1 : *Adhatoda zeylanica* Medic. - Known for medicinal value.



Plate 2 : *Cuscuta reflexa* Roxb. - A stem parasite with wide host range.



Plate 3 : *Arnebia hispidissima* (Lehm.) DC. - Roots yield red dye.



Plate 4 : *Convolvulus prostratus* Forsk.



Plate 5 : *Heliotropium europaeum* L. var. *lasiocarpum*
(Fish. & Mey) Kazmi



Plate 6 : *Salvadora persica* L.



Plate 7 : *Solanum virginianum* L.



Plate 8 : *Orobanche aegyptiaca* Pers.



Plate 9 : *Asparagus racemosus* Willd.



Plate 10 : *Ephedra foliata* Boiss.



Plate 11 : *Withania coagulana* (Stocks) Dunal –
A rare plant of the desert.



Plate 12 : *Tecomella undulata* (Sm.) Seem.

141. ARECACEAE (PALMAE *nom. alt.*)

(P.J. Parmar)

PHOENIX L.

Stem short, bulbiform.	...	1. <i>P. acaulis</i>
Stem well developed.	...	2. <i>P. sylvestris</i>

1. *Phoenix acaulis* Buch. Ham. ex Roxb. Fl. Ind. 3 : 783. 1832 ; Beccari & Hook. f. in Hook. f. Fl. Brit. India 6 : 426. 1892 ; Duthie, Fl. Gangetic Plain 3 : 287. 1929.

Stem bulbiform, 15 - 20 cm in diam., densely clothed with sheaths and bases of petioles. Leaves 60 cm - 2m long. Leaflets in subopposite fascicles, multifarious, subglaucous. Spathes 15 - 20 cm long, lanceolate, rigid. Spadix short, 15 - 25 cm long. Fruits elliptic-oblong, mucronate, bright red to blue-black. Groove of seeds broad.

Fl. & Fr. : February - August.

Rare, in wastelands.

Selected specimen : Jhalawar : NKS 1435 (RUBL. not seen).

2. *Phoenix sylvestris* (L.) Roxb. Fl. Ind. 3 : 787. 1832 ; Beccari & Hook. f. in Hook. f. Fl. Brit. India 6 : 425. 1892 ; Duthie, Fl. Gangetic Plain 3 : 286. 1929. *Elate sylvestris* L. Sp. Pl. 1189. 1753, 'Khajoor' (Hindi).

Tall, unbranched, monoecious, graceful palms, with straight or crooked trunk. Leaves 1.5 - 3.0 m long, pinnate ; leaflets 20 - 30 × 1.0 - 2.5 cm, linear-lanceolate, conduplicate, coriaceous, spinous pointed, glaucous. Inflorescence a spadix. Spathes woody, scurfy, separating into boat-shaped valves. Male flowers numerous, fragrant, creamish-yellow. Female flowers distant, roundish. Drupes scattered, ellipsoid-oblong, orange-yellow. Seeds rounded at the both ends, deeply grooved on one side.

Fl. & Fr. : February - August.

Common in wastelands ; abundant in low-lying areas.

Pl. 3 : 293. 1929 ; Mahesh. Illus. Fl. Delhi f. 206. 1966. 'Patera, Pata' (Hindi).

Erect, perennial, rhizomatous herbs, c. 2 m tall ; rhizomes not deep seated. Leaves spongy, vertical, thick, linear, acute, convex beneath, as long as the scape. Spikes cylindrical, 40-50 cm long. the upper male ; lower female spikes interrupted by long interval, dark brown. Bracteoles spatulate. Pollens simple. Ovary born on gynophore, surrounded by closely set white hairs at the base. Achenes elongate-ovoid, with obtuse apex and acute base, brownish, pericarp easily separable.

Fl. & Fr. : August-June.

Common in marshy and aquatic places.

Selected specimens : Ajmer : *Lourie* 2126 (DD) ; Alwar : Alwar to Jai Samand, *Hira Lal* 34598 (LWG) ; Banswara : Ghatol, *Singh* 2946 (BSJO) ; Ganganagar : Anupgarh, *Roy* 3803 (BSJO) ; Jaipur : Chaksu, *Wadhwa* 8390 (BSA) ; Jhalawar : *Verma* 3340 (BSA) ; Jodhpur : Birai dam, *Moorthy* 401 (BSJO).

2. *Typha elephantina* Roxb. Fl. Ind. 3 : 566. 1832 ; Hook. f. Fl. Brit. India 6 : 489. 1893 ; Duthie, Fl. Gangetic Plain 3 : 293. 1929 ; Sharma & Gopal in Aquat. Bot. 9 : 382. f. 1 b, 3 b & 4 b. 1980.

Rhizomatous, erect, perennial herbs, upto 3.5 m tall ; rhizomes deep seated, robust. Leaves basal, trigonous, 3.0-3.5 cm broad, margins often undulate and white ; sheath membranous. Spikes cylindrical, more than 50 cm long. Male flowers with 3 or more bracts ; pollens 4-globate. Female flowers mixed with clavate pistillodes ; bracteoles shorter than the stigmas. Pericarp of seeds easily removable.

Fl. & Fr. : August-May.

Common in swampy areas.

Selected specimens : Ajmer : *Lourie* 2127, 4894 (DD) ; Bharatpur : Bund Baretha, *Bharadwaj* Acc. No. 8608 (LWG) ; Jalore : Sunda-hill, *Vyas* 6850 (BSJO). Also reported from Udaipur (Ramdeo, 1969).

144. ARACEAE

(P.J. Parmar)

1a. Plants aquatic :

2a. Free floating aquatic herbs. Leaves rosulate,
obovate-cuneate, pubescent. ...

4. *Pistia*.

- 2b. Submerged attached herbs. Leaves radical, glabrous, grass-like. ... 3. *Cryptocoryne*
- 1b. Plants terrestrial, often at marshy places :
- 3a. Leaves peltate, entire :
- 4a. Spadix with an apical barren appendage, adnate to the spathe at base. ... 2. *Colocasia*
- 4b. Spadix without an apical appendage, entirely free from the spathe. ... 6. *Remusatia*
- 3b. Leaves not peltate, variously dissected :
- 5a. Spadix with an apical barren appendage :
- 6a. Plants dioecious. Male flowers shortly pedicelled. ... 1. *Arisaema*
- 6b. Plants monoecious. Male flowers sessile. ... 7. *Santontatum*
- 5b. Spadix without an apical barren appendage. ... 5. *Plesmonium*

1. ARISAEMA Mart.

Arisaema tortuosum (Wall.) Schott in Schott & Endl. Melet. Bot. 1 : 17. 1832 ; Hook. f. Fl. Brit. India 6 : 502. 1892 ; Duthie, Fl. Gangetic Plain 3 : 298. 1929.

Perennial dioecious herbs, with depressed, globose tubers. Leaves 2 - 3, arising from the root-stock, padately 7 to 9-partite ; segments lanceolate-elliptic, acuminate, entire, glabrous ; petioles 20 - 60 cm long. Peduncles 15 - 70 cm long ; spathes greenish, with a cylindric, 3 - 6 cm long tube and an erect, ovate-oblong, long-acuminate, 10 - 15 cm long limb. Spadix curved or sigmoid, narrowed into a long acute point. Stamens 3 - 4, purple brown. Fruits ovoid, red.

Fl. & Fr. : July - August.

Rare, in shady localities in the gardens, ravine slopes and forest edges.

Selected specimen : Jhalawat : NKS 919 (RUBL, not seen).

2. COLOCASIA Schott

Colocasia esculenta (L.) Schott in Schott & Endl. Melet. Bot. 1 : 18. 1832. *Arum esculentum* L. Sp. Pl. 965. 1753. *Colocasia antiquorum* Schott, l.c. 1 : 18. 1832 ; Wight, Ic. 3(1) : 6. t. 386. f. 1. 1844 ; Hook. Fl.

6. REMUSATIA Schott

Remusatia vivipara (Roxb.) Schott in Schott & Endl. Melet. Bot. 1 : 18. 1832 ; Hook. f. Fl. Brit. India 6 : 521. 1893 ; Duthie, Fl. Gangetic Plain 3 : 303. 1929. *Arum viviparum* Roxb. Fl. Ind. 3 : 496. 1832 ; Wight, Ic. 3(1) : 6. t. 798. 1844.

Perennial herbs, with short, 2 - 3 cm broad, depressed tubers. Leaves on 15 - 45 cm long petioles, 10 - 30 × 6 - 20 cm, ovate-triangular, abruptly acute, cordate at base with a triangular sinus. Bulbiferous shoots 1 to many, suberect, simple or branched. Bulbils in clusters, ovoid-globose or oblong, squarrosely scaly. Spathes 10 - 12 cm long ; tube ovoid-oblong, green, 2 - 3 cm long ; limb ovate-cordate, golden yellow. Spadix yellow above.

Fl. & Fr. : January & July.

Rare, in the forests.

Selected specimens : Mt. Abu, Mehta 1839, 2322 (JAC). Also reported by Raizada (1954) & Jain (1962).

7. SAUROMATUM Schott

Sauromatum pedatum (Willd.) Schott in Schott & Endl. Melet. Bot. 1 : 17. 1832. *Arum pedatum* Willd. Enum. Suppl. 54. 1809. *A. guttatum* Wall. Pl. As. Rar. 2 : 10. t. 115. 1830. *A. sessiliflorum* Roxb. Fl. Ind. 3 : 507. 1832 ; Wight, Ic. 3(1) : 6. t. 800. 1844. *Sauromatum guttatum* (Wall.) Schott, Ic. 1 : 17. 1832 ; Hook. f. Fl. Brit. India 6 : 508. 1893 ; Duthie, Fl. Gangetic Plain 3 : 299. 1929.

Perennial, deciduous herbs, with depressed-globose tubers. Leaves solitary, palmately deeply 7 to 9-lobed, appear after flowers on a 50 - 80 cm long, purple-blotched petiole ; segments c 30 cm long, elliptic-obovate or oblong, acute or cuneate at apex and narrowed at base. Spathes shortly peduncled, lanceolate-oblong, purple outside, dark-purple & blotched inside. Spadix as long as spathe, with a long terminal appendage. Fruits ovoid, black.

Fl. & Fr. : March - April.

Occasionally found in moist and shady places in dry deciduous forests.

Selected specimens : Chittorgarh : Bansi, Majumdar 12348 (BSA) ; Sirohi : Mt. Abu, Jain 5342 (BSI) ; Udaipur : Gemawat 216 (BSI).

DOUBTFUL TAXON

Amorphophallus commutatus Engler in DC. Monog. Phan. 2 : 319. 1879 ; Hook. f. Fl. Brit. India 6 : 515. 1893.

Perennial herbs, with solitary, deeply variously lobed leaves. Scapes 30 - 60 cm tall. Spathes ovate-lanceolate. Spadix columnar, as long as spathe. Ripe berries deep-orange.

This species is chiefly concentrated in Concan region. Sankhala (1951) reported it from North-west Rajasthan. Authors could not trace out any specimen from Rajasthan and consider its occurrence doubtful.

CULTIVATED SPECIES

Alocasia decipiens Schott - Perennial herbs, with globose or ovoid tubers covered with leaf scars and roots. Leaves oblong, sagittate-cordate. Flowers unisexual and naked. Stamens united to form a 6-angled body. Berries reddish. Cultivated in the gardens for ornamental purposes.

Alocasia macrorrhiza (L.) G. Don (*Arum macrorrhizon* L.) 'Arvi' (Hindi). Stout herbs, with long root-stocks. Leaves 60 - 90 cm long, ovate-undulate, deeply sagittately cordate, bright green. Spathes pale yellowish green. Commonly cultivated for its edible starchy root-stocks and leaves.

Amorphophallus paeoniifolius (Dennst.) Nilcolson (*Dracontium paeoniifolium* Dennst.) 'Suran' (Hindi). - Deciduous, cormous herbs. Corm upto 35 cm in diam., subglobose with depressed top. Leaf-segments bifurcate-pinnatifid with oblong lobes of varying sizes. Spathes campanulate, purplish within. Spadix stout. Cultivated at some places for the corms used as vegetable.

Monstera deliciosa Liebm. - Straggling climbers, with hanging cord-like roots and ovate or oblong, pinnatifid leaves. Spathes with revolute margins. Fruits cohering into a cone-like body as long as spadix. Native of Central America and Tropical Mexico ; planted in the gardens for its spectacular ornamental foliage.

Typhonium trilobatum (L.) Schott (*Arum trilobatum* L.) 'Jangli Jamikand' (Hindi). Tuberos herbs, with subglobose tubers 3 - 4 cm in diam and hastately 3-lobed or partite leaves. Spathes narrowed in a fine point at apex, pinkish-green below the basal constriction, pink or red above the constriction. Occasionally grown in moist and shady places in orchards.

145. LEMNACEAE

(R.P. Pandey)

- 1a. Fronds flat above, with one to many roots and two marginal reproductive pouches. Inflorescence spathaceous with two male and one female flowers :
- 2a. Fronds 3 to 18 nerved, with a dorsal and ventral scale and two to many roots. Stipe ventrally attached. Anthers longitudinally dehiscent. Utricles winged. ... 2. *Spirodela*
- 2b. Fronds 1 to 3-nerved, without scales and with a solitary root. Stipe marginally attached. Anthers transversely dehiscent. Utricles smooth, not winged... 1. *Lemna*
- 1b. Fronds subglobose, not flat, rootless and with a solitary basal reproductive pouch. Inflorescence not spathaceous, with one male and one female flowers. ... 3. *Wolffia*

1. LEMNA L.

- 1a. Fronds tailed ; root-cap acute :
- 2a. Submerged plants ; fronds symmetric, young ones hastate, older ones elliptic-lanceolate or oblanceolate, crenate-serrate near apex. Root-sheath indistinct. Seeds horizontal, semi-anatropous. ... 3. *L. trisulca*
- 2b. Floating plants ; fronds asymmetric, obovate-oblong or suborbicular, entire. Root-sheath winged at the base. Seeds erect, orthotropous. 2. *L. perpusilla*
- 1b. Fronds sessile, not tailed ; root-cap obtuse. 1. *L. minor*

1. *Lemna minor* L. Sp. Pl. 970. 1753 ; Hook. f. Fl. Brit. India 6 : 556. 1893 ; Hartog & Plas in Blumea 18 : 362. 1970 ; Raizada, Suppl. Duthie, Fl. Gangetic Plain 287. 1976.

Minute, floating, annual herbs. Root-sheath not appendaged at the base ; root-cap obtuse. Fronds up to 0.25 cm long, sessile, symmetrical, obovoid or oblong, more or less flat on both surfaces. Flowers in marginal clefts of fronds, surrounded by 2-lipped spathe. Stamens 2, each representing a male flower. Style long ; ovules solitary. Seeds horizontal, semi-anatropous, albuminous.

Fl. & Fr. : July - September.

Commonly found in pools, ponds, and ditches.

Selected specimen : Alwar : Vyas 671 A (Udaipur Univ.). Also reported from Sikar (Ratnam, 1951) and Udaipur (Ramdeo, 1969).

Notes : Closely related to *L. perpusilla* Torrey ; the latter, however can be distinguished by the asymmetric fronds, root-sheath winged at the base, root-cap acute and erect and orthotropic seeds.

2. *Lemna perpusilla* Torrey in Fl. New York 2 : 245. 1843 ; Hartog & Plas in Blumea 18 : 363. 1970 ; Plas in van Steenis, Fl. Males I. 7 : 231. 1971. *L. paucicostata* Hegelm. Lemnac. 139. t. 8. 1868 ; Hook. f. Fl. Brit. India 6 : 556. 1893 ; Parker in Duthie, Fl. Gangetic Plain 3 : 305. 1929 ; Subram. Aquat. Angiosp. 78. 1962. 'Chowpatti' (Hindi).

Minute, floating, aquatic, annual herbs. Fronds upto 3.0×1.5 mm, flat, glabrous. Spathes membranous, with 2 male and 1 female flowers. Stamens 2. Ovary one.

Fl. & Fr. : July - September.

Common in ponds, pools, canals etc. in stagnant water.

Selected specimens : Ajmer : Akhajtgarh, Duthie 4899 (DD) ; Jodhpur : Bhandari 1814 (JAC) ; Kota : Kelwara, Singh 90699 (LWG) ; Pali : Near Phulad, Shetty 1833 (BSJO) ; Tonk : Near Malpura, Shetty 1309 (BSJO).

3. *Lemna trisulca* L. Sp. Pl. 970. 1753 ; Hook. f. Fl. Brit. India 6 : 557. 1893 ; Parker in Duthie, Fl. Gangetic Plain 3 : 305. 1929 ; Hartog & Plas in Blumea 18 : 364. 1970 ; Raizada, Suppl. Duthie, Fl. Gangetic Plain 287. 1976.

Small, submerged, annual, aquatic herbs. Fronds 4 - 8 mm long, thin, flat. Flowers naked or in a spathe. Stamens 1 - 2. Ovary 1-celled ; style very short ; ovules solitary. Seed testa rough, grooved.

Fl. : March - April.

Rare, found in ponds and ditches. Included on the authority of Majumdar (1969, 1976) from Lohargarh (Jhunjhunu) and southern Rajasthan respectively.

2. SPIRODELA Schleid.

Spirodela polyrhiza (L.) Schleid. in Linnaea 13 : 392. 1839 ; Parker in Duthie, Fl. Gangetic Plain 3 : 305. 1929 ; Subram. Aquat. Angiosp. 77. 1962 ; Hartog & Plas in Blumea 18 : 360. 1970. *Lemna polyrhiza* L. Sp. Pl. 970. 1753 ; Hook. f. Fl. Brit. India 6 : 557. 1893.

Minute, floating, aquatic herbs. Fronds upto 8×7 mm, flat, orbicular or broadly ovate-oblong, opaque, dark green above and purplish beneath. Spathes open at the top, with two male and one female flowers. Stamen one. Ovary two-ovuled. Fruits one-seeded. Seeds semi-anatropous, smooth or faintly reticulate.

Fl. & Fr. : February - April.

Common in ponds, pools, ditches etc. in stagnant water.

Selected specimens : Jodhpur : *Bhandari* 1966 (JAC) ; Kota : *Singh* 90698 (LWG) ; Sirohi : Mt. Abu, *Mehra* 813 (JAC) ; Tonk : Mor village, *Shetty* 1309 A (BSJO). Also reported from Alwar (*Vyas*, 1967) and Jaipur (*Sharma*, 1974).

3. WOLFFIA Horkel ex Schleid. *nom. cons.*

Fronds subglobose beneath.	...	1. <i>W. arrhiza</i>
Fronds subcylindric or conical beneath.	...	2. <i>W. microscopica</i>

1. *Wolffia arrhiza* (L.) Horkel ex Wimmer, Fl. Schles. ed. 3. 140. 1857 ; Hook. f. Fl. Brit. India 6 : 557. 1893, *pro parte* ; Parker in Duthie, Fl. Gangetic Plain 3 : 306. 1929 ; Subram. Aquat. Angiosp. 79. 1962 ; Hartog & Plas in Blumea 18 : 367. 1970. *Lemna arrhiza* L. Mant. Alt. 2 : 294. 1771.

Smallest and simplest plants resembling small dots or grains floating on still water. Fronds upto 1.5×1.0 mm, orbicular or ellipsoidal, upper surface slightly convex. Male and female flowers solitary, inserted in a cup-like groove on the upper surface of the frond.

Fl. & Fr. : July - October.

Abundant in tanks and pools in still water.

Selected specimens : Bhilwara : Shahapura, *Singh* 7174 (BSJO) ; Jodhpur : *Bhandari* 1813 (JAC). Also reported from Alwar (*Vyas*, 1964, 67), Kota (*Majumdar*, 1976), Udaipur (*Ramdeo*, 1969) and N.W. Rajasthan (*Sankhala*, 1951).

2. *Wolffia microscopica* (Griff. ex Voigt) Kurz in Journ. Linn. Soc. Bot. 9 : 265. 1866 ; Hook. f. Fl. Brit. India 6 : 558. 1893 ; Parker in Duthie, Fl. Gangetic Plain 3 : 306. 1929 ; Hartog & Plas in Blumea 18 : 367. 1970. *Grantia microscopica* Griff. ex Voigt, Hort. Suburb. Calc. 692. 1845.

Floating, aquatic herbs. Fronds flat on the upper surface, ovate or obovate, glabrous, entire, with a conical root-like appendage beneath. Male and female flowers solitary, inserted in a groove on upper surface of the frond.

Fl. & Fr. : July - October.

Occasional, in ponds and ditches. Included on the authority of Dhiloon & Bajwa (1969) from Ganganagar.

146. ALISMATACEAE

(P. J. Parmar)

Flowers polygamous. Stamens 6. Receptacles flat. Achenes obovoid, swollen. ...	1. <i>Limnophyton</i>
Flowers unisexual. Stamens usually more than 6. Receptacles globose or oblong. Achenes compressed. ...	2. <i>Sagittaria</i>

I. LIMNOPHYTON Miq.

Limnophyton obtusifolium (L.) Miq. Fl. Ind. Bat. 3 : 242. 1855 ; Hook. f. Fl. Brit. India 6 : 560. 1893 ; Raizada, Suppl. Duthie, Fl. Gangetic Plain 288. 1976. *Sagittaria obtusifolia* L. Sp. Pl. 993. 1753.

Perennial, robust, scapigerous, aquatic herbs, with a stout root-stock. Leaves petiolate, 10 - 15 × 7.5 - 9.5 cm, broadly sagittate, pellucid-punctate, apex tapering to a fine point, basal lobes long. Flowers in whorls, borne on 65 - 95 cm long scapes, pale-blue to almost white, upper whorls mostly male, the lower bisexual. Achenes obovoid, wrinkled, numerous collected into a globose head.

Fl. & Fr. : September - October.

Occasionally found along the margins of ponds, tanks, ditches etc.

Selected specimens : Ajmer : *Lourie* 4901 (DD) ; Banswara : Lamero tank, *Singh* 3634 (BSJO) ; Bharatpur : *Raizada* 62169, 64502 (DD).

2. SAGITTARIA L.

Leaves hastate or sagittate, with acute or acuminate basal lobes, acute at apex. Seeds with blunt spiny wing. ...	1. <i>S. guayanensis</i> subsp. <i>tappula</i>
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Leaves broadly ovate, with rounded basal lobes, obtuse at apex. Seeds with smooth wing. ... 2. *S. sagittifolia*

1. *Sagittaria guayanensis* Kunth subsp. *lappula* (D. Don) Bogin in Mem. New York Bot. Gard. 9 : 192. f. 5. 1955 ; Subram. Aquat. Ang. 87. 1962. *S. lappula* D. Don, Prodr. Fl. Nep. 22. 1825. *S. guayanensis auct. pl. non.* Kunth 1816 ; Hook. f. Fl. Brit. India 6 : 561. 1893 ; Duthie, Fl. Gangetic Plain 3 : 310. 1929.

Laticiferous, aquatic or semi-aquatic herbs. Leaves floating, 2.7 × 1.5-4.0 cm, ovate or suborbicular with a triangular sinus at the base. Scape (incl. peduncle) upto 36 cm long. Racemes with 2-6 whorls of 2-3 flowers ; upper whorls male-flowered and lower ones bisexual, white. Achenes many, obovoid-elliptic, shortly stalked.

Fl. & Fr. : June - September.

Common in ponds along the roads and in other marshy places in the eastern parts of the state.

Selected specimens : Bhilwara : Bijolia. Singh 6063 (BSJO) ; Jaipur : Amolao tank - Naraina, Sharma 1592, 2296 (RUBL) ; Kota : Shahabad, Majumdar 13160, 10855 (BSA) ; Tonk : Benthela village, Shetty 1043 (BSJO).

2. *Sagittaria sagittifolia* L. Sp. Pl. 993. 1753 ; Hook. f. Fl. Brit. India 6 : 561. 1893 ; Duthie, Fl. Gangetic Plain 3 : 310. 1929 ; Subram. Aquat. Ang. 86. 1962.

Specigerous, monoecious, aquatic herbs, with thick, stoloniferous rhizomes. Leaves 5-20 × 1.8-5.0 cm, raised above the surface of water, basal lobes more or less equal to the rest of the blade. Scape c. 25 cm long ; flowers 3-6 in each whorl ; lower whorls females, sessile or shortly pedicelled ; upper ones male, pedicellate, white or tinged with pink. Achenes obliquely ovate, flat, with broad dorsal and ventral wings, sides smooth.

Fl. & Fr. : December - February.

Occasional, in ponds, rivers, rice-fields and other marshy areas in the eastern parts of the state. Often confused for *Limnophyton obtusifolium* (L.) Miq.

Selected specimen : Jaipur : Digotha, Sharma 3704 (RUBL).

147. BUTOMACEAE

(R. P. Pandey)

TENAGOCHARIS Hochst.

Tenagocharis latifolia (D. Don) Buchen. Abb. Naturw. Ver. Bremen 2 : 2, 3, 6. 1868 ; van Steenis, Fl. Males. I. 5 : 118. f. 1. 1954 ; Subram. Aquat. Angiosp. 88. t. 4. f. 53. 1962. *Butomus latifolius* D. Don, Prodr. Fl. Nep. 22. 1825. *Butomopsis lanceolata* Kunth, Enum. Pl. 3 : 165. 1841 ; Hook. f. Fl. Brit. India 6 : 562. 1893 ; Duthie, Fl. Gangetic Plain 3 : 311. 1929.

Aquatic herbs. Leaves 5 - 12 × 1.5 - 3.0 cm, oblong to oblong-lanceolate, mucronate, upto 5-nerved. Flowers white, in umbels. Sepals c. 4.5 × 3.0 mm, elliptic to obovate, rounded. Petals longer than the sepals. Ovary reticulately veined ; stigma yellow. Fruits upto 10 mm long. Seeds c. 0.5 mm long, elliptic, shiny brown.

Fl. & Fr. : October - March.

Rare, in ponds and lakes.

Selected specimen : Kota : Shahabad, Majumdar 13197 (BSA).

148. APONOGETONACEAE

(R. P. Pandey)

APONOGETON L. f.

Aponogeton natans (L.) Engl. & Krause in Engl. Pflanzenr. 24 : 22. 1906 ; Subram. Aquat. Angiosp. 92. t. 5. f. 54. 1962 ; Raizada, Suppl. Duthie, Fl. Gangetic Plain 288. 1976. *Saururus natans* L. Mant. Alt. 2 : 227. 1771. *Aponogeton monostachyon* L. f. Suppl. Pl. 214. 1781 ; Hook. f. Fl. Brit. India 6 : 564. 1893.

Submerged, aquatic herbs, with edible stoloniferous root-stock. Leaves petiolate, upto 7.5 × 1.5 cm, lanceolate to linear-oblong, base and apex narrowly cuneate, with 2 - 3 parallel nerves ; floating leaves upto 15 × 3 cm, 5 to 7-nerved. Flowers white, pink or lilac, in a solitary spike. Spathe upto 15 mm long, caducous. Tepals 2, spatulate, c. 1.5 × 0.75 mm, 1-nerved. Stamens 6. Ovaries 3. Fruits upto 3.5 × 2.0 mm, beaked. Seeds c. 1.5 × 0.7 mm, winged, transparent and reticulately veined.

Fl. & Fr. : Most part of the year, particularly after the rains.

Commonly occurs in stagnant shallow water in tanks, pools and marshes.

Selected specimens : Bhilwara : Bijolia, Singh 6083 (BSJO) ; Jaipur : Digotha, Sharma 3734 (RUBL). Also reported from Jhunjhunu (Nair & Kanodia, 1959).

149. POTAMOGETONACEAE

(R. P. Pandey)

POTAMOGETON L.

- 1a. All leaves submerged, sessile :
- 2a. Leaves narrowly linear to filiform ; sheath upto 2 cm long. ... 3. *P. pectinatus*
- 2b. Leaves not linear to filiform ; sheath free, forming stipules :
- 3a. Leaves ovate-cordate, entire, amplexicaul, 5 to 9-nerved. Tepals elliptic-obovate. Druplets globose, short-beaked. ... 4. *P. perfoliatus*
- 3b. Leaves linear-oblong, margins crisped and finely serrulate, semi-amplexicaul, 3-nerved. Tepals suborbicular. Druplets obliquely ovoid, long beaked. ... 1. *P. crispus*
- 1b. At least upper leaves floating, petiolate. ... 2. *P. nodosus*

1. *Potamogeton crispus* L. Sp. Pl. 126. 1753 ; Hook. f. Fl. Brit. India 6 : 566. 1893 ; Parker in Duthie, Fl. Gangetic Plain 3 : 315. 1929 ; Mahesh. Illus. Fl. Delhi f. 210. 1966.

Submerged, slender, branched, glabrous herbs. Leaves 2.0 - 15.0 × 0.5 - 1.5 cm. translucent. Spikes lax, terminal, upto 20 cm long, few-flowered. Druplets obliquely ovoid, tipped with a compressed, recurved beak.

Fl. & Fr. : November - June.

Common in ponds, ditches, rivers and canals in still and slow running fresh water.

Selected specimens : Ajmer : Ajmer-lake, *Wadhwa* 8419 (BSA) ; Banswara : *Verma* 226 (BSA) ; Bikaner : Kodemdasar tank, *Roy* 1692 (BSJO) ; Jaipur : Sagar, *Sharma* 455 (RUBL) ; Jhalawar : *Sharma* 551, 552 (RUBL) ; Jodhpur : Akhraj ji ka tank, *Singh* 4485 (BSJO) ; Sirohi : Mt. Abu - Achalgarh, *Kanodia* 62209 (BSA).

2. *Potamogeton nodosus* Poir. in Lam. Encycl. Meth. Bot. Suppl. 4 : 535. 1816 ; Subram. Aquat. Angiosp. 95. 1962. *P. indicus* Roxb. Fl. Ind. 1 : 471. 1820, non Roth ex Roem. & Schult. 1818 ; Hook. f. Fl. Brit. India 6 : 565. 1893 ; Parker in Duthie, Fl. Gangetic Plain 3 : 314. 1929.

Submerged herbs, rooting at nodes. Leaves 3 - 8 × 1.5 - 2.5 cm, floating, upper ones opposite, thinly coriaceous, elliptic-lanceolate, oblong or suborbicular, acute or obtuse ; lower submerged, linear to elliptic-lanceolate, acute, often undulate-margined. Stipules free, scarious. Spikes 3.0 - 7.5 cm long, dense, reddish-brown, projecting above the surface of the water. Tepals 4, clawed, suborbicular, concave. Drupelets 2.5 × 3.0 mm, oblique, shortly beaked and keeled. Seeds subreniform.

Fl. & Fr. : May - September.

Common throughout in ponds, ditches and canals.

Selected specimens : Bikaner : Lift canal R.D. 264 near Lunkaransar, *Roy* 2158 (BSJO) ; Chittorgarh : Deogarh, *Verma* 276 (BSA) ; Jaipur : Chaksu, *Sharma* 1727 (RUBL) ; Jodhpur : Akhraj ji ka tank, *Singh* 4483 (BSJO) ; Kota : Shahabad *Wadhwa* 9306 (BSA) ; Pali : Bar, *Duthie* 4902 (DD).

3. *Potamogeton pectinatus* L. Sp. Pl. 127. 1753 ; Hook. f. Fl. Brit. India 6 : 567. 1893 ; Parker in Duthie, Fl. Gangetic Plain 3 : 315. 1929 ; Subram. Aquat. Angiosp. 95. f. 55. (1 - 3). 1962.

Submerged, profusely branched, aquatic herbs. Stems filiform. Leaves 3 - 10 cm long, acute. Stipules with short free point. Spikes 2 - 3 cm long, white. Tepals 4, limb suborbicular or broadly obovate. Drupelets c. 3.0 × 2.5 mm, turgid, dimidiate-obovoid, with a very short beak, scarcely keeled.

Fl. & Fr. : February - November.

Common in ponds, tanks, canals, rivers, streams etc. in slow running water.

Selected specimens : Ajmer : Jawaj tank, *Duthie* 4903 (DD) ; Banswara : Jalawara village, *Singh* 4299 (BSJO) ; Jaipur : Baragaon, *Sharma*

1880 (RUBL) ; Jaisalmer : *Bhandari* 627 (JAC) ; Jodhpur : Luni river-bed near Pichiyak, *Singh* 3533 (BSJO) ; Kota : Chhipabaraut, *Singh* 74089 (LWG) ; Sirohi : Mt. Abu, *Kanodia* 62212 (BSI).

4. *Potamogeton perfoliatus* L. Sp. Pl. 126. 1753 ; Hook. f. Fl. Brit. India 6 : 566. 1893 ; Parker in Duthie, Fl. Gangetic Plain 3 : 314. 1929 ; Subram. Aquat. Angiosp. 95. f. 55 (4 - 5). 1962.

Submerged, stoloniferous herbs, with terete, laxly branched stems. Leaves 2.0 - 3.75 × 1.75 cm. Peduncles axillary, 2.5 - 5.0 cm long. Spikes few-flowered, 1.5 - 2.5 cm long. Drupelets 0.2 mm long, globose, compressed, smooth.

Fl. & Fr. : January - April, rarely upto July.

Common in fresh and stagnant water of ponds and tanks and slow running water of rivers and streams.

Selected specimens : Bhilwara : Guwari dam, *Singh* 7098 (BSJO) ; Bundi : Maugi river, *Majumdar* 16422 (BSA) ; Chittorgarh : Pratapgarh, *Majumdar* 16214 (BSA) ; Kota : Kothari tank, *Singh* 90856 (LWG). Also reported from Mt. Abu (Jain, 1962).

150. ZANNICHELLIACEAE

(R. P. Pandey)

ZANNICHELLIA L.

Zannichellia palustris L. Sp. Pl. 969. 1753 ; Hook. f. Fl. Brit. India 6 : 568. 1893 ; Parker in Duthie, Fl. Gangetic Plain 3 : 316. 1929. *Z. palustris* L. subsp. *pedicellata* Wahlenb. & Rosen in Nov. Act. Soc. Sci. Upsal. 8 : 254. 1821 ; Subram. Aquat. Angiosp. 97. f. 56. (7 - 9). 1962 ; Raizada, Suppl. Duthie, Fl. Gangetic Plain 289. 1976.

Fragile, submerged, fresh or blackish water herbs ; stems slender, filiform, branched. Leaves opposite or in whorls, linear or filiform. Spathe with 1 male and 2 - 5 female flowers. Male flowers without perianth. Stamen solitary. Female flowers with a cupular, hyaline perianth. Carpels 1 - 9 ; stigma peltate. Achenes stipitate, 4.5 - 5.75 mm long, rostrate, back curved, tuberculate. Seeds oblong, pendulous.

Fl. : January - April ; *Fr.* : April - July.

Common in stagnant or slow running water in the ponds, tanks and river-beds.

Selected specimens : Jhalawar : Verma 3379 (BSA) ; Kota : Atru, Singh 9035 (LWG) ; Tonk : Banar river-bed near Raj Mahal, Shetty 459 (BSJO). Also reported from N.W. Rajasthan (Sankhala, 1951).

151. NAJADACEAE

(P.J. Parmar)

NAJAS L.

- 1a. Plants dioecious. Back of the leaves and internodes with spinous teeth. ... 3. *N. marina*
- 1b. Plants monoecious ; usually glabrous :
 - 2a. Flowers of both sexes, or at least males, enclosed in spathes :
 - 3a. Flowers of both sexes enclosed in spathes :
 - 4a. Older leaves with transverse markings, apex spinulate. Sheath with short obtuse auricles... 5. *N. welwitschii*
 - 4b. Leaves without any markings, apex not spinulate. Auricles of sheath variable, truncate or lobed. ... 2. *N. indica*
 - 3b. Spathes absent in female flowers. ... 4. *N. minor*
 - 2b. Flowers of both sexes without spathes. ... 1. *N. graminea*

1. *Najas graminea* Del. Deser. Egypt. Hist. Nat. 2 : 282. t. 50. f. 3. 1813 ; Hook. f. Fl. Brit. India 6 : 569. 1893 ; Parker in Duthie, Fl. Gangetic Plain 3 : 317. 1929.

Grass-like, submerged herbs, with mucronated stem rooting at lower nodes. Leaves 1.5 - 3.0 × 0.06 - 0.1 cm, very narrowly linear, marginal spinules minute, numerous, spreading, sheathing at base ; sheath-auricles about half the length of sheath, toothed. Flowers solitary or 2 to 4-together. Male-perianth ending directly above the anther in 2 ear-like lobes. Fruits ellipsoid-oblong, attenuate at the apex ; arcole minute, subquadrate or polygonal.

Fl. & Fr. : November - March.

Common in tanks, lakes and other water reservoirs throughout the state.

Selected specimens : Banswara : Near Shergarh village, Singh 3096 (BSJO) ; Barmer : West of Gadra road, Shetty 3315 (BSJO) ; Churu :

Chhaper tank; Roy 4032 (BSJO); Jaipur: Ramgarh, Sharma Acc. No. 11695 (RUBL); Kota: Shahabad, Majumdar 13136 (BSA); Udaipur: Majumdar 12477 (BSA).

2. *Najas indica* (Willd.) Cham. in Linnæa 4: 501. 1829; Subram. Aquat. Ang. 101. 1962. *Caulima indica* Willd. Mem. Acad. Roy. Sci. Hist. Berlin 1798: 89. t. 1. f. 3. 1801. *Najas fulciculata* A. Br. in Journ. Bot. 2: 278. f. 4. 1864; Hook. f. Fl. Brit. India 6: 569. 1893. *N. minor* non All. 1785; Hook. f. l.c. 6: 569. 1893. *pro majore parte, pro syn. indica.*

Submerged, aquatic, slender herbs. Leaves 2 - 4 × 0.05 - 0.1 cm, linear, marginal spinules few, often as long as the width of leaf. Auricles of sheath never elongate. Flowers of both sexes enclosed in the spathes; spathe of male flowers narrowed into an irregularly toothed mouth, ending in 2, opposite, linear prolongations, 1 to 2-spined at the apex; spathe of female flowers with a small neck and spinulose mouth. Fruits ellipsoid, enclosed in persistent spathes; areole quadrate.

Fl. & Fr. : After rainy season.

Rare, in ponds, lakes, ditches etc, particularly in the south and south-eastern parts of the state.

Selected specimens : Chittorgarh: Dhanarar Mahadev near Bhadhrar, Singh & Pandey 6994 (BSJO); Jodhpur: Bap, Khisti 40767 (BSA); Kota: Cooke et Gut. s.n., Jan. 1976 (BSA); Udaipur: Kanodia 82354 (BSA).

3. *Najas marina* L. Sp. Pl. 1015. 1753; Majumdar in Bull. Bot. Surv. India 18: 78. 1979. *N. major* All. Fl. Pedem. 2: 221. 1785; Hook. f. Fl. Brit. India 6: 569. 1893; Parker in Duthie, Fl. Gangetic Plain 3: 316. 1929.

Submerged, perennial herbs. Stem stout, terete, rigid, dichotomously branched, armed with 1 - 2 mm long spines. Leaves whorled, 2.0 - 3.8 × 0.2 - 0.4 cm, linear, pinnatifid or toothed; spines 4 - 15 on each margin and 3 - 5 on dorsal surface. Anther 4-celled. Female flowers represented by sessile, solitary, ovoid, 1-ovuled carpel. Achenes 4 - 5 × 2.0 - 2.5 cm, oblong-ellipsoid. Seeds ovoid, with crustaceous testa.

Fl. & Fr. : September - December.

Rare, in the rivers, lakes etc. in association with *Ceratophyllum* L. and *Hydrilla* Rich. in south-eastern part of the state.

Selected specimens : Bundi: Fakera river, Singh 74497 (LWG); Jhalawar: Jhanganbara stream, Verma 3379 (CAL); Kota: Cooke & Gut. s.n. Jan. 1976 (BSA).

4. *Najas minor* All. Auct. Syn. Meth. Strip. Hort. Taurin. 3. 1773 & Fl. Pedem. 2: 221. 1785; Hook. f. Fl. Brit. India 6: 569. 1893,

pro parte; Parker in Duthie, Fl. Gangetic Plain 3 : 317. 1929. *Fluvialis minor* Pers. Syn. 2 : 530. 1807.

Submerged, fragile, dichotomously branched herbs. Leaves 0.8 - 2.5 × 0.04 - 0.05 cm, with 6 - 12 broad-based up-curved, spinules on the margins. Spathes necked, ellipsoid, enclosing male flowers only, ending above the perianth in a short cylindrical neck. Perianth closely inresting the anther. Fruits ellipsoid; areoles in the shape of ladder-like pits.

Fl. & Fr. : September - December.

Frequent in shallow, still-watered ponds, rivers etc.

Selected specimens : Banswara : Lasara tank, Singh 3621 (BSJO); Chittorgarh : Pratapgarh, Majumdar 10180 (BSA); Jodhpur : Luni river, Tiwari 641 (BSJO); Jaipur : Ramgarh, Kumar Acc. No. 12903 (RUBL).

5. *Najas welwitschii* Rendle in Cat. Afr. Pl. Welwitsch. 2 : 95. 1899; Blatter & Hallberg in Journ. Bombay Nat. Hist. Soc. 26 : 974. 1920; Bhandari, Fl. Ind. Desert 359. 1978.

Submerged, aquatic herbs. Stem c. 30 cm long, spreading rooting at nodes, lower internodes long, becoming gradually smaller upwards. Leaves 2.0 - 2.5 × 0.04 - 0.05 cm, linear, midrib evident, marginal teeth 12 - 16, broadly subtriangular. Male flowers sessile; female ones brown. Spathes of female flowers similar to that of male but with a much longer neck. Fruits pale-brown, with many quadrilateral markings.

Fl. & Fr. : September - December.

Rare, found in ponds, lake, ditches etc. in the north-western parts of the state.

Selected specimens : Jodhpur : Bap, Blatter 9336 (BLAT), Bhandari 1137 (IAC).

DOUBTFUL TAXON

Najas australis Bory ex Cham. in Linnaea 4 : 501. 1829; Blatter & Hallberg in Journ. Bombay Nat. Hist. Soc. 26 : 974. 1920; Bhandari, Fl. Ind. Desert 359. 1978.

Blatter & Hallberg (*l.c.*) reported this taxon from Kailana lake near Jodhpur for the first time in India. Sarup (1960) and Bhandari (*l.c.*) included this species in their works on the authority of Blatter and Hallberg (*l.c.*). No subsequent worker could trace the specimen Blatter 9337 (BLAT). The taxon finds its distribution in Madagascar and Mauritius. Its occurrence in Rajasthan is doubtful.

152. ERIOCAULACEAE

(P. J. Parmar)

ERIOCAULON L.

- 1a. One of the petal of male flowers larger and extruded beyond its floral bract. ... 6. *E. polycephalum*
- 1b. Petals of male flowers equal or nearly so, not extruded beyond the floral bract :
- 2a. Involucre bracts quite glabrous :
- 3a. All sepals of female flowers winged :
- 4a. Anthers white or yellow. ... 1. *E. cinereum*
- 4b. Anthers black or dark green :
- 5a. Involucre bracts hyaline. ... 4. *E. margaretue*
- 5b. Involucre bracts not hyaline. ... 5. *E. minutum*
- 3b. Two sepals of female flowers winged and one wingless. ... 3. *E. eleanorae*
- 2b. Involucre bracts pilose or distinctly pubescent :
- 6a. Petals of female flowers with an apical gland :
- 7a. Sepals of male flowers penicillate at the tip. Heads grey or snow-white. Floral bracts sub-rhomboid or oblanceolate, acuminate ... 7. *E. quinquangulare*
- 7b. Sepals of male flowers glabrous. Heads dark-grey. Floral bracts cuneate-obtuse or sub-acute, not acuminate. ... 8. *E. sollyanum*
- 6b. Petals of female flowers without any apical glands. ... 2. *E. diana* var. *richardiana*

1. *Eriocaulon cinereum* R. Br. Prodr. 254. 1810 ; Moldenke in *Phytologia* 3 : 185. 1949 et 26 : 19. 1973 ; Webb. in Tutin *et al.* *Fl. Europaea* 5 : 117. 1980. *E. sieboldianum* Sieb. & Zucc. ex Steud. Syn. Pl. Glum. 2 : 272. 1855 ; Hook. f. *Fl. Brit. India* 6 : 577. 1893 ; Parker in Duthie, *Fl. Gangetic Plain* 3 : 318. 1929.

Stemless, monocious, glabrous, tufted annual herbs, upto 8 cm high. Leaves basal, in rosette, 20 - 40 × 0.5 - 1.5 mm, subulate to narrowly linear, entire, acute, opaque. Peduncles many, exceeding the leaves. Heads 2 - 3 mm across, ovoid-globose, grey. Involucre bracts many, scarious, outer oblong or oblong-lanceolate and obtuse, inner ones narrower. Floral bracts 1.2 - 1.5 mm long. Receptacles columnar. Male flowers stipitate ; outer perianth-segments 3, united basally to form a cupular structure which is apically tridentate. Corolla tubular, irregularly tridentate at apex. Female flowers with 2, free, linear, acute sepals. Petals absent. Seeds ellipsoid-ovoid, smooth, pale-brown.

Fl. & Fr. : August - November.

Common in marshy/aquatic habitats, in the east of Aravalli.

Selected specimens : Banswara : Looda, *Majumdar* 10271 A (BSA) ; Bhilwara : Parvatipur, *Singh* 6573 (BSJO) ; Chittorgarh : Pratapgarh, *Majumdar* 12305 (BSA) ; Dholpur : *Joneson* 33615 (DD) ; Sirohi : Mt. Abu, *Mehta* 611 (JAC) ; Tonk : Near Rampura village, *Shetty* 1040 (BSJO).

2. *Eriocaulon diana* Fyson var. *richardiana* Fyson in Journ. Ind. Bot. 2 : 260. t. 14. 1921 ; Fischer in Gamble, Fl. Madras 3 : 1620. 1931 ; Moldenke in Phytologia Mem. 2 : 261. 1980 ; Singh, Fl. Banswara 233. 1983.

Erect herbs, upto 25 cm high. Leaves ligulate, 5 - 30 cm long, many - nerved, narrowed to an obtuse apex. Peduncles many, about 8 - ribbed, 10 - 30 cm long ; sheath lax, upto 7.5 cm long, obtuse. Involucre bracts lanceolate or ovate, acute or sub - acute, pale. Floral bracts cuneate or oblong - obovate, cuspidate, dark - green with white apex, hairy. Calyx of male flowers spathaceous, split down one side, obovate, more or less white papillose - hairy at apex. Female flowers with 3 - sepals, all boat - shaped or one much narrow ; petals spathulate, pilose. Seeds oblong - subglobose, finely transverse - striate, brown.

Fl. & Fr. : January - May.

Rare, in marshy habitats in southern & south - eastern parts of the state.

Selected specimens : Banswara : Looda, *Majumdar* 10271 (BSA) ; Kota : Shahabad, *Majumdar* 13132 (BSA) ; Sirohi : Mt. Abu, *Mehta* 668, 692 (JAC), *McCann* 2791 (BLAT).

3. *Eriocaulon eleanora* Fyson in Journ. Ind. Bot. 2 : 316. 1921 ; Fischer in Gamble, Fl. Madras 3 : 1619. 1931 ; Gandhi in Saldanha & Nicolson, Fl. Hassan 652. 1976 ; Moldenke in Phytologia Mem. 2 : 261. 1980.

Tufted annuals. Leaves 6×0.13 cm, linear, acicular or subulate, glabrous, sharply acuminate. Sheaths upto 2 cm long. Peduncles many, upto 12 cm long ; heads monoecious, c. 3 mm across ; receptacle sparsely hairy. Involucre bracts glabrous. Floral bracts spathulate, pubescent, acuminate. Corolla - lobes of male flowers with apical gland. Two sepals of female flowers winged ; one wingless petals hairy and gland - tipped. Ovary sessile ; style 3. Seeds 3, glabrous, shining, dark - brown.

Fl. & Fr. : September - October.

Rare, in moist and shady habitats.

Selected specimen : Sirohi : Mt. Abu, *Mehta* 88 (JAC).

4. *Eriocaulon margaretae* Fyson in Journ. Ind. Bot. 2 : 316. 1921 ; Fischer in Gamble, Fl. Madras 3 : 1619. 1931 ; Moldenke in Phytologia Mem. 2 : 261. 1980.

Erect herbs. Leaves 3 - 5 cm long, narrowly linear or setaceous. Peduncles many, 5 - 10 cm long, slender, striate. Sheaths shorter than the leaves, acute. Heads conic - sub globose, whitish. Involucre bracts obovate - oblong, rounded or sub - acute. Floral bracts narrowly obovate, acute, hyaline, glabrous or sub - pubescent. Receptacles shortly columnar, villous. Calyx of male flowers spathaceous, split down one side, 3 - lobed, silvery grey ; corolla - lobes small, with an apical black gland. Sepals of female flowers 3, narrowly boat - shaped, acute, hyaline, glabrous, with spongy wing in the middle of the back ; petals 3, linear, eglandular. Seeds oblong - subglobose, brown.

Fl. & Fr. : August - December.

Rare, in moist or marshy places on the Aravalli hills.

Selected specimen : Sirohi : Mt. Abu, Jain 48165 (BSI).

5. *Eriocaulon minutum* Hook. f. Fl. Brit. India 6 : 579. 1893 ; Cooke, Fl. Bombay 2 : 846. 1908 ; Fischer in Gamble, Fl. Madras 3 : 1619. 1931 ; Moldenke in Phytologia Mem. 2 : 262. 1980.

Small, densely tufted herbs. Leaves 1.2 to 1.8 cm long, narrowly linear or filiform, acute or obtuse, base dilated and sparsely woolly within. Peduncles numerous, 2.5 - 6.5 cm high, capillary, striate, slightly twisted ; sheaths shorter than the leaves, lax, obsolete ribbed, slender. Heads campanulate, 2.5 mm in diam., white, shining. Involucre bracts erect, ovate - lanceolate, acute or acuminate. Floral bracts shorter, oblanceolate, acute or cuspidate. Receptacles glabrous or sparsely villous. Calyx of male flowers spathaceous, split down one side, irregularly 3 - toothed, pale, glabrous. Sepals of female flowers 2, free, boat - shaped, falcately curved, spinulose, winged or keeled on the back, glabrous. Petals absent. Seeds oblong.

Fl. & Fr. : August - November.

Rare, in moist habitats on the hills.

Selected specimens : Sirohi : Mt. Abu, Duthie 6715 (DD), Mehta 117 (JAC), McCann 2792 (BLAT).

6. *Eriocaulon polyccephalum* Hook. f. Fl. Brit. India 6 : 573. 1893 ; Moldenke in Phytologia 19 : 351. 1970 ; Singh, Fl. Banskara 233. 1983. *E. longispis* Hook. f. var. *polyccephalum* (Hook. f.) Fyson in Journ. Ind. Bot. 2 : 309. 1921.

Stemless herbs, more than 25 cm high. Leaves c. 20×0.8 cm, linear - ensiform. Peduncles one to many, upto 50 cm long, glabrous or pubescent. Heads 8 mm in diam. Receptacles villous. Involucre bracts obovate, sparsely hairy. Floral bracts obovate, caudate. Sepals of male flowers 3, free; stamens 6. Sepals of female flowers long, narrow, petals narrowly oblanceolate, ciliate with long soft hairs. Ovary sub-sessile.

Fl. & Fr. : October - March.

Rare, in marshy habitats in southern parts of the state.

Selecte specimen : Banswara - *Majumdar* 10271 B (BSA).

7. *Eriocaulon quinqueangulare* L. Sp. Pl. 87. 1753; Hook. f. Fl. Brit. India 6 : 582. 1893; Parker in Duthie, Fl. Gangetic Plain 3 : 319. 1929.

Stemless, annual herbs. Leaves radical, $3 - 10 \times 0.3 - 0.6$ cm, linear - lanceolate, often red - tinged when dry. Scapes numerous, 7.5 - 20.0 cm high. Heads 3.0 - 4.5 mm in diam., globose or somewhat ovoid, densely white villous. Receptacles villous. Involucre bracts obovate or cuneate, obtuse, glabrous, pale straw - coloured. Floral bracts very much similar to involucre bracts but narrower and long acuminate, light or dark - brown, white hairy on the back. Calyx of male flowers spathaceous, oblong - spatulate, obtuse, tip penicillate; petals stipitate, minute, pilose. Sepals of female flowers narrowly oblanceolate - spatulate, hairy. Seeds sub - globose, smooth.

Fl. & Fr. : October - February.

Common in wet and marshy places in south and south - eastern parts of the state.

Selected specimens : Banswara : Punapathar forest block, *Singh* 3659 (BSJO); Bhilwara : Bijolia, *Singh* 5706 (BSJO); Kota : Atru, *Singh* 83924, 90963 (LWG). Also reported from Bundi district (*Maheshwari & Singh*, 1974).

8. *Eriocaulon sollyanum* Royle, Illus. 409. t. 97. f. 1. 1839. *E. trilobum* Buch. - Ham. ex Koern. in Linnaea 27 : 645. 1856; Hook. f. Fl. Brit. India 6 : 583. 1893; Parker in Duthie, Fl. Gangetic Plain 3 : 319. 1929.

Scapigerous herbs. Leaves $4.0 - 11.0 \times 0.25 - 0.6$ cm, caespitose, linear, narrowed towards an acute or sub-obtuse apex, flat, 9 to 11 - nerved. Peduncles numerous, twisted, glabrous. Heads 3.0 - 4.5 mm in diam., sub - globose. Involucre bracts 3×1 mm, linear - oblong, obtuse, at first radiating beyond the head, afterwards reflexed, pale - shining. Floral

bracts 2 mm long, ciliate at the apex, concave. Receptacles villous. Male flowers shortly stipitate; sepals 3, oblong, obtuse, connate into spathes. Female flowers sub-sessile; sepals 3, oblanceolate, boat-shaped, hairy on the back. Seeds ellipsoid, transversely ridged, pale - yellow.

Fl. & Fr. : October - December.

Rare, in wet and marshy habitats in the south - eastern parts of the state.

Selected specimens : Kota : Kair - Khari river, *Majumdar* 10456 (BSA); Shahabad, *Majumdar* 13132 A (BSA).

153. CYPERACEAE

(P.J. Parmar)

1a. Flowers bisexual :

2a. Style jointed with the ovary, style - base dilated or spongy - thickened, clearly demarcated :

3a. Hypogynous bristles present. ... 5. *Eleocharis*

3b. Hypogynous bristles absent :

4a. Style - base caducous *i.e.* falling apart from achene. ... 7. *Fimbristylis*

4b. Style - base persistent on the mature achene, hence, achenes crowned by a bulbous style base. ... 2. *Bulbosotylis*

2b. Style continuing with the ovary, without demarcated border, hence, achenes neither crowned by nor jointed with the style - base :

5a. Spikelets many - flowered :

6a. Hypogynous bristles and/or scales present. Glumes spirally imbricated :

7a. Hypogynous scales 3, often alternate with 3 - bristles. Glumes pilose outside. ... 8. *Fuirena*

7b. Hypogynous bristles present, scales absent. Glumes glabrous or pubescent outside :

8a. Leaves absent or reduced to sheath or at - most mucros. Hypogynous bristles needle - like. ... 14. *Schoenoplectus*

- 8b. Leaves with distinct lamina.
Hypogynous bristles not needle like :
- 9a. Hypogynous bristles 3 - 6, undivided, retrorsely scabrid, upto as long as the nut. Styles 2, rarely 3. Nuts obovate. ... 1. *Bolboschoenus*
- 9b. Hypogynous bristles 6, divided almost to the base into numerous hairs, exerted, much longer than the nut. Styles 3. Nuts ellipsoid. ... 6. *Eriophorum*
- 6b. Hypogynous bristles and scales absent. Glumes spirally imbricated or 2 - ranked :
- 10a. Glumes spirally imbricate. ... 14. *Schoenoplectus*
- 10b. Glumes 2 - ranked *i.e.* distichous :
- 11a. Rhachilla articulated ; spikelets falling entirely :
- 12a. Nuts triangular with one side facing rhachilla ... 11. *Mariscus*
- 12b. Nuts bilaterally flattened with one angle facing rhachilla. ... 9. *Kyllinga*
- 11b. Rhachilla not articulated, persistent ; glume falling apart from rhachilla :
- 13a. Nuts triangular or dorsiventrally flattened with one side facing rhachilla. ... 4. *Cyperus*
- 13b. Nuts bilaterally flattened with one angle facing rhachilla. ... 12. *Pycurus*
- 5b. Spikelets one - flowered :
- 14a. Glumes 2, dorsiventral. ... 10. *Lipocarpa*
- 14b. Glumes absent. Spikelets represented only by an achlamydeous flower subtended directly by a bracteole of spike. ... 13. *Riklrella*
- 1b. Flowers unisexual :
- 15a. Pistillate flowers enclosed in an utricle. Nuts not bony, without hypogynous disk. ... 3. *Carex*
- 15b. Pistillate flowers not enclosed in an utricle. Nuts bony, borne on a discoid or cupule - like hypogynous disk. ... 15. *Scleria*

1. BOLBOSCHOENUS (Ascherson) Palla

Glumes brown or golden - brown. Style 3 - fid.	... 1. <i>B. maritimus</i> var. <i>maritimus</i>
Glumes straw - coloured. Style 2 - fid.	... 2. <i>B. maritimus</i> var. <i>affinis</i>

1. *Bolboschoenus maritimus* (L.) Palla in Koch. Syn. Deutsch. Fl. ed. 3. 3532. 1904 ; Hooper in Saldanha & Nicolson, Fl. Hassan 658. 1978. *Scirpus maritimus* L. Sp. Pl. 51. 1753 ; Clarke in Hook. f. Fl. Brit. India 6 : 658. 1893 ; Duthie, Fl. Gangetic Plain 3 : 363. 1929.

var. *maritimus*

Erect, perennial sedge, with horizontally creeping rhizomes forming ovoid tubers at the nodes. Leaves 3 - 8 mm wide, often as long as the stem, flat, linear. Involucre - bracts 1 - 3, leaf - like. Inflorescence anthelate, terminal, loose ; rays 5 - 8, slender. Spikelets 1.5 - 3.0 cm long, oblong - ovoid. Glumes 5 - 7 mm long, broadly ovate, puberulous, bifid at apex, strongly keeled, mucro antrorsely scabrid. Hypogynous bristles 6, retrorsely scabrid. Nuts sessile, narrowly obovoid, lenticular or trigonous, beaked, smooth, brown to greyish - black.

Fl. & Fr. ; October - March.

Common in marshy places, on the bank of tanks, ponds, ditches etc.

Selected specimens : Ajmer : Tiagi 24 (DD) ; Banswara : Kanodia 51110 (BSI) ; Barmer : Sheo, Rao 67037 (BSI) ; Bharatpur : Khatipura village, Parmar 8653 (BSJO) ; Ganganagar : Rampura, Roy 5055 (BSJO) ; Sirohi : Abu Road, McCann 1389, 1390 (BLAT).

Notes . Many workers consider *Scirpus maritimus* L. as an European element following Beetle (1942) and *S. tuberosus* Desf. as an Asian element. Recently *S. maritimus* L. has been reported from many parts of Asia including India. Detailed study to confirm the taxonomic status and distribution pattern of these taxa is necessary.

2. var. *affinis* (Roth) Parmar, P.J. *comb. nov. Scirpus affinis* Roth in Reem. & Schult. Syst. Veg. 2 : 140. 1817. *S. maritimus* L. var. *affinis* (Roth) Clarke in Hook. f. Fl. Brit. India 6 : 659. 1893 ; Duthie, Fl. Gangetic Plain 3 : 366. 1929.

Very similar to type variety, but can be easily distinguished by its usually 3 - 1 spikelets, entire, straw - coloured glumes and 2 - fid style.

Fl. & Fr. : January - May.

Common particularly in the eastern parts of the state in marshy places.

Selected specimens : Awar : Baranvir, *Parmar* 9716 (BSJO) ; Banswara : *Majumdar* 10270 (BSA), *Karodi* 51110 A (BSI) ; Barmer : *Sheo* (behind Mansar tank), *Rao* 67037A (BSA) ; Jaipur : Shahapura - kanwat, *Kaul* 41941 (LWG) ; Kota : Amar Niwas, *Singh* 74763 (LWG) ; Tonk : Near Frazer bridge, *Pandey* 4769 (BSJO).

2. *BULBOSTYLIS* Kunth *nom. cons.*

- 1a. Spikelets in an almost prickly head. Glumes densely pubescent. ... 3. *B. subspinescens*
- 1b. Spikelets in capitate or anthelate heads without prickles. Glumes almost glabrous :
- 2a. Inflorescence anthelate. Spikelets and glumes chestnut - brown. Glumes mucronate. Achenes undulate - corrugate. ... 2. *B. densa*
- 2b. Inflorescence capitate. Spikelets and glumes yellowish or rusty - brown. Glumes with recurved awns. Achenes smooth. ... 1. *B. barbata*

1. *Bulbostylis barbata* (Rottb.) Clarke in Hook. f. *Fl. Brit. India* 6 : 651. 1893 ; Duthie, *Fl. Gangetic Plain* 3 : 358. 1929. *Scirpus barbata* Rottb. *Descr. Pl. Rar. Proc.* 27. 1772 *et* *lc. Rar. Nov. Pl.* 52. t. 17. f. 4. 1773.

Annual, tufted, glabrous herbs. Leaves 40 - 100 × 0.5 - 0.8 mm, as long as or shorter than the stem, filiform, acute, glabrous or sparsely pilose on lower surface. Inflorescence of 10 - 25 spikelets. Spikelets sessile, 2 - 9 × 1.0 - 1.3 mm, linear, polygonal. Glumes 1.5 - 2.2 mm long, ovate, membranous, keeled. Stamens 1 - 3. Achenes obovate - orbicular, trigonous, pale, obscurely trabeculate with transversely rectangular cells, rounded at apex.

Fl. & Fr. : August - November.

Common in wet grounds in wastelands and cultivated fields, particularly in the eastern parts of the Aravalli range.

Selected specimens : Ajmer : *Lourie* 199/11 (DD) ; Banswara : Near Paloda village, *Singh* 2819 (BSJO) ; Jodhpur : Malar, *Singh* 3238

(BSJO) ; Kota : Atru, *Singh* 74475 (LWG) ; Nagaur : Roopasar well, *H. Lal* 34923 (LWG) ; Sirohi : Rohi to Chitrasani, *Allen* 1054 (BLAT).

2. *Bulbostylis densa* (Wall.) Hand. - Mazz. in Karsten & Schenk, *Vegetationsb.* 20(7) : 16. 1930 ; Raizada, *Suppl. Duthic. Fl. Gangetic Plain* 290. 1976. *Scirpus densus* Wall. in Roxb. *Fl. Ind.* 1 : 231. 1820. *Isolepis trifida* Nees in Wight, *Contrib. Bot. Ind.* 108. 1834. *Bulbostylis capillaris* (L.) Kunth var. *trifida* (Nees) Clarke in Hook. f. *Fl. Brit. India* 6 : 652. 1893.

Annual, tufted, slender, glabrous herbs. Leaves narrowly linear, 20 - 100 × 0.4 - 0.5 mm, gradually acute at apex. Inflorescence simple to subcompound, bearing 1 - 8 spikelets. Spikelets solitary or in clusters, 3 - 6 × 1.5 mm, oblong - ovate to ovate, subacute at apex. Glumes 1.5 - 2.0 mm long, ovate, acute, mucicous, strongly keeled on back, membranous. Stamens 2. Achenes obovate - orbicular, trigonous, densely granular - punctulate.

Fl. & Fr. : August - November.

Rare, found along the dry sandy river - beds.

Selected specimens : Pali : Luni river bed, *Shetty* 1810 (BSJO) ; Sirohi : Mt. Abu, *Mchta* 298, 1476 (JAC). Also reported by Raizada (1954) & Chavan & Sabnis (1960) from Mt. Abu.

3. *Bulbostylis subspinescens* Clarke in Hook. f. *Fl. Brit. India* 6 : 652. 1893 ; Haines, *Bot. Bihar & Orissa* 5 : 924. 1924 ; Vyas in *Indian For.* 92 : 582. 1966 *et Journ. Bombay Nat. Hist. Soc.* 64 : 226. 1967.

Cacspitose, pubescent, annual herbs. Stem rigid, curved. Leaves 5.0 - 7.5 cm long, numerous, curved, acicular, striate, pubescent, with very broad striated sheath. Spikelets about 10, in a dense, almost prickly stellately spreading terminal head. Bracts about as long as the head. Glumes scarcely keeled, densely pubescent. Style 3 - fid. Achenes pale - brown.

Fl. & Fr. : August - November.

Rare, included on the authority of Vyas (1966 & 1967) from Alwar district.

3. CAREX L.

1a. Spikes many, in panicles :

2a. Panicles simple ; secondary panicles reduced to solitary spikes, at least in the upper part of inflorescence. Stigmas 3.

... 3. *C. myosuroides*

- 2b. Panicles compound ; secondary panicles not reduced to solitary spikes. Stigmas 2. ... 1. *C. cruciata*
 1b. Spikes 3 - 5, in simple racemes. ... 2. *C. heterostachya*

1. *Carex cruciata* Wahlenb. in Vet. - Akad. Nya. Handl Stockholm 24 : 149. 1803 ; Clarke in Hook. f. Fl. Brit. India 6 : 715. 1894 ; Babu, Herb. Fl. Dehradun 550. 1977 ; Singh in Journ. Bombay Nat. Hist. Soc. 74 : 48. 1977 *C. condensata* Nees in Wight, Contrib. Bot. Ind. 123. 1834 ; Clarke in Hook. f. *l.c.* 6 : 176. 1894 ; Duthie, Fl. Gangetic Plain 3 : 371. 1929.

Perennials, with a short, stout, woody rhizome covered with fibrous sheaths. Stems many, erect. 3 - gonous, glabrous. Leaves linear, sub-basal, as long or longer than the stem, upper one passing into bracts. Sheaths trigonous. Panicles 10 - 30 cm long, with 8 - 10, 3 - 8 cm long secondary panicles. Spikes monoecious. Spikelets cylindrical, linear-oblong, upto 1.5 cm long. Female florets 4 - 5 ; glumes ovate - oblong, aristate, reddish - brown. Utricle sub - inflated, ellipsoid, faintly 3 - gonous, abruptly narrowed into a 2 - fid beak. Male florets above the female ones ; glumes ovate - lanceolate, shortly aristate.

Fl. & Fr. : September - January.

Occasionally found in low - lying areas in the south - eastern parts of the state.

Selected specimen : Bundi : Near Hindoli, Singh 74091 (LWG).

2. *Carex heterostachya* Burge, Enum. Pl. Chin. Bor. 69. 1832 ; Singh in Journ. Bombay Nat. Hist. Soc. 74 : 48. 1977. *C. songorica* Kar. & Kir. in Bull. Soc. Nat. Mosc. 3 : 525. 1842 ; Clarke in Hook. f. Fl. Brit. India 6 : 739. 1894.

Perennial herbs, with horizontal rhizomes. Stem 30 - 50 cm high, 3 - gonous. Leaves flat, rigid, overtopping the stem, sheathing at base. Spikes 3 - 5, distant, erect, upper one or two narrow, 1.5 - 4.0 cm long, male ; lower ones cylindric, female. Female glumes ovate, shorter than utricles. Utricles ovoid - ellipsoid, 4 × 2 mm, inflated, narrowed into a beak, with 2, curved arms.

Fl. & Fr. : October - April.

Occasionally found along the bank of rivers and ponds in the south - eastern parts of the state.

Selected specimen : Kota : Sitabari (Kelwara), Singh 91075 (LWG).

3. *Carex myosurus* Nees in Wight, Contrib. Bot. Ind. 122. 1834 ; Clarke in Hook. f. Fl. Brit. India 6 : 723. 1894 ; Duthie, Fl. Gangetic Plain 3 : 370. 1929.

Perennial, glabrous, tall herbs, with short and stout woody rhizomes clothed with persistent, fibrous remains of leaf-sheaths. Stem erect, obtusely 3-angled. Leaves sub-basal, as long as or shorter than the stem. Panicles 15-60 cm long. Spikelets oblong-cylindric. Female flowers pale brown, aristate, glabrous or shortly hairy at the top. Utricles obliquely ellipsoid-obovoid, 3-gonous, shortly stalked, abruptly narrowed into a short hairy, 2-fid beak, hairy in the upper part. Male flowers with ovate, cuspidate, reddish-brown glumes.

Fl. & Fr. : August - December.

Rare, in wastelands and open forests. Included on the authority of Sutarja (1941), Raizada (1954) and Chavan & Sabnis (1960) from Mt. Abu (Sirohi district).

4. CYPERUS L.

- | | | |
|--|-----|----------------------------|
| 1a. Style undivided at the apex. Stigma entire. | ... | 22. <i>C. meeboldii</i> |
| 1b. Style divided at the apex. Stigmas as many as style-arms : | | |
| 2a. Stigmas 2. Nuts dorsally compressed : | | |
| 3a. Spikelets in a decomposed umbel. | ... | 1. <i>C. alopecuroides</i> |
| 3b. Spikelets in lobed heads : | | |
| 4a. Perennial, rhizomatous herbs. Spikelets in pseudolateral heads. | ... | 21. <i>C. laevigatus</i> |
| 4b. Annual herbs, with fibrous roots. Spikelets in terminal heads. | ... | 29. <i>C. pygmaeus</i> |
| 2b. Stigmas 3. Nuts trigonous or triquetrous : | | |
| 5a. Spikelets digitately or stellately arranged : | | |
| 6a. Annuals, with fibrous roots. Stamen 1, rarely 2 : | | |
| 7a. Glumes with recurved cuspidate apex. | ... | 10. <i>C. cuspidatus</i> |
| 7b. Glumes obtuse : | | |
| 8a. Spikelets few, digitate, in twice compound umbels. Rachilla flexuous. Nuts minutely verruculose. | ... | 32. <i>C. tenuispica</i> |

- 8b. Spikelets many, in compact heads Rachilla slender. Nuts punctate. ... 11. *C. difformis*
- 6b. Perennials, with a woody root - stock. Stamens usually 3, rarely 1 :
- 9a. Angle of nut much thickened by corky tissue. Style fimbriate. ... 27. *C. platystylis*
- 9b. Angle of nut not corky thickened. Style simple :
- 10a. Inflorescence a lax umbel. ... 17. *C. haspan*
- 10b. Inflorescence a more or less globose, terminal head or in contracted umbels :
- 11a. Rootlets woolly. ... 8. *C. conglomeratus*
- 11b. Rootlets not woolly :
- 12a. Rhizomes very short ; rootlets wiry :
- 13a. Stem slender, close - set, nodose at the base. Glumes c. 5 mm long. Stamens 3. ... 23. *C. niveus*
- 13b. Stem caespitose. Glumes c. 2 mm long. Stamen 1. ... 28. *C. pulchellus*
- 12b. Rhizomes creeping ; rootlets thick :
- 14a. Spikelets in contracted umbels. ... 5. *C. atkinsonii*
- 14b. Spikelets in one head. ... 3. *C. arenarius*
- 5b. Spikelets distinctly spicately or rarely sub - racemously arranged :
- 15a. Rachilla of spikelets distinctly winged, with decurrent base of glumes :
- 16a. Leaves short, rarely half the length of stem or absent :

- 17a. Culms more or less articulated when dry :
- 18a. Culms weakly trigonous. Bracts distinct, foliaceous. Glumes 1.8 - 2.2 mm long. Anthers upto 1 mm long. ... 9. *C. corymbosus*
- 18b. Culms terete. Bracts very small, papery. Glumes 2.2 - 3.5 mm long. Anthers 1.0 - 1.5 mm long. ... 4. *C. articulatus*
- 17b. Culms not articulated when dry. ... 26. *C. pangorei*
- 16b. Leaves long, more than half the length of stem or longer :
- 19a. Rhizomes stoloniferous :
- 20a. Stolons soon disappearing, terminating into tunicated bulbils. Leaves arising from the stem at some distance, above the base and below the middle. ... 6. *C. bulbosus*
- 20b. Stolons persistent, bearing ovoid black tubers. Leaves radical :
- 21a. Leaves flaccid, flat. Umbels usually compound. Glumes usually 3.0 - 3.5 mm long :
- 22a. Stem not closely thickened at base. Bracts 3. Glumes apiculate, 5 to 7 - nerved :
- 23a. Stolons bearing hard, black, fragrant tubers. Nuts oblong.

- Glumes frequently slightly recurved at apex, slenderly 5 - nerved. ... 30. *C. rotundus*
- 23b. Stolons not or scarcely tuberiferous. Nuts oblong - obovate. Glumes with straight apex, conspicuously 7 - nerved. ... 33. *C. tuberosus*
- 22b. Stem not nodosely thickened at base. Bracts 3 - 6. Glumes obtuse, 3 - nerved. ... 14. *C. esculentus*
- 21b. Leaves rigid. Umbels simple, usually compact. Glumes less than 2.5 mm long. ... 31. *C. stoloniferus*
- 19b. Rhizomes not stoloniferous :
- 24a. Wings of rachilla deciduous. Spikelets hardly flattened. ... 12. *C. digitatus*
- 24b. Wings of rachilla persistent. Spikelets conspicuously flattened :
- 25a. Spikelets densely arranged. Rachis invisible. Anthers longer than the filaments. ... 18. *C. imbricatus*
- 25b. Spikelets laxly arranged, exposing rachis. Anthers as long as or longer than the filaments :
- 26a. Ripe spikelets ascending. ... 15. *C. exaltatus* var. *exaltatus*
- 26b. Ripe spikelets rigidly patent. ... 16. *C. exaltatus* var. *dives*
- 15b. Rachilla of spikelets not or hardly winged. Glumes without decurrent base :
- 27a. Annuals, with tufted stems. Roots fibrous only :
- 28a. Slender herbs. Spikelets 1.0 - 2.5 cm long. Glumes acute at the apex. ... 7. *C. compressus*

- 28b. Stout herbs. Spikelets 0.3 - 1.0 cm long. Glumes obtuse, emarginate or minutely mucronate at the apex :
- 29a. Glumes dorsally 3 to 5 - nerved, back smooth :
- 30a. Spikes drawn out into a linear raceme. ... 20. *C. iria* var. *paniciformis*
- 30b. Spikes not drawn into a linear raceme. ... 19. *C. iria* var. *iria*
- 29b. Glumes dorsally 5 to 7 - nerved, back spinulose - ciliate. ... 2. *C. alulatus*
- 27b. Perennials, with woody rhizomes and often with long stolons :
- 31a. Plants without true stolons. Spikelets in cylindrical spikes. ... 25. *C. nutans* subsp. *eleusinoides*
- 31b. Plants stoloniferous. Spikelets in spicate - racemes :
- 32a. Mature spikelets acicular, patent. Glumes obtuse. Nuts as long as the glumes. ... 13. *C. distans*
- 32b. Mature spikelets linear, suberect. Glumes minutely mucronulate. Nuts shorter than the glume. ... 24. *C. nutans* subsp. *nutans*

1. *Cyperus alopecuroides* Rottb. Descr. Pl. Rar. Progr. 20. 1772 et Icon. Rar. Nov. Pl. 38. t. 8. f. 2. 1773 ; Mahesh. Illus. Fl. Delhi f. 212. 1966. *Juncellus alopecuroides* (Rottb.) Clarke in Hook. f. Fl. Brit. India 6 : 595. 1893 ; Duthie, Fl. Gangaic Plain 3 : 340. 1929.

Robust, perennial, tufted sedge, with short rhizomes. Culms stout, trigonous, 60 - 140 cm tall, glabrous. Leaves 3 to 5, as long as or shorter than the culms, 5 - 7 × 0.6 - 1.7 cm, coriaceous. Inflorescence terminal, lax, often with a central spike. Spikes digitate, patent, 2 - 4 × 0.8 - 1.5 cm, cylindrical to oblong - cylindrical, very dense, the rachis hidden by the crowded spikelets. Spikelets 4 - 7 × 2.0 - 2.5 mm, 10 to 30 - flowered, ovate to lanceolate - oblong, slightly turgid, acute. Rachilla straight, flattened. Glumes

1.5 - 2.2 × 1.0 - 1.3 mm, ovate - elliptic to ovate, 5 or 7 - nerved. Nuts broadly elliptic to obovate, c. 1 mm long, apiculate at apex, light - brown.

Fl. & Fr. : August - November.

Common in the aquatic and marshy places, particularly in the eastern regions of the state.

Selected specimens : Ajmer : *Lourie* 4911 (DD) ; Alwar : On the way to Talvarksh. *Parmar* 9579 (BSJO) ; Banswara : On Ghatol road, *Singh* 2945 (BSJO) ; Ganganagar : Hanumangarh, *Roy* 5037 (BSJO) ; Jodhpur : Bilara, *Singh* 3513 (BSJO) ; Udaipur : Jaisamand, *Verma* 63 A (BSA).

2. *Cyperus alulatus* Kern in Reinwardtia 1 : 643. f. 1. 1952 ; Raizada, Suppl. Duthie, Fl. Gangetic Plain 293. 1976. *C. iria* L. var. *rectangularis* Kükenth. in Engl. Pflanzcnr. 101 : 152. 1935.

Erect, tufted, annual sedge. Leaves 5 - 40 cm long, basal, longer than the stem. Involucre bracts 3 - 5, foliaceous, unequal. Inflorescence a terminal, lax, compound umbel. Spikes 1 - 3 × 1.0 - 1.8 cm. Spikelets 3 - 10 × 2.0 - 2.2 mm, patent, compressed, ovate to oblong - linear, 5 to 15 - flowered, golden - brown or yellowish - brown. Rachis flexuous, hispid on the angles. Glumes 1.5 - 2.0 × 1.2 - 1.3 mm, ovate or suborbicular, imbricate, emarginate, membranous, 7 - nerved, keel narrowly winged, spinosely ciliate on the back. Nuts c. 1.7 × 1.0 mm, obovate - ellipsoid, triquetrous with concave smooth sides, broadly stipitate, apiculate, brown to dark - brown.

Fl. & Fr. : September - November.

Common in moist, sandy and marshy places, particularly in the eastern parts of the state.

Selected specimens : Alwar : Umrai forest block, *Parmar* 9599 (BSJO) ; Banswara : Ghatol, *Singh* 2903 (BSJO) ; Bhilwara : Bhimar village, *Singh* 5991 (BSJO) ; Jaisalmer : 40 km south - west of Jaisalmer, *Shetty* 3403 (BSJO) ; Pali : Sarandhana village, *Shetty* 1807 (BSJO) ; Udaipur : Khamblighat, *Kanodia* 82394 (BSI).

3. *Cyperus arenarius* Retz. Obs. Bot. 4 : 9. 1786 ; Clarke in Hook. f. Fl. Brit. India 6 : 602. 1893 ; Raizada, Suppl. Duthie, Fl. Gangetic Plain 294. 1976 ; Bhandari, Fl. Ind. Desert 364. 1978.

Perennial, rhizomatous sedge. Rhizomes horizontally long - creeping. Culms one to few arising from the apices of the branches of rhizomes,

obtusely trigonous, smooth. Leaves 4 - 8, lower few reduced to subphyllous sheaths, 5 - 20 × 1 - 3 mm, shorter or slightly overtopping the culm, subcoriaceous. Sheaths membranous, straw - coloured. Inflorescence head - like, bearing 5 - 30 spikelets. Spikelets 6 - 13 × 2 - 5 mm, lanceolate - ovate, subacute, 8 to 17 - flowered, turgid, with obtuse angles. Rachilla straight. Glumes imbricated, 4 - 5 × 2 - 3 mm, ovate, obtuse or slightly emarginate at mucronulate apex, 9 or 11 - nerved. Nuts broadly obovate, rounded at apex, triquetrous, black.

Fl. & Fr. : June - December.

Common in sandy grounds, particularly in the western parts of the state.

Selected specimens : Ajmer : Tiagi 9 (DD) ; Barmer ; Near Kujra village, Shetty 2282 (BSJO) ; Churu : Sharma Acc. No. 18039 (BSI) ; Ganganagar : Lakuwali, Roy 6424 (BSJO) ; Jaipur : Durgapura, Sharma 1206 (RUBL) ; Jaisalmer : Rann near Ramgarh, Tiwari 822 (BSJO) ; Nagaur : Merta road station, H. Lal 34859 (LWG).

4. *Cyperus articulatus* L. Sp. Pl. 44. 1753 ; Clarke in Hook. f. Fl. Brit. India 6 : 611. 1893 ; Raizada, Suppl. Duthie, Fl. Gangetic Plain 294. 1976.

Subphyllous perennial sedge. Rhizomes long - creeping. Culms trigonous, smooth, glabrous, distinctly transversely septate when dry, clothed at base with 3 - 4 sheaths. Leaves reduced to long sheaths, at times sheath with a short blade. Sheaths membranous to herbaceous, reddish - brown. Inflorescence terminal or pseudolateral, compound umbel ; primary rays 6 - 10, unequal, upto 15 cm long, secondary rays in corymbs. Spikes ovoid, with 5 - 10 mm long rachis, densely bearing 10 - 15 spikelets. Spikelets 5 - 18 × 1.0 - 1.5 mm, suberect to spreading, linear. Rachilla straight, winged. Glumes ovate - oblong to lanceolate - oblong, obtuse. Nuts trigonous, brown to grey brown.

Fl. & Fr. : August - November.

Occasionally found in the stagnated water of ponds in the south western parts of the state.

Selected specimens : Jalore Baragaon, Shetty 6692 (BSJO) Udaipur : Jaisamand lake, Verma 64 (BSI).

5. *Cyperus atkinsonii* Clarke in Journ. Linn. Soc. 21 : 109. 1884 et Hook. f. Fl. Brit. India 6 : 603. 1893 ; Raizada, Suppl. Duthie, Fl. Gangetic Plain 295. 1976 ; Bhandari, Fl. Ind. Desert 365. 1978.

Perennial, tufted sedge, with woody rhizomes. Culms trigonous, with numerous brown sheaths at the base. Leaves basal, shorter than the stem, c. 40×0.4 cm, lanceolate, rigid. Sheaths persistent, at length disintegrating into fibers. Inflorescence a simple umbel, often contracted into a head. Spikes c. 14×4 mm, compressed, narrowly linear, acute, brown. Spikelets 10 - 15 in a head, $1 - 2 \times 0.3 - 0.4$ cm. 20 to 30-flowered, compressed, narrowly linear, sub-acute. Rachilla persistent, slender. Glumes 3.0 - 3.5 cm long, ovate, cymbiform, with a strong, sharp mucro beyond the obtuse tip. Nuts c. 1.2 mm long, trigonous, obovate, yellowish - brown.

Fl. & Fr. : March - September.

Rare, grows sporadically in large tufts on sand, usually in the north - western region of the state.

Selected specimens : Barmer : *Bhandari* 1871 (JAC) ; Bikaner : Vallabh garden, *Roy* 1750 (BSJO) ; Churu : Bhaleri village, *Roy* 2587 (BSJO) ; Jaipur : Bassi plantation, *Raizada* Acc. No. 130149 (DD) ; Jodhpur : Kailana, *Moorthy* 41 (BSJO) ; Tonk : Barni plantation, *Sen* Acc. No. 148964 (DD).

6. *Cyperus bulbosus* Vahl, Enum. Pl. 2 : 342. 1805 ; Clarke in Hook. f. Fl. Brit. India 6 : 611. 1893 ; Duthie, Fl. Gangetic Plain 3 : 336. 1929.

Perennial sedge, with ovoid - globose or ovoid - fusiform tubers. Culm solitary, triquetrous, smooth. Leaves 7 - 18, equalling or slightly longer than the culm, $8 - 25 \times 0.2 - 0.4$ cm, narrowly linear, gradually acuminate, scabrid on upper margins. Sheaths 2 - 6 cm long, broader than the blade, membranous, dark brown. Inflorescence a sub-umbellate, interrupted or reduced to a capitate head. Spikelets $1.0 - 2.2 \times 0.15 - 0.2$ cm, patent, linear, acute, 8 to 25-flowered, reddish - brown. Rachilla with ovate, persistent wings. Glumes 3 - 4 $\times 1.5 - 2.0$ mm, boat-shaped, 9 to 11-nerved, reddish, margins hyaline in lower part, obtuse or mid-rib produced into a short arista. Nuts 1.5 - 1.7 mm long, ellipsoid to obovoid, trigonous, apiculate or obtuse at apex, black.

Fl. & Fr. : August - November.

Common in moist - waste places, particularly in the north - western part of the state.

Selected specimens : Bhilwara : Badnor, *Singh* 6470 (BSJO) ; Churu : Bhaleri village, *Roy* 2741 (BSJO) ; Jaipur : Durgapura, *Sharma* 1208 (RUBL) ; Jaisalmer : On Pokaran road, *Raizada* 45/55 (DD) ; Jodhpur : Kailana, *Shetty* 95 (BSJO).

7. *Cyperus compressus* L. Sp. Pl. 46. 1753 ; Clarke in Hook. f. Fl. Brit. India 6 : 605. 1893 ; Duthie, Fl. Gangetic Plain 3 : 326. 1929 ; Mahesh. Illus. Fl. Delhi f. 217. 1966.

Tufted, erect or diffuse, glabrous sedge. Culms patent, stout, trigonous, smooth. Leaves few, basal, 8 - 20 × 0.1 - 0.4 cm, linear, shorter than or slightly longer than the culm. Sheaths membranous, striate, pale - brown. Inflorescence anthelate or congested. Bracts 2 - 5, foliaceous, unequal. Spikes 2 - 5 cm long, oval or somewhat flabelliform. Spikelets 10 - 25 × 2.5 - 4.0 mm, compressed, 15 to 40 - flowered, greenish, turning to straw colour when mature. Rachilla flexuose, with caducous wings. Glumes 3 - 4 × 2.0 - 2.5 mm, broadly ovate, strongly folded with acute keel, 3 - nerved on both sides, acute at apex with a straight mucro. Nuts 1.0 - 1.5 × 0.7 - 1.0 mm, broadly - ovate, triquetrous, minutely puncticulate, dark - brown.

Fl. & Fr. : August - November.

Common weed in open, dry waste places and in cultivated fields after rains.

Selected specimens : Alwar : Naldeshwar forest block, Parmar 9538 (BSJO) ; Banswara : Near Paloda village, Singh 2810 (BSJO) ; Jaipur : Durgapura, Sharma 1215 (RUBL) ; Kota : Shahabad, Verma 698 (BSA) ; Sirohi : Abu road, Allen 1052 (BLAT).

8. *Cyperus conglomeratus* Rottb. Descr. et Ic. Rar. Nov. Pl. 21. t. 15. f. 7. 1773 ; Clarke in Hook. f. Fl. Brit. India 6 : 602. 1893 ; Bhandari, Fl. Ind. Desert 367. 1978.

Perennial, tufted, glabrous sedge, with more or less woody rhizomes. Culms stout, terete below, trigonous above, thickened and clothed with brown, ovate, acuminate scales. Leaves as long as or shorter than the culm, 2.0 - 2.5 cm wide, coriaceous, margins inrolled when dry, shortly cuspidate at apex. Sheath pale, with oblique mouth. Inflorescence a simple umbel of a few, densely crowded spikes, often contracted into a head. Bracts 3 - 5. Spikelets 1.2 - 2.5 × 0.3 - 0.4 cm, oblong - lanceolate, compressed, 8 to 20 - flowered, straw - coloured or pale brown. Rachilla stout, not winged. Glumes c. 8 × 1.5 mm, oblong - lanceolate or ovate, with a minute mucro, many - nerved, tightly imbricating but not placed very close to rachilla. Nuts obovoid, unequally trigonous, pale brown.

Fl. & Fr. : August - November.

Common in moist or dry sandy soils throughout the desertic zones.

Selected specimens : Barmer : Near Munabao, Pandey 7910 (BSJO) ; Bikaner : Near Ranjitpura, Roy 2389 (BSJO) ; Churu : Adsisar, Roy 4024

(BSJO); Jaisalmer : West of Nachana, *Shetty* 3338 (BSJO); Jodhpur : CAZRI, *Rao* 67199 (BSI).

9. *Cyperus corymbosus* Rottb. *Descr. et Ic. Rar. Nov. Pl.* 42. t. 7. f. 4. 1773; Clarke in *Hook. f. Fl. Brit. India* 6 : 612. 1893; Duthie, *Fl. Gangetic Plain* 3 : 336. 1929.

Perennial, glabrous, glaucous - green sedge, with long creeping rhizomes. Culms subterete or weakly trigonous, scarcely septate when dry. Sheaths membranous, reddish - brown. Inflorescence a compound umbel. Bracts 2 - 4, lanceolate, erect - patent; primary rays 6 - 15, unequal. Spikes ovoid; rachis 5 - 10 mm long, densely bearing 10 - 15 spikelets. Spikelets 5 - 18 × 1.0 - 1.5 mm, sub - erect or spreading. Rachilla straight, with oblanceolate, white - hyaline or red - brown wings. Glumes 1.8 - 2.2 × 0.8 - 1.0 mm, ovate - oblong to lanceolate - oblong, obtuse, membranous, with 2 or 3 parallel veins on both sides of strong costa. Nuts 1.0 - 1.2 mm, oblong, trigonous, brown.

Fl. & Fr. : August - November.

Occasionally found in the eastern parts of the Aravalli in marshy places.

Selected specimens : Ajmer : *Raizada* 3/56 (DD); Alwar : *Siliserh*, *H. Lal* 34544 (LWG); Jhalawar : *Eklera*, *Majumdar* 10022 (BSA); Sirohi : *Mt. Abu*, *Mehta* 1041 (JAC).

10. *Cyperus cuspidatus* Kunth in *H.B.K. Nov. Gen. et Sp. Pl.* 1 : 204. 1815; Clarke in *Hook. f. Fl. Brit. India* 6 : 598. 1893. *C. uncinatus auct. plur.* non Poir. 1806; Duthie, *Fl. Gangetic Plain* 3 : 325. 1929.

Slender, tufted, annual sedge, with fibrous roots. Culms slender, triquetrous, smooth, 1 to 3 - leaved at base. Leaves upto 2/3 as long as the culm; blades nearly setaceous, 0.4 - 1.0 mm wide, narrowly linear. Inflorescence a single, terminal, compact, nearly globose head. Bracts 3 - 6, foliaceous, but usually longer. Spikelets linear, strongly flattened, 5 - 15 × 2 - 3 mm. Glumes patent, narrowly elliptic, mucronate, 1.0 - 1.5 × 0.6 - 1.0 mm, emarginate at apex, strongly 3 - nerved on keel. Nuts obovate, 0.5 - 0.75 × 0.3 - 0.4 mm, trigonous and with 3 - flat faces, puncticulate, brown.

Fl. & Fr. : August - October.

Frequent in sandy soils, low - lying areas, river - beds, ponds etc., particularly in the eastern parts of the state.

Selected specimens : Banswara : Near Paloda village, *Singh* 2811 (BSJO) ; Bharatpur : Bundh - Baretha, *Bharadwaj* Acc. No 8427 (LWG) ; Jhalawar : Manoharthana, *Singh* 83929 (LWG).

11. *Cyperus difformis* L. Cent. Pl. 2 : 6. 1756 ; Clarke in Hook. f. Fl. Brit. India 6 : 599. 1893 ; Duthie, Fl. Gangetic Plain 3 : 325. 1929.

Tufted, annual, glabrous sedge, with purple fibrous roots. Culms erect to erect-patent, acutely triquetrous with concave sides, smooth. Leaves many, slightly shorter than the culm, 5 - 30 × 0.2 - 0.6 cm, linear, folded, gradually tapering to an acute apex. Sheaths rather long, pale or yellowish-brown. Inflorescence a terminal, simple or compound umbel, with a sessile head at the base of umbel. Bracts 2 - 3, leafy ; rays 3 - 9, very unequal. Spikelets 2 - 8 × 1.0 - 1.25 mm, linear to linear-oblong, 8 to 28-flowered. Rachilla straight, not winged. Glumes 0.5 - 0.8 × 0.7 - 1.0 mm, laxly disposed, nearly orbicular, rounded or slightly emarginate at apex, membranous, faintly 3-nerved, white-hyaline on margins. Nuts c. 0.6 × 0.3 mm, obovate-elliptic, triquetrous, nearly equalling the glumes, yellowish.

Fl. & Fr. : August - December.

Common in aquatic and marshy habitats throughout the state.

Selected specimens : Ajmer : Bhim, *Duthie*, 4906 (DD) ; Alwar : Siliserh, *H. Lal* 34554 (LWG) ; Banswara : Lasara, *Singh* 3626 (BSJO) ; Barmer : Haladeshwar Mahadev temple, *Pandey* 7988 (BSJO) ; Chittorgarh : Near Bhadrar, *Singh & Pandey* 6981 (BSJO) ; Sirohi : Mt. Abu, *Rao* 6531 (BSI) ; Tonk : Bisalpur, *Shetty* 540 (BSJO).

12. *Cyperus digitatus* Roxb. Fl. Ind. 1 : 209. 1820 ; Clarke in Hook. f. Fl. Brit. India 6 : 618. 1893 ; Duthie, Fl. Gangetic Plain 3 : 331. 1929.

Tall, perennial sedge, with short, erect, woody rhizomes. Culms tufted or solitary, sharply triquetrous above, trigonous below, smooth. Leaves few to many, shorter or equalling the culm, 5 - 10 mm wide, linear, 1 or 3-costate, flat to plicate, scabrous on margins. Sheaths mostly stained with brownish purple or dusty brown. Inflorescence a compound umbel of spikes. Bracts 3 - 8, patent, usually much larger than the rays. Bracteoles shorter or equalling the rays. Spikes 4 - 10, digitate, 3 - 6 × 1.5 - 3.0 cm, cylindrical. Rachis narrowly winged, glabrous. Spikelets 6 - 20 × 1.0 - 1.5 mm, rectangularly spreading, linear, 8 to 20-flowered, straw-coloured. Rachilla winged, caducous. Glumes 1.8 - 2.2 × 1 mm, narrowly elliptic, acute, keeled on back, obscurely 1 to 2-nerved along costa, pale straw-coloured. Nuts oblong-elliptic to

oblong - obovate, trigonous, about half the length of glume, yellow brown.

Fl. & Fr. : August - November.

Occasionally found in eastern parts of the state in semi - aquatic habitats.

Selected specimens : Alwar : Siliserh, *H. Lal* 34588 (LWG); Dungarpur : *JAV* 29339 (RSI); Jaipur : Ramgarh, *Sharma* 1817 (RUBL); Kota : Chhabra, *Singh* 74474 (LWG).

13. *Cyperus distans* L. f. *Suppl. Sp. Pl.* 103. 1781; Clarke in *Hook. f. Fl. Brit India* 6 : 607. 1893; Duthie, *Fl. Gangetic Plain* 3 : 335. 1929.

Tall perennials, with short knotty rhizomes. Culms solitary or few together, slender, triquetrous, thickened at base. Leaves shorter or equalling the culm, 4 - 6 mm wide, linear, weakly folded. Sheaths light brown to purple brown. Inflorescence an open, compound or decomposed umbel. Bracts 4 - 6, leafy. Rays 5 - 12, very unequal, patent, rigid, smooth. Spikes loose, broadly ovate pyramidal in outline, bearing 8 - 20 spikelets. Spikelets 6 - 25 × 0.8 - 1.0 mm, linear, divergent, subterete, 8 to 32 - flowered. Rachilla flexuous, winged. Glumes distantly disposed on weak zig - zag rachilla, 1.8 - 2.0 × 1.0 - 1.2 mm, elliptic to ovate - oblong, obtuse, membranous, 3 to 5 nerved near keel. Nuts narrowly ellipsoid, trigonous, dark - brown to black.

Fl. & Fr. : August - November.

Rare, found among grasses in gardens, road - sides, fields etc.

Selected specimen : Ajmer : Beawar, *Duthie* 4908 (DD). Also reported from Alwar (*Vyas*, 1966, 67) and Udaipur (*Ramdeo*, 1969).

14. *Cyperus esculentus* L. *Sp. Pl.* 67. 1753; Clarke in *Hook. f. Fl. Brit. India* 6 : 616. 1893; Duthie, *Fl. Gangetic Plain* 3 : 333. 1929.

Perennial, erect, glabrous sedge, with slender, subterranean stolons ending in ovoid tubers. Culms triquetrous, smooth, finely striated. Leaves shorter than the culm, 3 - 5 mm wide, linear, gradually tapering into an acuminate apex. Inflorescence a terminal, lax, compound umbel. Bracts about 4, unequal, foliaceous. Spikes rarely exceeding 5 cm and most often simple. Spikelets c. 1.2 × 1.5 mm, linear, yellowish - brown. Rachis slender, with narrow, hyaline wings. Glumes c. 3 × 1.5 mm, boat - shaped, rounded or slightly emarginate at apex, 3 - nerved on each side of keel. Nuts obovoid - ellipsoid, triquetrous.

Fl. & Fr. : August - November.

Rare, in the aquatic habitats in the tanks, ponds etc.

Selected specimen : Banswara : Talwara village, *Singh* 4605 (BSJO). Also reported from Kota district by (Gupta, 1966).

15. *Cyperus exaltatus* Retz Obs. Bot. 5 : 11. 1789 ; Clarke in Hook. f. Fl. Brit. India 6 : 617. 1893 ; Duthie, Fl. Gangetic Plain 3 : 331. 1929.

var. *exaltatus*

Perennial, loosely tufted, stout, glabrous sedge. Culms robust, trigonous, smooth. Leaves many, nearly equalling the culm, 6 - 10 mm wide, 3 - costate, scabrous on margins. Sheaths purple - brown. Inflorescence a terminal, compound or decomposed umbel of spikes. Bracts 4 - 6, leafy. Spikes 2 - 5 × 0.7 - 1.5 cm, digitately disposed, but a few usually peduncled, cylindric. Rachis visible, flexuous, narrowly winged. Spikelets 4 - 10 × 1.2 - 1.5 mm, patent, sub - distichous, linear to lanceolate - oblong, 6 to 20 - flowered. Rachilla straight, with pale caducous wings. Glumes 1.5 - 2.0 × 1.2 - 1.5 mm, ovate to broadly ovate, membranous, greenish to straw - coloured, tinged with brown. Keel 3 to 5 - nerved. Nuts elliptic to elliptic - obovate, trigonous, yellowish - brown.

Fl. & Fr. : August - November.

Common in aquatic and marshy habitats, usually on the banks of slow running water streams in the east of Aravalli.

Selected specimens : Chittorgarh : Bansi, *Verma* 1763 (BSA) ; Jhalawar : *Singh* 83923 (LWG) ; Kota : Chambal river, *Majumdar* 10121 (BSA) ; Pali : Bar, *Duthie* 4910 (DD) ; Sirohi : Mt. Abu, *Raizada* 23587 (DD), Delwara, *Despande* 46494 (BSA).

16. var. *dives* (Del.) Clarke in Journ. Linn. Soc. 21 : 187, 1884 et in Hook. f. Fl. Brit. India 6 : 617. 1893 ; Cooke, Fl. Bombay 2 : 873. 1908 ; Shah, Fl. Gujarat 2 : 725. 1978. *Cyperus dives* Del. Fl. Aegypt. Illus. 5. t. 4. f. 3. 1813.

Similar to type variety, but can be distinguished by more turgid, yellow or golden - yellow, shining, horizontally spreading spikelets and glumes with scarious margins.

Fl. & Fr. : August - November.

Rare, found on Aravalli hills in aquatic and marshy habitats.

Selected specimen : Sirohi : Mt. Abu, McCann 1376 (BLAT).

17. *Cyperus haspan* L. Sp. Pl. 45. 1753 ; Clarke in Hook f. Fl. Brit. India 6 : 600. 1893 ; Raizada, Suppl. Duthie, Fl. Gangetic Plain 298. 1976.

Short-lived perennial, tufted sedge, with short rhizomes. Roots fibrous, red-purple. Culms tufted, slender, acutely trigonous. Leaves 2-4, basal. 2-20 × 0.2-0.5 cm. linear or sometimes reduced to lanceolate appendage of sheaths. Sheaths upto 6 cm long lower membranous, red-purple or brown. Inflorescence a compound or decomposed, dense or slightly loose umbel. Bracts 2-3, leafy, shorter than or equalling the umbel. Spikelets 3-6, digitately disposed at the apices of rays, 5-10 × 1-2 mm, linear-oblong or linear-lanceolate, acute, 10 to 20-flowered. Rachilla not winged, hidden by densely disposed glumes. Glumes 1.0-1.5 × 0.5-0.7 mm, membranous, oblong-ovate, mucous. Keel 3-nerved. Nuts trigonous, broadly obovoid, stipitate, shortly apiculate, densely granulate to verruculose, yellowish.

Fl. & Fr. : August - November.

Rare, in wet and marshy habitats. Included on the authority of Vyas (1965, 66, 67) from Udaipur & Alwar districts respectively.

18. *Cyperus imbricatus* Retz. Obs. Bot. 5 : 12. 1789 ; Sharma & Tiagi, Fl. N.E. Rajasthan 413. 1979. *C. radtatus* Vahl. Enum. Pl. 2 : 369. 1805 ; Clarke in Hook. f. Fl. Brit. India 6 : 617. 1893 ; Duthie, Fl. Gangetic Plain 3 : 330. 1929.

Tall perennial, glabrous sedge, with short, woody rhizomes. Culms coarse, obtusely trigonous, clothed with several leaf-sheaths. Leaves basal, shorter than the culm, 5-15 mm wide, broadly linear, weakly folded below. Sheaths dark or reddish-brown. Inflorescence a decomposed umbel; leafy bracts surpassing the umbel. Spikes sessile to subsessile, 1.5-4.0 × 0.5-0.8 cm, cylindrical, dense, straw-coloured. Spikelets patent, 3-6 × 1.0-1.75 mm, lanceolate to oblong-lanceolate, 8 to 20-flowered, sub-compressed. Glumes tightly imbricated, 1.5 mm long, ovate to ovate-oval, base decurrent along the rachilla forming whitish, persistent wings, membranous, yellow-brownish on both sides; keel 3 to 5-nerved, ending in a recurved mucro. Nuts obovate to elliptic-obovate, trigonous, half the length of glume.

Fl. & Fr. : August - November.

Rare, in aquatic and marshy places.

Selected specimens : Jaipur : Ramgarh, Sharma 8801. (RUBL) ; Sirohi : Mt. Abu, McCann 1534, 1535, 1543 (BLAT).

19. *Cyperus iria* L. Sp. Pl. 45. 1753 ; Clarke in Hook. f. Fl. Brit. India 6 : 606. 1893 ; Duthie, Fl. Gangetic Plain 3 : 329. 1929.

var. *iria*

Tall, glabrous, annual sedge, with fibrous roots. Culms solitary or a few together, triquetrous, smooth. Leaves 2 or 3, shorter or slightly surpassing the culm, 2 - 6 mm wide, weakly folded, scabrous on upper margins. Inflorescence a terminal compound, diffuse umbel. Bracts leafy, 3 - 5, patent. Rachis flexuose, glabrous. Spikes 1 - 5 cm long, ovate - oblong to broadly ovoid, bearing 4 - 30 spikelets. Spikelets erect - patent, 9 - 13 × 1.7 - 2.0 mm, oblong - elliptic to linear - oblong, obtuse, compressed, 6 to 22 - flowered, golden - yellow. Rachilla straight, hardly winged. Glumes 1.2 - 1.5 × 1.0 - 1.5 mm, obovate - orbicular, 3 to 5 - nerved, keeled, spreading, acutely ridged. Nuts obovate, trigonous, equalling or longer than glumes, dark - brown.

Fl. & Fr. : August - November.

Common in marshy habitats throughout the state.

Selected specimens : Alwar : Siliserh, *H. Lal* 34582 (LWG) ; Banswara : Lamcro tank, *Singh* 3643 (BSJO) ; Ganganagar : Gharsana, *Roy* 4902 (BSJO) ; Jaipur : Ramgarh, *Sharma* 1808 (RUBL) ; Jaisalmer : Barabagh, *Shetty* 3429 (BSJO) ; Sirohi : Mt. Abu, *Duthie* 6721 (DD).

20. var. *paniciformis* (Franch. & Sav) Clarke in Hook. f. Fl. Brit. India 6 : 607. 1893 ; Cooke, Fl. Bombay 2 : 867. 1908. *Cyperus paniciformis* Franch. & Sav, Enum. Pl. Jap. 537. 1879. *C. parviflorus* Nees in Wt. Contrib. 87. 1834, excl. syn. *C. iria* L. var. *parviflorus* (Nees) Miq. Fl. Ind. Bat. 3 : 270. 1859.

Very similar to *C. iria* var. *iria*, but can be distinguished by spikes often drawn out into nearly linear racemes bearing 10 - 25 spikelets. Spikelets 2 to 4 - flowered, bearing 2 - 4 nuts.

Fl. & Fr. : August - November.

Rare, in moist and marshy habitats.

Selected specimens : Sirohi : Mt. Abu, *Mehta* 621, 1723 (JAC). Also reported by Chavan & Sabnis (1960) from Mt. Abu.

21. *Cyperus laevigatus* L. Mant. Pl. Alt. 179. 1771. *Juncellus laevigatus* (L.) Clarke in Hook. f. Fl. Brit. India 6 : 596. 1893 ; Duthie, Fl. Gangetic Plain 3 : 341. 1929.

Perennial, glabrous, tufted sedge, with horizontally creeping rhizomes. Culms solitary, distant or crowded, base enclosed by imbricate, shining, chestnut - red scales. Leaves very short or absent, sometimes as long as the stem, upper part often terete. Spikelets 1 - 30 in an apparently lateral head; heads solitary or in clusters, straw - coloured. Bracts 2. Spikelets 6 - 8 × 3 - 4 mm, ovate - oblong, sub - acute, compressed but thick, straw - coloured and dotted with brown spots, 12 to 30 - flowered. Rachilla stout, quadrangular, dotted with brown spots. Glumes 2.5 - 3.0 × 1.2 - 1.6 mm, ovate or oblong, acute, mucronulate, closely imbricate, with hyaline margins. Nuts obovate - oblong or ellipsoid, minute punctate.

Fl. & Fr. : August - November.

Common in marshy and aquatic places near ponds, river - beds, along road - sides etc.

Selected specimens : Alwar : Baranviar, *Parmar* 9756 (BSJO); Banswara : Kushalgarh, *Singh* 3777 (BSJO); Barmer : Gandhav river - bed, *Tiwari* 1206 (BSJO); Ganganagar : Ghagger - bed, *Roy* 5917 (BSJO); Jaipur : Chaksu, *Sharma* 1741 (RUBL); Sirohi : Mt. Abu, *Mehta* 1019 (JAC); Udaipur : Dabok, *Kanodia* 82260 (BSI).

22. *Cyperus meeboldii* Kuk. in Fedde, Rep. 18 : 345. 1922; Raynal in *Adansonia* 6 (2) : 304. 1966; Hooper in *Hutchin. & Dalz. Fl. West Trop. Africa* 3 (2) : 293. 1972; Singh, *Fl. Banswara* 238. 1983.

Erect, terrestrial sedge, with small pseudo - bulbous base and fibrous roots. Leaves filiform, 5 cm or more long, shorter than the stem. Spikelets 3.5 - 7.5 × 1.0 - 2.75 mm, condensed in a solitary terminal head, greenish - brown; heads 0.75 - 1.25 cm across. Bracts 2 - 3, unequal, leafy, filiform. Glumes c. 1.5 mm long, boat - shaped, mucronate, 3 - nerved. Stamen one. Style slender, solitary; stigma single, entire. Nuts c. 0.5 mm long, trigonous, turbinate, pale brownish.

Fl. & Fr. : August - November.

Rare. in wet habitats in wastelands.

Selected specimens : Banswara : Forest nursery near Kushalgarh, *Singh* 3034 (BSJO); Pali : Sardarpura village - along Sojat - Ajmer road, *Shetty* 1843 (BSJO).

23. *Cyperus niveus* Retz. *Obs. Bot.* 5 : 12. 1789; Clarke in *Hook. f. Fl. Brit. India* 6 : 601. 1893; Duthie, *Fl. Gangetic Plain* 3 : 327. 1929.

Perennial, tufted, glabrous sedge, with woody rhizomes and wiry rootlets. Culms nodose at the base, closely uni-seriate. Leaves much shorter than the culm, 2 - 3 mm wide, narrowly linear, acuminate. Sheaths numerous, brown, striate, persistent. Inflorescence a sessile head or umbellate, bearing 3 - 12 spikelets. Spikelets 15 - 18 × 5 - 6 mm, oblong-elliptic, compressed, 20 to 40-flowered, pale to almost white. Rachilla not winged. Bracts usually 2, upto 6 cm long, unequal, leafy, not dilated at the base. Glumes 5 × 1.5 mm, ovate-lanceolate, compressed, keel produced into a very short mucro, multistriate, with narrow hyaline margins. Nuts obovoid, triquetrous, dark-brown.

Fl. & Fr. : August - November.

Common in open wastelands and marshy habitats throughout the state.

Selected specimens : Ajmer : Pushkar, *Puri* 35854 (BSI) ; Bharatpur : Lahasar village, *Purmar* 8590 (BSJO) ; Banswara : Paloda village, *Singh* 2824 (BSJO) ; Barmer : Phalsund, *Wadhwa* 4732 (BSA) ; Bikaner : *Puri* 23996 (BSI) ; Kota : Shahabad, *Verma* 647 (BSA) ; Nagaur : Roopasar well, *H. Lal* 34988 (LWG).

24. *Cyperus nutans* Vahl, Enum. Pl. 2 : 263. 1805 ; Clarke in Hook. f. Fl. Brit. India 6 : 607. 1893 ; Duthie, Fl. Gangetic Plain 3 : 330. 1929.

subsp. *nutans*

Perennial, tufted sedge, with very short, corm-like rhizomes. Culm solitary or few together, trigonous, smooth. Leaves few, shorter than the culm, 20 - 40 × 0.6 - 1.5 cm, linear, subcoriaceous, flattish-plicate, 3-costate, whitish beneath, scabrous on upper margins. Sheaths subloosely surrounding the culm-base. Inflorescence a simple or compound spicate umbel. Bracts foliaceous, 4 - 6, unequal. Primary rays 6 - 12, very unequal, erect-patent. Spikes 1.4 - 4.0 × 0.5 - 1.0 cm, more or less penicillate, bearing 7 - 25 spikelets. Spikelets 6 - 15 × 1.0 - 1.5 mm, linear to linear-oblong, compressed, 8 to 14-flowered, light brown. Rachilla weakly flexuous, winged. Glumes 2.0 - 2.5 × 1 mm, oblong, obtuse, folded with acute keel. Nuts 1.3 - 1.5 × 0.5 mm, oblong to ovate-oblong, apiculate, brown.

Fl. & Fr. : September - February.

Common in marshy habitats, particularly in the eastern parts of the state.

Selected specimens : Banswara : Ghatol, *Singh* 2900 (BSJO) ; Barmer : Haldeshwar Mahadev temple, *Pandey* 8036 (BSJO) ; Chittorgarh :

Near Bhadhasar, *Singh & Pandey* 6984 (BSJO) ; Pali : Near Sendra, *Shetty* 1802 (BSJO), *Ghanerao R.F., Shetty* 1886 (BSJO).

25. subsp. *eleusinoides* (Kunth) Koyama in Gard. Bull. Singapore 30: 136. 1977. *Cyperus eleusinoides* Kunth. Enum. Pl. 2: 39. 1837; Clarke in Hook. f. Fl. Brit. India 6: 608. 1893; Duthie, Fl. Gangetic Plain 3: 330. 1929. *Cyperus nutans* Vahl var. *eleusinoides* (Kunth) Haines, Bot. Bihar Orissa 5: 898. 1924.

Very similar to subsp. *nutans*, but can be separated on the basis of primary rays of anthela being less patent. Spikes 5 × 1 cm, bearing spikelets nearly to the base. Spikelets few (4 - 10) - flowered, 1.5 - 2.0 mm wide. Rachilla - internodes c. 0.5 mm long. Glumes more patent, upto 2.2 mm long, more conspicuously mucronate, tinged with glaucous green. Nuts obovate to broadly elliptic, 1.0 - 1.2 × 0.5 - 0.7 mm, more suddenly narrowed to an apiculate tip.

Fl. & Fr. : September - February.

Common in marshy habitats throughout the state.

Selected specimens : Ajmer : Todgarh, *Duthie* 4913 (DD) ; Alwar : Baranviar, *Parmar* 9752 (BSJO) ; Banswara : *Kanodia* 51177 (BSI) ; Barmer : Haldeshwar Mahadev temple, *Tiwari* 1170 (BSJO) ; Kota : Shahabad, *Verma* 694 (BSA) ; Pali : Near Sumerpur, *Shetty* 1421 (BSJO) ; Tonk : Near Niwai temple, *Shetty* 1010 (BSJO).

26. *Cyperus pangorei* Rottb. Pl. Rar. Progr. 18. 1772 et Descr. Ic. Rar. Nov. Pl. 31. t. 7. f. 3. 1773. *C. tegetum* Roxb. Fl. Ind. 1: 208. 1832; Clarke in Hook. f. Fl. Brit. India 6: 613. 1893 et Illus. Cyper. t. 17. 1909; Duthie, Fl. Gangetic Plain 3: 334. 1929.

Tall, perennial, glaucous, rhizomatous sedge. Rhizomes decumbent, clothed with brown scales. Culms laxly tufted or arranged in a row along the rhizome, acutely trigonous. Leaves reduced to 4 - 6 sub-phyllus sheaths; blade, if developed, patent, c. 10 × 0.5 cm. Inflorescence a terminal, lax, compound umbel. Bracts 4 - 5, patent, longer than the inflorescence, unequal. Rays 5 - 7, unequal. Spikes 2 - 3 cm long and as broad, lax, ovate, bearing 5 - 14 spikelets. Spikelets 1 - 2 × 0.1 - 0.15 cm, linear, subacute, compressed, straw - coloured, tinged with red - brown. Rachilla straight, with lanceolate, deciduous wings. Glumes erect - patent, half imbricate, 2.2 - 2.7 × 0.8 - 1.0 mm, oblong to somewhat lanceolate - oblong, obtuse, nerveless. Nuts oblong - obovate, trigonous, reddish brown.

Fl. & Fr. : August - November.

Common throughout the state, particularly in the eastern parts of the state in marshy habitats.

Selected specimens : Alwar : Near Pandupole, *Parmar* 9476 (BSJO) ; Banswara : Bagaycha forest block, *Singh* 4280 (BSJO) ; Jaipur : *Jain* 49624 (BSI) ; Jaisalmer : Salam Sagar, *Tiwari* 697 (BSJO) ; Jhalawar : Aklera, *Wadhwa* 7605 (BSA) ; Pali : Amlia nala, *Shetty* 1413 (BSJO) ; Tonk : Near Gar R.F., *Shetty* 1239 (BSJO).

27. *Cyperus platystylis* R. Br. Prodr. Fl. Nov. Holl. 214. 1810 ; Clarke in Hook. f. Fl. Brit. India 6 : 598. 1895 ; Raizada, Suppl. Duthie, Fl. Gangetic Plain 302. 1976.

Tall, perennial, robust sedge. Rhizomes short, upto 10 cm long, suberect, often hardly developing. Culm solitary, rarely 2 to 3 - together, triquetrous, scabrid on angles. Leaves few, more or less equalling the culm, 5 - 12 mm wide, linear, stiff, septate, nodulose, scabrid on margins. Sheaths light brown, lower ones sometimes cataphylloid. Inflorescence compound or decomposed umbel, hemispherical to corymbiform. Bracts 4 - 12, leafy. Spikelets digitately arranged in groups of 2 - 8, at the apices of raylets, 5 - 20 × 2.5 - 3.0 mm, lanceolate, oblong to linear - lanceolate, acute, densely 15 to 60 - flowered, straw - coloured, stained with rusty brown. Rachilla straight, not winged. Glumes 2.0 - 2.5 × 1.5 - 2.0 mm, ovate to broadly ovate ; keel inconspicuously 3 - nerved, brownish. Nuts oblong - elliptic or oblong - ovate, unequally trigonous, angles corky - thickened, brown to blackish.

Fl. & Fr. : April - December.

Rare, found in marshy and aquatic habitats in south - eastern parts of the state.

Selected specimen : Kota : Kelwara, *Singh* 90843 (LWG).

28. *Cyperus pulchellus* R. Br. Prodr. Fl. Nov. Holl. 213. 1810 ; Kern in Reinwardtia 3 : 39 - 46, f. 5. 1954. *C. leucocephalus* auct. non Retz. 1789 ; Clarke in Hook. f. Fl. Brit. India 6 : 602. 1893 ; Cooke, Fl. Bombay 2 : 864. 1908.

Perennial, rhizomatous, slender, glabrous sedge. Rhizomes very short, woody, with long fibrous rootlets. Culms caespitose, nodose at the base. Leaves shorter than the culm, narrow, 1.2 - 1.5 mm wide, many - nerved. Inflorescence a terminal, globose, dense, white head 0.6 - 0.9 cm in diam. and bearing 8 - 50 spikelets. Bracts 3, narrowly linear, unequal, many - nerved. Spikelets 4 - 5 × 2.5 - 3.0 mm, elliptic, compressed, 10 to 18 - flowered. Glumes *c.* 2.0 × 0.6 mm, oblong - lanceolate, subobtuse, whitish or pale - brown, with hyaline margins. Anthers mucicous. Nuts

6. 0.8 mm long, oblong - ellipsoid, trigonous, shortly - apiculate, granulate. black.

Fl. & Fr. : August - November.

Rare, found among grasses in moist places.

Selected specimens : Kota : Shahabad, *Verma* 644 (BSA) ; Sirohi : Mt. Abu, *Mehta* 534 (JAC).

29. *Cyperus pygmaeus* Rottb. *Descr. et Ic. Rar. Nov. Pl.* 20. t. 14. f. 4 - 5. 1773. *Juncellus pygmaeus* (Rottb.) Clarke in *Hook. f. Fl. Brit. India* 6 : 596. 1893 ; Duthie, *Fl. Gangetic Plain* 3 : 341. 1929. *Cyperus michelianus* (L.) Delile subsp. *pygmaeus* (Rottb.) Asch. & Gracbn. *Synops. Mitteleur. Fl.* 2 (2) : 273. 1903.

Annual, densely tufted sedge, with fibrous roots. Culms erect or patent, often pulvinate, trigonous. Leaves 1 - 3, shorter or slightly longer than the culm, 2 - 20 × 0.1 - 0.3 cm, linear, scabrid on upper margins. Sheaths pale or stained with light or reddish brown. Inflorescence congested in a lobed head, with 3 to many, dense glomerules of spikelets. Bracts 2 - 7, more or less dilated at base, longer than inflorescence. Spikelets 3 - 5 × 1.5 - 2.2 mm, broadly ovate to ovate - lanceolate, strongly compressed, 10 to 20 - flowered, whitish - green. Rachilla weakly flexuous, wingless. Glumes 1.8 - 2.2 × 0.5 mm, lanceolate to elliptic - lanceolate, 3 or 5 - nerved, acute or mucronate. Nuts oblong to oblong - ovate, plano - convex to flattened - trigonous, minutely puncticulate, pale - brown.

Fl. & Fr. : Most part of the year.

Common in damp, sandy or salty soils on the banks of ponds, tanks, rivers etc.

Selected specimens : Ajmer : Todgarh, *Lourie* 4905 A (DD) ; Alwar : Baranviar, *Parmar* 9717 (BSJO) ; Banswara : Barighata R.F., *Singh* 3730 (BSJO) ; Bikaner : Gujner, *Puri* 39788 (BSJO) ; Jaisalmer : Salamsagar, *Shetty* 6172 (BSJO) ; Pali : Ranakpur river - bed, *Pandey* 4144 (BSJO) ; Sirohi : Mt. Abu, *Mehta* 136 (JAC).

30. *Cyperus rotundus* L. *Sp. Pl.* 45. 1753 ; Clarke in *Hook. f. Fl. Brit. India* 6 : 614. 1893 ; Duthie, *Fl. Gangetic Plain* 3 : 332. 1929. 'Motha' (Hindi).

Perennial sedge, with long, slender stolons terminated by an ellipsoid or globose - ovoid tuber. Culms solitary or few together, bearing

corm - like enlargement at base, triquetrous, glabrous. Leaves few at base, usually shorter than the culm, 2 - 5 mm wide, linear. Sheaths light brownish, soon disintegrating into brown parallel fibers. Inflorescence simple or compound, terminal corymb. Spikes turbinate with short rachis, bearing 3 - 10 spikelets. Bracts usually 2 to 5, leafy, as long as the corymb. Spikelets 1.0 - 3.5 × 0.15 - 3.0 mm, linear, acute, compressed with acute edges, 8 to 28 - flowered, dusty - brown. Rachilla with broad, white - hyaline, persistent wings. Glumes 3.0 - 3.5 × 2.0 mm, ovate to ovate - elliptic, folded with subacute keel, light dusty brown with pale margins. Nuts oblong to obovate - oblong, triquetrous, minutely punctulate, brown.

Fl. & Fr. : Almost throughout the year.

Troublesome weed throughout the state in variable habitats.

Selected specimens : Ajmer : *Lourie* 2883 (DD) ; Alwar : *Ita Rana Raund, H. Lal* 34396 (LWG) ; Banswara : Near Paloda village, *Singh* 2838 (BSJO) ; Ganganagar : *Karanpura, Roy* 6440 (BSJO) ; Jaisalmer : Along Miajlar road, *Shetty* 3405 (BSJO) ; Sirohi : Abu road, *McCann* 1374 (BLAT).

31. *Cyperus stoloniferus* Retz. Obs. Bot. 4 : 10. 1786 ; Clarke in Hook. f. Fl. Brit. India 6 : 615. 1893 et Illus. Cyper. t. 19. f. 1 - 3 1909 ; Nair & Malhotra in Bull. Bot. Surv. India 3 : 151. 1962 ; Shah, Fl. Gujarat 2 : 736. 1978.

Perennial sedge, with creeping rhizomes forming ellipsoid or ovoid enlargement at the base of culm, clothed with dusty brown parallel fibres. Culms solitary or 2 together, subrigid, obtusely trigonous. Leaves basal, usually shorter than the culm, 2 - 4 mm wide, linear, folded, more or less recurved. Sheaths pale, split into parallel brown fibers. Inflorescence a simple to sub - compound or congested umbel. Bracts 2 or 3, leafy. Spikes 1.5 - 2.5 cm long, ovate, with 3 - 8 spikelets on short axis. Spikelets 6 - 15 × 1.5 - 2.0 mm, linear - oblong to oblong - lanceolate, 8 to 18 - flowered, yellow, stained with dusty - brown. Rachilla slightly flexuous, widely winged. Glumes densely disposed, 2.2 - 2.7 × 2.0 - 2.3 mm, broadly ovate, obtuse or mucronate at apex, 7 - nerved. Nuts ovate - oval, trigonous, obcompressed, dark - brown.

Fl. & Fr. : Monsoon and post monsoon.

Rare, in wet and marshy habitats. Included on the authority of Nair & Malhotra (*l.c.*) from Sikar district.

32. *Cyperus tenuispica* Steud. Synop. Pl. Glum. 2 : 11. 1855. *Cyperus flavidus sensu* Clarke in Hook. f. Fl. Brit. India 6 : 600. 1893, non Retz. 1879 ; Duthie, Fl. Gangetic Plain 3 : 326. 1929.

Erect or diffuse, tufted annual sedge, with fibrous, red - purple roots. Culms triquetrous. Leaves few at the base of culm, much shorter or equalling the culm, most of them reduced to sub - phyllous sheaths, c. $20 \times 0.2 - 0.4$ cm, linear, uncostate. Sheaths upto 5 cm long, membranous, red - brown. Inflorescence a terminal, compound or decomposed, lax umbel. Bracts 1 - 3, leafy, equalling or longer than the umbels. Spikelets in digitate clusters of 3 to 9, $3 - 12 \times 10 - 15$ mm, linear - oblong, 10 to 40 - flowered, compressed. Rachilla slightly zig-zag, not winged. Glumes $0.8 - 1.0 \times 0.5 - 0.75$ mm, ovate to ovate - oblong, truncate or obtuse at weakly recurved apex, reddish - brown. Nuts orbicular - obovate or oval, obtusely trigonous with convex sides, white or creamy - yellow.

Fl. & Fr. : April - December.

Frequent in marshy and wet habitats in the southern & south eastern parts of the state.

Selected specimens : Banswara : Punapathar forest block, Singh 3670 (BSJO) ; Bhilwara : On the way to Bijolia, Singh 6056 (BSJO) ; Bundi : Kota dam, Singh 90170 (LWG).

33. *Cyperus tuberosus* Rottb. Descr. et Ic. Rar. Nov. Pl. 28. t. 7. f. 1. 1773 ; Clarke in Hook. f. Fl. Brit. India 6 : 616. 1893 *C. rotundus* L. subsp. *tuberosus* (Rottb.) Kuk. in Engl. Pflanzenr. 4(20), Heft 101 : 113. 1936 ; Raizada, Suppl. Duthie, Fl. Gangetic Plain 302. 1976.

Perennial, tall sedge, with long, creeping, slender, stoloniferous rhizomes terminated by a tuber. Culms solitary to few together, trigonous, smooth. Leaves many, shorter than the culm, 3 - 6 mm wide, linear, weakly folded. Sheaths pale, stained with reddish - brown. Inflorescence a simple to partially compound corymb. Spikes turbinate, loosely bearing 2 - 11 spikelets. Bracts 2 or 3, leafy, equalling or shorter than the corymbs. Spikelets patent, $8 - 20 \times 15 - 30$ mm, linear, 8 to 20 - flowered, yellow - brown. Rachilla with broad, white - hyaline wings. Glumes c. 3.5 mm long, elliptic to ovate, rounded at apex, yellowish - brown, conspicuously 7 - nerved. Nuts obovate - oblong, trigonous, half the length of glume, puncticulate, brown.

Fl. & Fr. : August - November.

Common in aquatic and marshy habitats, particularly in the north - western parts of the state.

Selected specimens : Barmer : *Bhandari* 1810, 1852 (JAC) ; Bikaner : Mud village, *Roy* 2092 (BSJO) ; Jaisalmer : *Bhandari* 941, 1032 (JAC) ; Jodhpur : *Bhandari* 1810 (JAC) ; Between Phalodi and Bap, *Blatter* 1953 (BLAT) ; Sirohi : Abu road, *McCann* 1403 (BLAT).

5. ELEOCHARIS R. Br.

- 1a. Annual herbs. Spikelets ovoid or globose, less than 10 mm long :
- 2a. Stigmas 3. Nuts olive or yellowish - brown. ... 3. *E. congesta*
- 2b. Stigmas 2. Nuts black :
- 3a. Orifice of sheaths firm. Hypogynous bristles brownish. Nuts c. 1 mm long. ... 5. *E. geniculata*
- 3b. Orifice of sheaths hyaline. Hypogynous bristles glistening white. Nuts c. 0.5 mm long. ... 2. *E. atropurpurea*
- 1b. Perennial herbs. Spikelets cylindrical or ellipsoid, more than 10 mm long :
- 4a. Glumes membranous, with green keel. Nuts smooth. ... 6. *E. palustris*
- 4b. Glumes sub - rigid, smooth or striate, not keeled. Nuts vertically striate :
- 5a. Culms terete, hollow, transversely septate when dry. ... 4. *E. dulcis*
- 5b. Culms triquetrous, solid, not transversely septate when dry. ... 1. *E. acutangula*

1. *Eleocharis acutangula* (Roxb.) Schult. in Roem. & Schult. Mant, 2 : 91. 1824 ; Raizada, Suppl. Duthie. Fl. Gangetic Plain 306. 1976. *Scirpus acutangulus* Roxb. Fl. Ind. 1 : 216. 1820. *Scirpus fistulosus* Poir. in Lam. Encycl. 6 : 749. 1804, non Forsk. 1775. *Eleocharis fistulosa* (Poir.) Schult. in Roem. & Schult. Mant. 2 : 89. 1824, *nom. eligit.* ; Clarke in Hook. f. Fl. Brit. India 6 : 626. 1893.

Perennial, tufted sedge, with slender stolons often terminated by a small tuber. Culms erect, sharply triquetrous. Basal sheaths 3 or 4, the lower ones scale - like, brownish, the uppermost pale green. Spikelets cylindrical, 2 - 4 × 0.3 - 0.4 cm, subacute at apex, obtusely angular, loosely many - flowered, pale - green. Glumes 4 - 5 mm long, ovate to ovate - elliptic, rounded at apex, uncostate, margins narrowly hyaline. Nuts 1.5 - 2.0 × 1.4 mm, compressed - triangular, apex contracted to

an annular neck. Hypogynous bristles 6, surpassing the style - base, rigid, retrorsely spinulose - scabrous.

Fl. & Fr. : November - April.

Rare, in aquatic or marshy habitats in the southern parts of the state.

Selected specimen : Dungarpur : Sagwara, *Kanodia* 82166 (BSI).

2. *Eleocharis atropurpurea* (Retz.) Presl, Reliq. Haenk. 1 : 196. 1828 ; Clarke in Hook. f. Fl. Brit. India 6 : 627. 1893 et Illus. Cyper. t. 36. f. 6 - 9. 1909. *Scirpus atropurpureus* Retz. Obs. Bot. 5 : 14. 1789. *Heleocharis atropurpurea* (Retz.) Kunth, Enum. 2 : 151. 1837 ; Duthie, Fl. Gangetic Plain 3 : 348. 1929.

Annual, tufted sedge, with fibrous roots. Culms capillary to filiform, finely channelled. Leaves absent. Basal sheaths membranous, pale, often reddish - tinged at base, orifice obliquely truncate. Spikelets 3 - 5 × 2.0 - 2.5 mm, ovate to ovate - oblong, sub - acute at apex, densely many - flowered, purplish or reddish. Glumes 1.3 - 1.5 mm long, elliptic, obtuse at apex, mid - vein green and broad. Nuts 0.4 - 0.6 mm long, obovate - obdeltoid, thickly biconvex, rounded - truncate at apex. Hypogynous bristles 4 or 5, slender, whitish, surpassing the achene, sparsely spinulose.

Fl. & Fr. : September - April.

Common in marshy places throughout the state.

Selected specimens : Banswara : Punapathar forest block, *Singh* 3667 (BSJO) ; Bhilwara : On the way to Bijolia, *Singh* 6051 (BSJO) ; Bikaner : Gajner game sanctuary, *Roy* 2470 (BSJO) ; Jaisalmer : Mahelai tank, *Tiwari* 754 (BSJO) ; Jhalawar : *Majumdar* 10099 (BSA) ; Jodhpur : Agolai tank, *Shetty* 303 (BSJO).

3. *Eleocharis congesta* D. Don, Prodr. Fl. Nepal. 41. 1825 ; Clarke in Hook. f. Fl. Brit. India 6 : 630. 1893 ; Raizada, Suppl. Duthie, Fl. Gangetic Plain 307. 1976.

Annual or short - lived perennial, densely tufted sedge. Culms slender, subrigid, terete to weakly angular, deep green. Sheaths appressed, membranous, reddish to purplish at base, pale above, orifice transversely to obliquely truncate at apex and with a minute mucro. Spikelets 6 - 11 × 2.5 - 3.0 mm, ovate - oblong to ovate or lanceolate, densely many - flowered, often proliferous at base, pale, ferruginous, often tinged with red. Glumes tightly imbricate, 1.5 - 2.5 × 0.7 - 0.9 mm, oblong - ovate to lanceolate, rounded at apex, pale - brown with white hyaline margins. Nuts

0.8 - 1.2 × 0.5 - 0.6 mm, obovate, trigonous, obtuse on edges, contracted at apex. Hypogynous bristles 6, whitish to ferruginous, longer than the nut, retrorsely scabrid.

Fl. & Fr. : December - March.

Rare, in marshy places near water courses.

Selected specimen : Jodhpur : Banganga river - bed, Singh 3523 (BSJO).

4. *Eleocharis dulcis* (Burm. f.) Trin. ex Hensch. Vita Rumph. 186. 1833. *Andropogon dulce* Burm. f. Fl. Ind. 219. 1768. *Scirpus plantagineus* Retz. Obs. Bot. 5 : 14. 1799. *Eleocharis plantaginea* (Retz.) Roem. & Schult. Syst. Veg. 2 : 150. 1817 ; Clarke in Hook. f. Fl. Brit. India 6 : 625. 1893 ; Duthie, Fl. Gangetic Plain 3 : 348. 1929.

Perennial sedge, with elongated stolons terminated by a small tuber. Culms many, tufted, terete, deep green. Basal sheaths few, membranous, usually red brown, orifice truncate. Spikelets cylindrical, 2 - 5 × 0.3 - 0.4 cm, subobtusate at apex, terete, many-flowered, whitish to pale. Glumes 5.0 - 6.5 × 1.5 - 3.2 mm, elliptic to elliptic-oblong or oblong-obovate, obtuse or rounded-truncate at apex, whitish, margins hyaline, narrow. Nuts 1.7 - 2.2 × 1.5 - 1.8 mm, obovate, biconvex with obtuse angles, yellow or greyish brown, faintly cancellated with minute epidermal cells. Hypogynous bristles 6 - 8, unequal, twice as long as the nut, filiform, compressed towards free base, retrorsely spinulose-scabrous above the base.

Fl. & Fr. : August - December.

Occasionally found in the eastern parts of the state in swampy areas.

Selected specimens : Bharatpur : Ghana Bird sanctuary, Parmar 8702 (BSJO) ; Bhilwara : Jahajpur, Singh 5723 (BSJO) ; Chittorgarh : Near Kalyanpur, Singh & Pandey 7265 (BSJO).

5. *Eleocharis geniculata* (L.) Roem & Schult. Syst. Veg. 2 : 150. 1817. *Scirpus geniculatus* L. Sp. Pl. 1 : 48. 1753. *Eleocharis capitata* R. Br. Prodr. Fl. Nov. Holl. 1 : 225. 1810 ; Clarke in Hook. f. Fl. Brit. India 6 : 627. 1893 ; Cooke, Fl. Bombay 2 : 889. 1908.

Tufted, annual sedge, with fibrous roots. Culms filiform but not soft, pale or slightly glaucous green. Basal sheaths herbaceous, pale green, often tinged with purplish-red on lower part, orifice rigid and transversely to obliquely truncate at apex. Spikelets 3 - 7 × 3 - 4 mm, ovate-globose

to ovoid ellipsoid, rounded at base, obtuse at apex, reddish ferruginous, densely many flowered. Glumes 1.8-2.0 mm long, patent, broadly elliptic to ovate oval, membranous, obtuse at apex, pale brownish. Nuts c. 1.0×0.8 mm, broadly obovate, thickly biconvex, black. Hypogynous bristles 6-8, ferruginous, slightly longer than nut, sparingly retrorsely spinulose.

Fl. & Fr. : December - April.

Common, particularly in the eastern parts of the state in marshy habitats.

Selected specimens : Banswara : Lahoria, Singh 4251 (BSJO) ; Bhilwara : Ganthila, Singh 7108 (BSJO) ; Jodhpur : Bilara - Banganga river - bed, Singh 4429 (BSJO) ; Kota : Verma 482 (BSA).

6. *Eleocharis palustris* (L.) R. Br. Prodr. Fl. Nov. Holl. 1 : 224. 1810 *emend.* Roem. & Schult. Syst. Veg. 2 : 151. 1817, *sp. aggr.* ; Clarke in Hook. f. Fl. Brit. India 6 : 628. 1893. *Scirpus palustris* L. Sp. Pl. 1 : 47. 1753. *Heleocharis palustris* (L.) R. Br. l.c. 1 : 224. 1810 ; Duthie, Fl. Gangetic Plain 3 : 348. 1929.

Tufted, stoloniferous sedge. Culms longitudinally striate. Basal sheaths membranous, truncate or somewhat produced as a small triangular limb. Spikelets 10-25 mm long, ellipsoid or cylindrical, wider than the stem, yellow to brown. Rachilla stout. Glumes c. 5 mm long, much imbricated, ovate lanceolate or elliptic, keel green, margins broad, hyaline or brown. Nuts c. 2 mm long, broadly obovoid, biconvex, tipped by broad conical style base which is nearly half as long as the nut, pale-brown. Hypogynous bristles 4-6, as long as nut, retrorsely scabrid, brown.

Fl. & Fr. : January - April.

Rare, found in marshy places in the north-east and south-eastern parts of the state.

Selected specimen : Kota : Atru, Singh 74785 (LWG).

6. ERIOPHORUM L.

Eriophorum comosum (Wall.) Wall. ex Clarke in Hook. f. Fl. Brit. India 6 : 664. 1893 ; Duthie, Fl. Gangetic Plain 3 : 336. 1929 ; Koyama in Hara *et al.* Enum. Flow. Pl. Nepal. 1 : 110. 1978. *Scirpus comosus* Wall. in Roxb. Fl. Ind. 1 : 234. 1820.

Perennial, tufted, slender sedge, with short woody rhizomes. Culms terete below, trigonous above. Leaves clustered towards the base, equal or longer than the culm, 1.5 - 4.0 mm broad. Sheaths castaneous, glossy, ultimately fibrous. Inflorescence a terminal decomposed umbel bearing numerous spikelets. Bracts many, foliaceous, much exceeding the inflorescence. Spikelets usually all solitary, 3 - 7 × 1.0 - 1.5 mm, ellipsoid-oblong, obtuse, reddish-brown, 18 to 25-flowered. Rachilla persistent, wingless. Glumes 2.5 - 3.0 mm long, oblong-lanceolate, acute or mucronate, keeled. Nuts 2.6 - 2.8 mm long, ellipsoid, trigonous, beaked, dusty-black. Hypogynous bristles 4 times as long as the achenes.

Fl. & Fr. : February - August.

Occasionally found in rock-crevices near streams, particularly in the north-eastern parts of the state.

Selected specimens : Alwar : Pandupole, *Parmar* 9489 (BSJO); Jaipur : Ramgarh, *Sharma* 1805 (RUBL); Jalore : Sundahill, *Shetty* 6721 (BSJO); Sirohi : Mt. Abu, *McCann* 5890 (BLAT); Abu road, *Blatter* 1982, 3856 (BLAT).

7. FIMBRISTYLIS Vahl *nom. cons.*

- 1a. Stigmas 2. Nuts biconvex or oblong - cylindrical :
- 2a. Nuts oblong - cylindrical. ... 19. *F. tetragona*
- 2b. Nuts biconvex :
- 3a. Glumes hairy at least in the apical part :
- 4a. Lower sheaths coriaceous, castaneous. Blades of cauline leaves c. 10 × 0.15 cm. Involucre bracts usually shorter than the inflorescence. Glumes pubescent, ferruginous. ... 9. *F. ferruginea*
- 4b. Lower sheaths herbaceous, stramineous or ferruginous. Blades of cauline leaves c. 30 × 0.2 cm. Involucre bracts usually overlapping the inflorescence. Glumes densely tomentose, dark-brown. ... 15. *F. sieberiana*
- 3b. Glumes glabrous :
- 5a. Inflorescence head-like :
- 6a. Glumes conspicuously 3-nerved. Styles glabrous. ... 2. *F. argentea*
- 6b. Glumes 5 to 7-nerved. Style fimbriate. ... 14. *F. schoenoides*

5b. Inflorescence open, corymbose :

7a. Style dorsiventrally flattened, firm-briate or long ciliate at least in the upper part :

8a. Ligule of a ciliate auricle or a fringe of pubescence :

9a. Spikelets 2 - 4 mm wide. Glumes usually with 2 - 4 lateral nerves :

10a. Style - base conical. Stamens usually 2. ... 6. *F. dichotoma* subsp. *dichotoma*

10b. Style - base inconspicuous. Stamen usually 1. ... 7. *F. dichotoma* subsp. *podocarpu*

9b. Spikelets 1.2 - 1.8 mm wide. Glumes usually without distinct lateral nerves. ... 3. *F. bisumbellata*

8b. Ligule absent :

11a. Style - base pilose with silky hairs. ... 16. *F. squarrosa*

11b. Style - base glabrous. ... 1. *F. aestivalis*

7b. Style laterally flattened, glabrous. ... 5. *F. cymosa* subsp. *spathacea*

1b. Stigmas usually 3. Nuts triquetrous or trigonous :

12a. Glumes 2 - ranked, at least in the lower part of a spikelet. ... 11. *F. ovata*

12b. Glumes spirally imbricate :

13a. Plants with long, slender, creeping stolons. ... 12. *F. picrotii*

13b. Plants not stoloniferous, occasionally with horizontal rhizomes :

14a. All leaves at culm - base with blade :

15a. Leaves with a ligule of a series of pubescence. ... 4. *F. complanata*

15b. Leaves without ligules :

16a. Rhizome thick, oblique. Leaves somewhat rosette-like, recurved. Glumes pubescent or glabrescent with highly convex keel. ... 8. *F. falcata*

- 16b. Rhizome very short or inconspicuous. Leaves erect, not rosette-like. Glumes glabrous, pubescent on the upper half with short glandular hairs, keel acute :
- 17a. Glumes glabrous on margins. ... 18. *F. tenera* var. *oxylepis*
- 17b. Glumes glandular pubescent on the margins. ... 17. *F. tenera* var. *tenera*
- 14b. Some of the leaves at culm-base reduced to bladeless sheaths :
- 18a. Culms compressed, tetragonal. Leaves laterally flattened. Rachilla deeply pitted after the fall of glumes. ... 10. *F. miliacea*
- 18b. Culms acutely pentagonal. Leaves dorsiventrally flattened. Rachilla ragged with scale-like wing after the fall of glumes. ... 13. *F. quinquangularis*

1. *Fimbristylis aestivalis* (Retz.) Vahl, Enum. Pl. 2 : 288. 1805 ; Clarke in Hook. f. Fl. Brit. India 6 : 637. 1893 ; Duthie, Fl. Gangetic Plain 3 : 352. 1929. *Scirpus aestivalis* Retz. Obs. Bot. 4 : 12. 1786.

Small, annual, densely tufted sedge. Culms trigonous, smooth, few leaved at base. Leaves narrowly linear, much shorter than the culm, sub acute at apex, sparsely pilose on both surfaces ; ligule absent. Sheaths pubescent with spreading hairs, pale green to yellowish brown. Inflorescence a terminal, decomposed umbel. Bracts 2 or 3, filiform, unequal. Spikelets solitary, 2.5 - 6.0 × 1.0 - 1.5 mm, lanceolate ovate or lanceolate-oblong, suberect, densely 10 to 40-flowered. Glumes 1.0 - 1.2 × 0.6 - 0.8 mm, ovate, boat-shaped, keeled, mucronate or cuspidate at apex, lower ones often hairy on green keel, finely 3-nerved, yellowish-brown. Nuts 0.5 - 0.6 × 0.3 - 0.4 mm, obovate, thickly biconvex, rounded at apex, shortly stipitate at cuneate base, smooth or faintly concellated, yellowish.

Fl. & Fr. : August - January.

Occasionally found in aquatic or marshy places.

Selected specimens : Kota : Chhabra, Singh 90632, 90910 (LWG). Also reported from Bikaner (Joshi, 1956).

2. *Fimbristylis argentea* (Rottb.) Vahl, Enum. Pl. 2 : 294. 1805 ; Clarke in Hook. f. Fl. Brit. India 6 : 640. 1893 ; Cooke, Fl. Bombay 2 : 881. 1908. *Scirpus argenteus* Rottb. Progr. 27. 1772 et Descr. et Ic. Rar. 51. t. 17. f. 6. 1773.

Densely tufted, glaucous, glabrous sedge, with very short rhizome and dark - brown fibrous roots. Culms many, slender, subrigid, trigonous, filiform, striate. Leaves weakly recurved, shorter than culm, glabrous, 3 - 20 × 0.5 - 1.0 mm, narrowly linear, canaliculate, acute. Inflorescence a terminal head, bearing 8 - 35 spikelets. Bracts 3 - 5, leafy, spreading. Spikelets 3.5 - 6.5 × 1.0 - 1.5 mm, narrowly oblong, terete, obtuse at both ends, many - flowered. Glumes 3 - 4 × 1.5 - 2.0 mm, ovate, obtuse, with strong green keel on back ; keel 3 - nerved. Stamen one. Nuts orbicular - obovoid, biconvex, shortly stipitate at base, with narrow acute margins, umbonate, straw - coloured.

Fl. & Fr. : August - December.

Rare, in wet and marshy habitats. Included on the authority of Vyas (1965) from Udaipur.

3. *Fimbristylis bisumbellata* (Forsk.) Bubani, Dodecanth. 30. 1850. *Scirpus bisumbellatus* Forsk. Fl. Aegypt - Arab. 15. 1775. *Fimbristylis dichotoma* auct. non Vahl, 1806 ; Nees in Wight, Contr. Bot. India 101. 1834 ; Clarke in Hook. f. Fl. Brit. India 6 : 635. 1893 ; Duthie, Fl. Gangetic Plain 3 : 351. 1929 ; Mahesh. Ill. Fl. Delhi f. 223. 1966.

Densely tufted, annual sedge. Culms slender, trigonous, striate, with few basal leaves. Leaf - blades 5 - 20 × 0.05 - 0.15 mm, narrowly linear, blunt at apex, flattish with weakly incurved margins. Sheaths 1 - 3 cm long, pale - greenish, pubescent ; ligule a fringe of loose hairs. Corymbs compound to decomposed, bearing many spikelets. Rays 4 - 10, filiform, unequal. Bracts leafy, 1 - 3, unequal. Spikelets solitary, 2 - 6 × 1.2 - 1.6 mm, ovate - oblong, densely 10 to 30 - flowered, yellow - brown. Glume 1.0 - 1.8 × 0.7 - 1.0 mm, broadly ovate, boat - shaped, with ridged keel, yellowish - brown ; keel greenish, 3 - nerved, excurrent into a recurved mucro. Nuts 0.5 - 0.8 mm long and as wide, broadly ovate, thickly biconvex, rounded at apex, light yellow.

Fl. & Fr. : August - April.

Common in marshy habitats.

Selected specimens : Ajmer : Jain 49696 (BSI) ; Banswara : Ghatol, Singh 2901 (BSJO) ; Bharatpur : Near Kanwah, Parmar 8682 (BSJO) ;

Jodhpur : Luni river - bed, *Singh* 3528 (BSJO) ; Pali : Ghanerao R.F., *Pandey* 4642 (BSJO) ; Sirohi : Mt. Abu, *Kanodia* 62192 (BSI).

4. *Fimbristylis complanata* (Retz.) Link, Hort. Berol. 1 : 292. 1827 ; Clarke in Hook. f. Fl. Brit. India 6 : 646. 1893 ; Duthie, Fl. Gangetic Plain 3 : 356. 1929. *Scirpus complanatus* Retz. Obs. Bot. 5 : 14. 1789.

Perennial sedge, with horizontal rhizomes clothed with brown scales and fibers. Culms closely arranged in a row along rhizome or more or less tufted, flattened - trigonous, glabrous, narrowly winged above. Leaves few to many, flat, with incurved margins, 2 - 5 mm wide, whitish above, light - green beneath. Sheaths laterally compressed, with sharply keeled back, straw - coloured. Corymbs compound or decompound. Rays 2 - 5. Bracts half as long as the corymb. Spikelets 4 - 9 × 1 - 2 mm, oblong to ovate - lanceolate, acute at apex, rusty - brown, 5 to 20 - flowered. Glumes 1.8 - 2.5 mm long, mucronate at apex, chartaceous, yellow - brown to brown, keeled ; keel green, one - nerved. Nuts 0.5 - 0.7 × 0.3 - 0.4 mm, broadly - obovate, trigonous, milky - white.

Fl. & Fr. : August - December.

Rare, in marshy habitats, particularly in the south - western parts of the state.

Selected specimen : Udaipur : Nal, *Kanodia* 82400 (BSI).

5. *Fimbristylis cymosa* R. Br. subsp. *spathacea* (Roth) Koyama in *Micronesica* 1 : 83. 1964. *F. spathacea* Roth, Nov. Pl. Sp. 24. 1821 ; Clarke in Hook. f. Fl. Brit. India 6 : 640. 1893 ; Duthie, Fl. Gangetic Plain 3 : 352. 1929.

Densely tufted, perennial sedge, with short rhizomes. Culms erect, obtusely trigonous, glabrous. Leaves many, forming rosette, much shorter than the culm, 5 - 30 × 0.1 - 0.4 cm, narrowly linear, patent to recurved, scabrous on the upper margins. Sheaths whitish or cinnamon - coloured ; ligule absent. Inflorescence varying from simple to compound open corymb. Rays, when present, 2 - 6. Bracts 1 - 3, shorter than the corymb. Spikelets solitary to clustered, 2 - 5 × 1 - 2 mm, oblong - elliptic to ovate - oblong, obtuse, many - flowered, light - brown. Glumes 1.0 - 1.5 × 0.5 - 0.7 mm, ovate to broadly ovate, obtuse, membranous, brown with broad white hyaline margins ; keel obtuse, obscurely 3 or 5 - nerved. Nuts 0.7 - 1.0 × 0.5 mm, obovate, thickly biconvex, dark - brown.

Fl. & Fr. : July - February.

Occasionally found in the aquatic and marshy places, particularly in the eastern part of the state.

Selected specimens : Ajmer : Jawaja, *Duthie* 4920 (DD) ; Bhilwara ; On the way to Bijolia, *Singh* 6504 (BSJO) ; Jaipur : Chaksu, *Sharma* 1718 (RUBL) ; Jodhpur : Near Pichiyak, *Singh* 4450 (BSJO) ; Sirohi : Abu road, *McCann* 1401 (BLAT).

6. *Fimbristylis dichotoma* (L.) Vahl, Enum. Pl. 2 : 287. 1805. *Scirpus dichotomus* L. Sp. Pl. 50. 1753. *S. diphylla* Retz. Obs. Bot. 5 : 15. 1789. *Fimbristylis diphylla* (Retz.) Vahl, Enum. Pl. 2 : 289. 1805 ; Clarke in Hook. f. Fl. Brit. India 6 : 636. 1893 ; Duthie, Fl. Gangetic Plain 3 : 351. 1929.

subsp. *dichotoma*

Annual or short - lived perennial, tufted sedge. Rhizome very short or absent. Culms erect or ascending, trigonous, smooth. Leaves few to many, usually half the length of culm, 10 - 30 × 0.15 - 0.5 mm, narrowly linear, herbaceous, obtuse, several - veined ; ligule a fringe of dense white hairs. Sheaths cylindrical. Corymbs simple, compound or decompound, bearing 2 - many spikelets. Bracts 2 - 7, lower one or two leafy, shorter or longer than the corymb. Spikelets solitary or in clusters of 2 to 10, 3 - 10 × 2.5 - 3.0 mm, ovoid to ovoid - ellipsoid, terete, subacute, densely many - flowered. Glumes 1.5 - 2.7 × 1.5 - 2.2 mm, broadly ovate, suborbicular, deeply boat - shaped, pale - brownish, nerveless or 2 to 4 - nerved on both side of keel towards base. Nuts 0.7 - 1.2 mm long, obovate, cream - coloured, each side cancellated with 7 - 13 rows of transversely oblong cells.

Fl. & Fr. : Almost throughout the year.

Occasional, found in moist places throughout the state.

Selected specimens : Ganganagar : Kumbharwali, *Roy* 4929 (BSJO) ; Jaisalmer : *Blatter* 2905 (BLAT) ; Jhalawar : Manokarthana, *Singh* 74464 (LWG) ; Jodhpur : *Bhandari* 820 (JAC) ; Sirohi : Abu road, *McCann* 159 (BLAT).

7. subsp. *podocarpa* (Nees & Meyen ex Nees) Koyama in *Micronesica* 1 : 87. 1964. *Fimbristylis podocarpa* Nees & Meyen ex Nees in *Wight, Contrib. Bot. India* 98. 1834, includ. var. α , β & γ ; Clarke in Hook. f. Fl. Brit. India 6 : 638. 1893 ; Duthie, Fl. Gangetic Plain 3 : 353. 1929.

Annual or short - lived perennial sedge. Culms erect or ascending, soft to rigid, trigonous, glabrous or sparsely pilose, leaved at base. Leaves few to several, 10 - 30 × 0.15 - 0.5 mm, about half the length of culm, narrowly linear. Corymbs simple or compound, bearing 2 - many spikelets.

Spikelets 2.5 - 4.0 mm wide, solitary or in clusters, many-flowered. Glumes 1.5 - 2.7 × 1.5 - 2.2 mm, ovoid to ovoid-ellipsoid, sometimes suborbicular, boat-shaped, pale-brown with brown striae. Nuts 1.2 - 1.5 mm long excluding gynophore, orbicular-ovate, thickly biconvex, each side cancellate by 15 - 24 series of transversely oblong hexagonal cells; gynophore obdeltoid; style strongly flattened, tapering from base to apex.

Fl. & Fr. : Almost throughout the year.

Rare, in wet and low-lying areas. Included on the authority of Vyas (1966, 67) from Alwar.

8. *Fimbristylis falcata* (Vahl) Kunth, Enum. Pl. 2 : 239. 1837. *Scirpus falcatus* Vahl, Enum. Pl. 2 : 275. 1805. *Trichelostylis junciformis* Nees in Wight, Contrib. Bot. India 106. 1834. *Fimbristylis junciformis* (Nees) Kunth, Enum. 2 : 239. 1837; Clarke in Hook. f. Fl. Brit. India 6 : 647. 1893; Duthie, Fl. Gangetic Plain 3 : 357. 1929.

Perennial, solitary or somewhat tufted sedge. Rhizomes woody, thickly clothed with brown leaf-sheaths. Culms slender, trigonous, smooth. Leaves many, rosette-like; blades recurved, falcate, shorter than the culm, 1.5 - 5.0 × 0.3 - 0.5 mm, flat with incurved margins, 7 to 15-nerved, smooth except on spinulose-scabrid upper margins. Corymbs compound, bearing many spikelets. Spikelets solitary, paired or in clusters of 3 - 5 at the end of final raylets, 4.0 - 5.5 × 1.8 - 2.2 mm, ovate or ovate-elliptic, many-flowered, brown. Glumes 2.0 - 2.5 × 1.2 - 2.0 mm, broadly deltoid-ovate or broadly ovate, boat-shaped, with highly convex keel, brown, dorsally 5 to 7-nerved; keel 3-nerved. Nuts 0.6 - 0.9 × 0.5 - 0.6 mm, obdeltoid-obovate, trigonous, rounded at apex, yellow or yellow-brown.

Fl. & Fr. : July - September.

Rare, in marshy habitats in rice field etc., particularly in the south-eastern parts of the state.

Selected specimen : Kota; Kelwara, Singh 74764 (LWG).

9. *Fimbristylis ferruginea* (L.) Vahl, Enum. Pl. 2 : 291. 1805; Clarke in Hook. f. Fl. Brit. India 6 : 638. 1893; Duthie, Fl. Gangetic Plain 3 : 354. 1929. *Scirpus ferrugineus* L. Sp. Pl. 50. 1753.

Perennial, tufted sedge, with shortly creeping, woody rhizomes. Culms rigid, striate, compressed, trigonous. Leaves 3 - 10 × 0.06 - 0.25 mm, narrowly linear, much shorter than the culm, canaliculate to involute-margined, spinulose-scabrous on margins. Corymbs simple or sub-

compound, usually compact, bearing 3 - 15 spikelets. Bracts 1 - 3, usually shorter than the corymbs, unequal. Spikelets solitary, 5 - 15 × 3 - 4 mm, ovoid to oblong - ovoid, terete, acute, many - flowered. Glumes 3.5 - 4.5 × 2.0 - 2.5 mm, broadly ovate - elliptic or ovate, boat - shaped, with subacute keel; keel one - nerved. Nuts broadly obovate, unequally biconvex, 1.0 - 1.2 × 0.7 - 0.8 mm, light orange - brown.

Fl. & Fr. : August - December.

Common throughout the state in marshy habitats.

Selected specimens : Ajmer : Bhim to Todgarh, *Duthie* 4916 (DD) ; Jaipur : Ramgarh, *Sharma* 2176 (RUBL) ; Jodhpur : Kailana, *Blatter* 2899 (BLAT) ; Kota : Shahabad, *Verma* 697 (BSA) ; Pali : Jawai dam, *Shetty* 1438 (BSJO) ; Sirohi : Abu road, *McCann* 1397 (BLAT).

10. *Fimbristylis miliacea* (L.) Vahl, Enum. Pl. 2 : 287. 1805 ; Clarke in Hook. f. Fl. Brit. India 6 : 644. 1893 ; Duthie, Fl. Gangetic Plain 3 : 356. 1929. *Scirpus miliaceus* L. Syst. Veg. ed. 10. 868. 1759. *F. littoralis* Gaud. in Frey. Voy. Bot. 413. 1826.

Erect, annual or perennial sedge, with many flowering culms and few sterile leafy culms. Rhizomes, if present, short, woody. Flowering culms usually leafless or with a solitary basal leaf. Leaves many, with thick margins. Sheath of the flowering culms inflated with short acute tip. Corymbs lax, decomposed or supra - decomposed, bearing few to many spikelets. Bracts usually short, leafy. Spikelets usually solitary, 2 - 5 × 1.2 - 2.0 mm, ovoid or ovoid - oblong, acutish, 6 to 16 - flowered. Rachilla after the fall of the glumes deeply pitted, the edges of the areole pale and very short. Glumes 1 - 2 × 0.6 - 1.0 mm, boat - shaped, mucronate, pale to dark - brown, keeled. Nuts 0.4 - 0.8 × 0.3 - 0.5 mm, obovoid or suborbicular, trigonous, shortly stipitate, verruculose, cream - yellow.

Fl. & Fr. : July - December.

Common throughout the state in moist and swampy places.

Selected specimens : Alwar : Minak forest block, *Parmar* 9622 (BSJO) ; Banswara : Near Lasara village, *Singh* 3616 (BSJO) ; Jaipur : Chaksu, *Sharma* 1744 (RUEL) ; Jodhpur : *Singh* 3231 (BSJO) ; Kota : *Jain* 28739 (BSI) ; Sirohi : Abu road, *McCann* 1395 (BLAT).

11. *Fimbristylis ovata* (Burm. f.) Kern in Blumea 15 : 126. 1967. *Carex ovata* Burm. f. Fl. Ind. 194. 1768. *Cyperus monostachyos* L. Mant. Pl. 2 : 180. 1771. *Fimbristylis monostachya* (L.) Hassk. Pl. Jav. Rar. 61. 1848 ; Clarke in Hook. f. Fl. Brit. India 6 : 649. 1893 ; Duthie, Fl. Gangetic Plain 3 : 355. 1929.

Perennial, densely tufted sedge, with short, knotty rhizomes. Culms erect, slender or filiform, spinulose - scabrous on upper angles. Leaves many, basal, about $\frac{2}{5}$ - $\frac{2}{3}$ the length of culm, linear, acute or acuminate. Sheaths short, with scarious margins. Inflorescence a single terminal spikelet or rarely two. Bracts 2 or 3, scale - like. Spikelet 8 - 15 \times 3 - 7 mm, ovate, acute or subacute at apex, 8 to 20 - flowered, pale straw - coloured. Glumes 3 - 6 \times 2 - 4 mm, coriaceous, ovate to broadly ovate, with an acute keel, mucronate at apex, pale yellowish. Nuts 2.0 - 2.5 \times 1.2 - 1.5 mm, broadly obovate, trigonous, rounded at apex, verruculose, straw - coloured.

Fl. & Fr. : August - November.

Occasionally found in sandy moist habitats near river banks, ponds etc.

Selected specimens : Banswara : Ghatol, Singh 2947 (BSJO) ; Bhilwara : Nahar Sagar, Singh 5749 (BSJO) ; Jaipur : Beragaon, Sharma 1908 (RUBL) ; Digotha, Sharma 3736 (RUBL) ; Jhalawar : Manohar-thana, Singh 83930 (LWG).

12. *Fimbristylis pierotii* Miq. in Ann. Mus. Lugd. Bat. 2 : 145. 1865 ; Clarke in Hook. f. Fl. Brit. India 6 : 642. 1893.

Stoloniferous, glabrous sedge. Stolons c. 5 cm long, densely clothed with lanceolate, striate scales, finally hardening into a woody rhizome. Culms about 30 cm long, somewhat slender. Leaves about half the length of culm, flat, acute. Inflorescence a simple or once compound umbel, bearing 5 - 14 spikelets. Bracts short. Spikelets c. 8 \times 6 mm, ellipsoid - lanceolate, 10 - flowered. Glumes adpressed, ovate, boat - shaped, shortly acuminate, usually with round glands in upper half, margins scarious, chestnut brown. Style 3 - fid, glabrous. Nuts obovoid, trigonous, sub - pyramidal at apex, laxly reticulate, smooth or somewhat tubercled, straw - coloured.

Fl. & Fr. : August - November.

Rare, in moist places in the north - eastern parts of the state.

Selected specimen : Jaipur : Doasa, Duthie 6087 (DD).

13. *Fimbristylis quinquangularis* (Vahl) Kunth, Enum. Pl. 2 : 229. 1837 ; Clarke in Hook. f. Fl. Brit. India 6 : 644. 1893 ; Duthie, Fl. Gangetic Plain 3 : 356. 1929. *Scirpus quinquangularis* Vahl, Enum. Pl. 2 : 279. 1805.

Annual or biennial sedge, with short rhizomes densely tufted with fibrous roots. Culm - sheaths bladeless, subterete, straw - coloured. Leaves linear, usually shorter than the subtending culm. Corymbs compound to decompound, bearing 3 - 30 spikelets. Bracts 3 - 5, setaceous, much shorter than the rays. Spikelets 2 - 5 \times 1.2 - 1.7 mm, solitary, sub - ovoid, obtuse to subacute, 20 to 40 - flowered, rusty - brown. Glumes 1.3 - 1.8 \times 0.8 - 1.0 mm, ovate, rounded or sometimes with mucronate apex, membranous, rusty - brown; keel subtrinnerved. Rachilla after the fall of the glumes ragged with small black scales. Nuts c. 0.8 \times 0.5 mm, obovate, trigonous, minutely tuberculate, pale - brown or whitish.

Fl. & Fr. : August - April.

Common in moist and marshy places near river - beds, ponds, ditches etc.

Selected specimens : Alwar : Bandipul, *Parmar* 9675 (BSJO); Barmer : Haldeshwar Mahadev R.F., *Pandey* 8035 (BSJO); Jaisalmer : Rann near Ramgarh, *Tiwari* 813 (BSJO); Jodhpur : Luni river - bed, *Singh* 4467 (BSJO); Tonk : Tordisagar, *Shetty* 1318 (BSJO).

Notes : Very similar to *F. miliacea* (L.) Vahl, but easily separable by its pentagonal culms, leaves not at all laterally compressed, rachilla after the fall of glumes ragged with scale - like wings.

14. *Fimbristylis schoenoides* (Retz.) Vahl, Enum. Pl. 2 : 286. 1805; Clarke in Hook. f. Fl. Brit. India 6 : 634. 1893; Duthie, Fl. Gangetic Plain 3 : 350. 1929. *Scirpus schoenoides* Retz. Obs. Bot. 5 : 14. 1789. "Motinga" (Hindi).

Annual or short - lived perennial tufted sedge, rarely with a small, woody rhizome. Culms slender, trigonous, striate, leaved at base. Leaves few, 2 - 16 \times 0.05 - 0.1 cm, filiform, shorter than the culm, inrolled - margined. Sheaths minutely spotted with cinnamon - brown on ventral side, membranous. Inflorescence of 1 - 4 spikelets. Rays 1 - 3 cm long, each terminated by a single spikelet. Bracts 1 or 2, setaceous. Spikelets 5 - 10 \times 3 - 4 mm, ovoid to ellipsoid, acute at apex, obtuse at base, many - flowered, orange - brown. Glumes 2.5 - 3.0 \times 2 - 3 mm, ovate - orbicular, with obtuse keel, distinctly 5 to 7 - nerved on back, margins membranous. Nuts ovate - orbicular, biconvex, rounded at apex, yellowish - white.

Fl. & Fr. : August - December.

Common in marshy habitats on the bank of tanks, ponds etc, particularly in the east of Aravalli.

Selected specimens : Banswara : Chirola, Singh 3749 (BSJO) ; Bhilwara : Meja dam, Singh 6038 (BSJO) ; Jhalawar : Sachod, Wadhwa 3579 (BSA) ; Sirohi : Mt. Abu, Rao 66625 (BSI), Mehta 1471 (JAC) ; Tonk : Saroi village, Shetty 1223 (BSJO) ; Udaipur : Khamblihat, Kanodia 82397 (BSI).

15. *Fimbristylis sieberiana* Kunth, Enum. Pl. 2 : 237. 1837 ; Kern in Blumea 8 : 131. 1955 ; Shah & Suryanarayan in Journ. Bombay Nat. Hist. Soc. 66 : 412 - 414. 1959 ; Raizada, Suppl. Duthie, Fl. Gangetic Plain 312. 1976. *F. ferruginea* (L.) Vahl var. *sieberiana* (Kunth) Boeck. in Linnaea 37 : 17. 1871.

Perennial sedge, with small woody rhizomes. Culms tufted, rigid, striate. Cauline leaves well developed, flat, upto $35 \times 0.15 - 0.2$ cm ; lower sheaths herbaceous, laminiferous, stramineous or ferrugineous, Sheath of cauline leaves pilose, at least at the apex, more or less glabrescent. Lower involucre bracts as long or longer than the inflorescence. Inflorescence simple or subcompound. Spikelets $5 - 20 \times 3 - 4$ mm, obtuse, many-flowered, dull-brown. Glumes 3.0 - 4.5 mm long and as wide, very broadly ovate, densely tomentose in the apical part, usually dark castaneous. Nuts broadly ovate or orbicular, distinctly stipitate, umbonulate.

Fl. & Fr. : August - December.

Common in marshy habitats, particularly in the east of Aravalli.

Selected specimens : Alwar : Sariska, Parmar 9555 (BSJO) ; Banswara : Ghatol, Singh 2898 (BSJO) ; Dungarpur : Kanodia 82169 (BSI) ; Jhunjhunu : Ajit Sagar, Kanodia 306 (DD) ; Pali : Erinpura, Rao 66806 (BSI) ; Udaipur : Nal, Kanodia 82396 (BSI).

16. *Fimbristylis squarrosa* Vahl, Enum. Pl. 2 : 289. 1805 ; Clarke in Hook. f. Fl. Brit. India 6 : 635. 1893 et Illus. Cyper. t. 41. f. 8 - 10. 1909 ; Duthie, Fl. Gangetic Plain 3 : 352. 1929. *F. aestivalis* (Retz.) Vahl var. *squarrosa* (Vahl) Koyama in Journ. Fac. Sci. Univ. Tokyo 3, 8 : 116. 1961.

Small, annual, densely tufted sedge. Culms slender, trigonous, glabrous, few-leaved at base. Leaves narrowly linear, c. 0.8 mm wide, flattish with more or less incurved margins, obtuse, mostly pilose on both surface. Sheaths pale-green or brownish, usually pubescent. Corymbs compound. Bracts 3 - 5, setaceous, shorter than the rays. Spikelet solitary, $3 - 6 \times 2.5 - 3.0$ mm. ovate to ovate-lanceolate, 7 to 18-flowered, greenish pale-brown. Glumes 3 - 4 mm long, ovate or elliptic ; keel green, 3-nerved, awn recurved, margins with red spots within. Nuts

obovate - orbicular, thickly biconvex, rounded at apex, shortly stipitate at base, pale - stramineous.

Fl. & Fr. : February - May.

Rare, found in marshy places, particularly in the east of Aravalli.

Selected specimens : Sirohi : Mt. Abu, *Blatter & McCann* 550, 551, *Blatter* 3444 (BLAT) ; Tonk : Near Tordi Sagar, *Shetty* 577 (BSJO). Also reported from Alwar (Vyas, 1964, 66, 67), Jhunjhunu (Nair & Kanodia, 1959) and Sikar (Nair & Nathawat, 1957).

17. *Fimbristylis tenera* Schult. *Mant. Syst.* 2 : 57. 1824 ; Clarke in *Hook. f. Fl. Brit. India* 6 : 642. 1893 ; Duthie, *Fl. Gangetic Plain* 3 : 355. 1929. *Scirpus tenellus* Roxb. *Fl. Ind.* 1 : 227. 1820, non *F. tenella* Schult. 1824.

var. *tenera*

Tall, annual or short - lived perennial, tufted sedge, with very short rhizomes. Culms slender, glabrous, smooth, few - leaved at base. Leaves 1 - 15 × 0.05 - 0.1 cm, upto half as long as culm or reduced to a subulate appendage of sheath. linear. Corymbs simple or subcompound, loosely bearing 3 - 15 spikelets. Bracts 2 - 4, setaceous. Rays 2 - 5, filiform, unequal, each bearing 1 - 4 spikelets. Spikelet solitary, 5 - 8 × 1 - 2 mm, lanceolate, terete, gradually tapering to an acute apex, brownish, many - flowered. Glumes 1.5 - 2.0 × 1.0 - 1.8 mm, broadly deltoid - ovate, deeply boat - shaped, with acute keel, glandular pubescent, white hyaline on margins. Nuts globular - obovoid, trigonous, straw - coloured.

Fl. & Fr. : August - November.

Rather common in the desertic zones of the state in wet grounds, particularly on the margins of tanks.

Selected specimens : Barmer : Seu, *Blatter* 2467 (BLAT) ; Jaisalmer : Vinjorai, *Blatter* 1966 (BLAT) ; Devikot, *Blatter* 1955 (BLAT) ; Jodhpur : Bhandari 1830 (JAC) ; Kailana, *Blatter* 2476 (BLAT) ; Balsamand, *Blatter* 2999 (BLAT) ; Sirohi : Abu road, *McCann* 540 (BLAT).

18. var. *oxylepis* (Steud.) Clarke in *Hook. f. Fl. Brit. India* 6 : 642. 1893 ; *Blatter & Hallberg* in *Journ. Bombay Nat. Hist. Soc.* 26 : 976. 1920 ; Bhandari, *Fl. Ind. Desert* 376. 1978.

Very similar to *F. tenera* var. *tenera*, but can be distinguished by glabrous glumes and verrucose, yellowish - brown nuts.

Fl. & Fr. : September - December.

Restricted to the desertic zones of the state in wet grounds near ponds, tanks, etc.

Selected specimens : Jaisalmer : Vinjorai, *Blatter* 1987 (BLAT) ; Jodhpur : Badka, *Blatter* 2946 (BLAT).

19. *Fimbristylis tetragona* R. Br. Prodr. Fl. Nov. Holl. 226. 1810 ; Clarke in Hook. f. Fl. Brit. India 6 : 631. 1893 ; Cooke, Fl. Bombay 2 : 879. 1908.

Perennial, densely tufted sedge, with very short rhizomes. Culms erect, sharply 4 - angled, smooth, glabrous, clothed with 2 - 4 bladeless sheaths at base. Sheaths tightly surrounding the culms, membranous. Inflorescence a single, terminal spikelet, without conspicuous bracts. Spikelets erect, 5 - 12 × 4 - 6 mm, broadly ellipsoid to ovoid - ellipsoidal, rounded at both ends, yellowish to dark - brown, many - flowered. Glumes 3 - 4 × 1.2 - 1.5 mm, oblong - elliptic, incurved, membranous, yellowish - brown, keel obtuse, almost 3 - nerved, nerves ending below the rounded apex. Nuts *c.* 1.6 × 0.4 mm, oblong, biconvex, obtuse at apex, cream - coloured.

Fl. & Fr. : September - January.

Frequently met with in open, wet, sandy places in the south - eastern parts of the state.

Selected specimens : Kota : Atru, *Singh* 83706 (LWG) ; Baran, *Majumdar* 10893 (BSA).

8. *FUIRENA* Rottb.

Leaves glabrous. Glumes with scabrid mucro. Inner scale setiform.	...	2. <i>F. wallichiana</i>
Leaves hairy. Glumes with hispidly hairy mucro. Inner scale quadrate.	...	1. <i>F. ciliaris</i>

1. *Fuirena ciliaris* (L.) Roxb. Fl. Ind. 1 : 184. 1820 ; Blatter in Journ. Bombay Nat. Hist. Soc. 37 : 712. 1934. *Scirpus ciliaris* L. Mant. Pl. 2 : 182. 1771. *Fuirena glomerata* Lam. Tabl. Encycl. Meth. Bot. 1 : 150. 1791 ; Clarke in Hook. f. Fl. Brit. India 6 : 666. 1893 ; Duthie, Fl. Gangetic Plain 3 : 365. 1929.

Annual, tufted sedge. Culms slender, triquetrous, leafy, sparsely hairy above. Leaves 5 - 10 × 0.4 - 0.6 cm, linear - lanceolate, acuminate, 3 to 5 - nerved, hairy. Sheaths more or less patently hairy. Spikelets 3 - 10,

in axillary and terminal clusters, 6 - 8 mm long. Bracts small. Glumes 3 mm long including awns, obovate - oblong, obtuse, pubescent ; keel 3 - nerved, ending in an awn. Outer bristles small and inconspicuous or linear, as long as the nut. Inner scales quadrate, apiculate, base cordate with a slender claw, back with 3, raised veins, adpressed to and concealing the nut. Nuts stipitate, apiculate, trigonous, globosely obovoid, pale - brown.

Fl. & Fr. : October - February.

Fairly common in the south - eastern parts of the state in aquatic and marshy places, particularly in rice - fields.

Selected specimens : Jhalawar : *Wadhwa* Acc. No. 17766 (BSA), *Singh* 83673 (LWG) ; Kota : *Atru*, *Singh* 90964 (LWG).

2. *Fuirena wallichiana* Kunth, Enum. Pl. 2 : 182. 1837 ; Clarke in Hook. f. Fl. Brit. India 6 : 665. 1893, incl. var. *evoluta* Cl. in Hook. f. *l. c.* et Illus. Cyper. t. 58. f. 8. 1909 ; Duthie, Fl. Gangetic Plain 3 : 364. 1929. *F. cuspidata* Kunth, *l. c.* 2 : 187. 1837.

Perennial sedge, with short, creeping rhizomes. Culms triquetrous, slightly pubescent above. Leaves 5 - 15 × 0.8 cm, with prominent mid - rib. Sheaths long, with pubescent ligule. Spikelets 6 - 8 mm long, in corymbose clusters. Bracts small. Rays small. Glumes 3 mm long excluding the stout scabrid mucro, elliptic - oblong, rounded at the tip below the mucro, pubescent and ciliate, lined with dark - red streaks. Outer bristles shorter than the nut, reddish - brown, scabrid. Inner bristles much longer than the nut, sometimes small or absent, irregularly developed. Nut c. 1.2 mm long, greyish, trigonous, globose, pyramidally pointed at each end, finely longitudinally ribbed.

Fl. & Fr. : September - January.

Occasionally found in marshy places near ponds, tanks etc. in the eastern parts of the state.

Selected specimens : Ajmer : *Kanolighat*, *Kaul* 8524 (LWG) ; *Todgarh*, *Duthie* 4919 (DD) ; *Bhilwara* : *Mejadam*, *Singh* 6047 (BSJO) ; *Jhalawar* : *Jhalarapatan*, *Singh* 83763 (LWG).

Notes : Clarke (*l. c.*) described var. *evoluta* on the basis of Duthie's collection No. 4919 from Merwara (Ajmer). He noted on this sheet "Setae hypogynae extraordinarily though, irregularly developed". Clarke (Fl. Brit. India 6 : 666. 1893) described this specimen as "petals narrowly elliptic, 3 - nerved, shortly stalked with long linear papillose - scabrous arista overtopping the nut" and figured the same (Illustration of Cyperaceae

t. 58 f. 9. 1909). Duthie (*l. c.*) and so also the author failed to find anything like this except the bristles as described by Clarke (*l. c.*).

Further, the collection no. *Singh* 6047 from Bhilwara have been found to have sometimes 4 stamens, which is an unusual character for the Cyperaceae as a whole.

9. KYLLINGA Rottb. *nom. cons.*

1a. Glumes winged on keel :

2a. Plants stoloniferous. Wing of glumes serrulate - scabrous. ... 3. *K. nemoralis*

2b. Plants with fibrous roots only. Wing of glumes deeply lobed. ... 4. *K. squamulata*

1b. Glumes not winged on keel :

3a. Rhizomes long, stoloniferous. Culms arranged in a single row along the rhizome. Keel of glumes spinulose at least towards the apex. ... 1. *K. brevifolia*

3b. Rhizomes short, not stoloniferous. Culms tufted. Keel of glumes smooth. ... 2. *K. bulbosa*

1. *Kyllinga brevifolia* Rottb. Descr. Ic. Rar. Nov. Pl. 13. t. 4. f. 3. 1773; Clarke in Hook. f. Fl. Brit. India 6 : 588. 1893; Duthie, Fl. Gangetic Plain 3 : 343. 1929. *Cyperus brevifolius* (Rottb.) Hassk. Cat. Hort. Regor. 24. 1844.

Perennial sedge, with long creeping rhizomes. Culms slender, triquetrous, few-leaved at base. Leaves radical, shorter or sometimes equalling the culms, 1 - 3 mm wide, narrowly linear, scabrid on margins, at times basal leaves reduced to sheaths. Sheaths membranous, brownish. Inflorescence a terminal, single, globose head, rarely consisting 2 or 3 heads. Bracts leafy, unequal. Spikelets 3.0 - 3.5 × 1.0 mm, oblong-lanceolate or elliptic-lanceolate, laterally compressed, 1 or rarely 2-flowered. Glumes ovate-elliptical, folded with an acute keel, membranous, 5 to 7-nerved, cuspidate at apex. Nuts 1.0 - 1.5 × 0.5 - 0.7 mm, obovate or elliptic, laterally lenticular, punctulate, brownish.

Fl. & Fr. : August - December.

Frequently found in marshy habitats near ponds, dams etc.

Selected specimens : Bhilwara : Mejadam, *Singh* 6033 (BSJO) ; Ganganagar : 24 PS, *Roy* 3883 (BSJO) ; Hanumangarh, *Roy* 6417 (BSJO) ;

Kumbharwali, Roy 4930 (BSJO). Also reported from Sirohi district by Chavan & Sabnis (1960) and Jain (1962).

2. *Kyllinga bulbosa* Beauv. Fl. d'Oware & Benin 1 : 11. t. 8. f. 1. 1804 ; Koyama in Dassanayake & Fosberg, Fl. Ceylon 5 : 245. 1985. *K. triceps* Rottb. Descr. Ic. Rar. Nov. Pl. 14. t. 4. f. 6. 1773, *nom. illegit* ; Clarke in Hook. f. Fl. Brit. India 6 : 587. 1893 ; Duthie, Fl. Gangetic Plain 3 : 343. 1929. *Schaenoides triceps* Rottb. Descr. Pl. Rar. Progr. 15. 1772, *invalid name*. *Cyperus triceps* (Rottb.) Endl. Cat. Hort. Acad. Vindb. 1 : 94. 1842, *nom. illegit.* ; Mahesh. Illus. Fl. Delhi f. 213. 1966.

Perennial, densely tufted sedge with erect, short rhizomes. Culms slender to obtusely trigonous, smooth. Leaves few, linear, 1 - 3 mm wide, flattish, plicate, acuminate. Sheaths stout, pale, lower part tinged with light brown. Inflorescence a terminal head of usually 3, (rarely 1, 4 or 5) sessile spikes, pale - greenish. Bracts 3 - 4, linear, reflexed. Spikelets c. 1.8 × 0.6 mm, oblong or oblong - lanceolate, 1 - flowered, pale - green. Glumes usually 4, ovate - oblong to oblong - lanceolate, acute, folded with almost smooth keel ; the lower two glumes 0.3 - 0.5 mm long, 1 or 3 - nerved ; third glume c. 1.5 mm long, 5 or 7 - nerved ; fourth glume c. 2 mm long, 5 - nerved. Nuts oblong, laterally flattened, brownish.

Fl. & Fr. : July - November.

Sparsely distributed in open wastelands.

Selected specimens : Ajmer : Tiagi 6 (DD) ; Banswara : Near Paloda village, Singh 2800 (BSJO) ; Bharatpur : On hills near Sikandra village, Parmar 8749 (BSJO) ; Jodhpur : Kailana, Moorthy 70 (BSJO) ; Pali : Haria mali village, Shetty 1827 (BSJO) ; Sirohi : Mt. Abu, McCann 5992 (BLAT).

3. *Kyllinga nemoralis* (J. R. & G. Forster) Dandy ex Hutch. & Dalz. Fl. West. Trop. Africa 2 : 487. 1936. *Thryocephalon nemorale* J. R. & G. Forster, Char. Gen. Pl. 130. 1776. *Kyllinga monocephala* Rottb. Descr. Ic. Rar. Nov. Pl. 13. t. 4. f. 4. 1773, *nom. illegit.* ; Clarke in Hook. f. Fl. Brit. India 6 : 588. 1893 ; Duthie, Fl. Gangetic Plain 3 : 344. 1929. *Cyperus kyllingia* Endl. Cat. Hort. Acad. Vindb. 1 : 94. 1842.

Perennial, laxly tufted sedge, with long creeping rhizomes. Culms triquetrous. Leaves many, usually shorter or nearly equalling the culm, 2 - 5 mm wide, linear. Sheaths brown to purple - brown. Inflorescence a terminal, single head, bearing globose central spike and 2 or 3 small lateral spikes, 5 - 10 × 5 - 7 mm across, whitish. Bracts leafy, 3 or 4, spreading to reflexed. Spikelets 2.5 - 3.5 × 1.5 mm, ovate - elliptic to ovate - lanceolate, 1 or 2 - flowered. Glumes usually 5, the lowest two smaller & narrow, 1.0 - 1.5 mm long, the remaining glumes 2.5 - 3.5 mm

long, boat-shaped, membranous, straw-coloured, variegated with rusty-brown, 3 or 4-nerved on each side of keel. Nuts c. 1.4×0.6 mm, oblong-obovate or suborbicular, biconvex, brownish.

Fl. & Fr. : September - December.

Rare, found in wet and marshy places in the eastern parts of the state.

Selected specimens : Jaipur : Univ. Reserve forest, Sharma 8895, 8896 (RUBL) ; Kota : Bara-bagh, Singh 70220 (LWG) ; Devari, Singh 90500 (LWG). Also reported from Alwar (Vyas, 1964, 1966, 1967), Jhunjhunu (Joshi & Sharma, 1964) & from Udaipur (Vyas, 1965).

4. *Kyllinga squamulata* Tonn. ex Vahl, Enum. Pl. 2 : 381. 1805 ; Clarke in Hook. f. Fl. Brit. India 6 : 589. 1893. *K. metzii* Hochst. ex Steud. Syn. Pl. Glum. 2 : 70. 1854. *Cyperus metzii* (Hochst. ex Steud.) Mattfeld & Kukenthal ex Kukenthal in Engler, Pflanzen. 101 : 25. 1935 & 612. t. 64 J - K. 1936 ; Raizada, Suppl. Duthie. Fl. Gangetic Plain 300. 1976.

Annual, tufted sedge, upto 30 cm high. Culms nearly glabrous, trigonous. Roots fibrous. Leaves usually longer than the culm, about 3 mm wide. Inflorescence a terminal head, about 4 mm in diam. Spikes 1 - 3, ovoid. Spikelets about 3 mm long, maturing 1 nut only. Flowering glumes scarcely acute, keel winged by a broad hyaline incise-toothed crest. Nuts brown.

Fl. & Fr. : Not seen.

Rare, in grassy habitats.

Selected specimens : Sirohi : Mt. Abu, Mehta 299, 676 (JAC). Also reported by Chavan & Sabins (1960) and Jain (1962) from Mt. Abu.

10. LIPOCARPHA R. Br. *nom. cons.*

Bracteoles glaucous - green, stained with dark purple at apex. Spikes purplish - brown. Achenes beaked.	...	2. <i>L. sphacelata</i>
Bracteoles whitish. Spikes whitish. Achenes not beaked.	...	1. <i>L. chinensis</i>

1. *Lipocarpus chinensis* (Obs.) Kern in Blumea Suppl. 4 : 167. 1958. *Scirpus chinensis* Obs. Dagd. Ostind. Resa 220. 1757. *Hypoclyptum argenteum* Vahl, Enum. Pl. 2 : 283. 1805. *Lipocarpus argentea* (Vahl) R.

Br. in Tuckey, Narr. Exp. Congo 477. 1819 ; Clarke in Hook. f. Fl. Brit. India 6 : 667. 1893 *et* Illus. Cyper. t. 60. f. 4 - 7. 1909 ; Duthie, Fl. Gangetic Plain 3 : 366. 1929.

Annual, glabrous, tufted sedge, with reddish - brown fibrous roots. Culms slender, obtusely trigonous, whitish - green. Leaves 2 - 4 to a culm, half the length of culm or shorter, 2 - 4 mm wide, linear, flattish to weakly incurved - margined. Inflorescence a head of 3 - 7 spikes. Bracts usually 2 or 3, rarely 5, unequal, dilated at base, longer than the heads. Spikes 5 - 8 \times 4 - 5 mm, oblong - ellipsoid, rounded at apex, whitish. Bracteoles 1.8 - 2.5 \times 1.0 - 1.2 mm, weakly incurved, inconspicuously 1 or 2 - nerved on both sides. Glumes 2, 1.8 - 2.0 mm long, membranous, lanceolate, adaxial one c. 0.3 mm wide, 2 - keeled, 1 or 2 - nerved between slender keels, abaxial one nearly twice as wide as adaxial. Nuts 1.0 - 1.25 \times 0.3 - 0.5 mm, oblong or oblong - ovate, trigonous, straw - brown.

Fl. & Fr. : August - September.

Restricted to marshy habitats, in the north - eastern parts of the state.

Selected specimens : Jaipur : Ramgarh, *Sharma* 2037 (RUBL) ; Galta, *Sharma* 2265 (RUBL) ; Athuni ka kund, *Singh* Acc. No. 12496 (RUBL).

2. *Lipocarpa sphacelata* (Vahl) Kunth, Enum. Pl. 2 : 267. 1837 ; Clarke in Hook. f. Fl. Brit. India 6 : 667. 1893 ; Sharma & Tiagi, Fl. N.E. Rajasthan 421. 1979. *Kyllinga triceps* Lam. Illus. Gen. 1 : 148. 1791, non Rottb. 1773. *Hypaelyptum sphacelatum* Vahl, Enum. Pl. 2 : 283. 1805.

Annual sedge, with brownish fibrous roots. Culms tufted, slender, obtusely trigonous. Leaves 2 or 3 to a culm, 1/2 to 3/4 times the length of culm, 1 - 2 mm wide, linear, canaliculate, whitish - green. Inflorescence a head of 2 - 4 spikes, dark purple - brown. Bracts 2 or 3, divergent, unequal. Spikes 4 - 7 \times 2.5 - 4.0 mm, ellipsoid or somewhat ovoid - ellipsoidal, rounded at apex, densely bearing many bracteoles. Bracteoles spirally imbricate, spreading, 1.5 - 1.6 \times 0.8 - 1.0 mm, obovate - oblong, 5 - nerved. Glumes 2, 1.2 - 1.3 mm long, broadly elliptic, hyaline ; adaxial one c. 0.7 mm wide, 2 - keeled, 3 or 5 - nerved between two prominent keels ; abaxial one boat - shaped, strongly 5 - nerved. Achenes 1.2 - 1.4 \times 0.3 - 0.5 mm, oblong - elliptic, trigonous, puncticulate, light - brown.

Fl. & Fr. : August - October.

Rare, found in wet grounds on the margins of tanks, ponds etc. confined to north - eastern parts of the state.

Selected specimen : Jaipur : Charan Mandir, Sharma 1010 (RUBL).

11. MARISCUS Vahl *nom. cons.*

- 1a. Anthela compound or decomposed. Spikes globose :
- 2a. Leaves (sheaths) septate - nodulose. Spikelets 6 - 12 mm long, each bearing 3 - many nuts. Glumes mucicous, not winged. ... 2. *M. compactus*
- 2b. Leaves (sheaths) not septate - nodulose. Spikelets 3 - 4 mm long, each bearing 1 - 2 nuts. Glumes mucronate, with spongy wing along the keel. ... 3. *M. cyperoides*
- 1b. Anthela simple. Spikes cylindrical, subglobose or ellipsoidal :
- 3a. Spikelets more or less flattened, with an acute edge, bearing 3 - many nuts. Glumes folded, with conspicuous keel and recurved awns. ... 5. *M. squarrosus*
- 3b. Spikelets terete, without conspicuous edge, bearing 1 - 2 nuts. Glumes involute, without distinct keel and awn :
- 4a. Base of culms with an ovoid to ovoid - oblong thickening, clothed with leaf - sheaths. Basal sheath straw - coloured. ... 1. *M. clarkei*
- 4b. Base of culms hardly enlarged. Basal leaf - sheaths purplish brown :
- 5a. Spikelets with 2 nuts, 4 - 5 mm long, patent to ascending at maturity. Nuts 2 mm long. ... 6. *M. sunatrensis*
- 5b. Spikelets with 1 nut, 2 - 3 mm long, spreading at maturity. Nuts *c.* 1.3 mm long. ... 4. *M. paniceus*

1. *Mariscus clarkei* (Cooke) Koyama in Journ. Jap. Bot. 51 : 313. 1976. *Cyperus clarkei* Cooke, Fl. Bombay 2 : 873. 1908 ; Bhandari, Fl. Ind. Desert 366. 1978. *Mariscus bulbosus* Clarke in Hook. f. Fl. Brit. India 6 : 620. 1893, non Steud. 1855 ; Sedgwick in Journ. Bombay Nat. Hist. Soc. 25 : 698. 1918.

Perennial sedge, with short rhizomes. Stolons slender, elongated. Culm solitary, triquetrous. Leaves 5 - 7 to a culm, equalling or shorter than the culm, 7 - 20 × 0.2 - 0.4 mm, herbaceous, unicostate. Sheaths wider

than the blade, membranous. Inflorescence simple, often congested in a digitate cluster. Bracts 5 - 9, spreading to reflexed, longer than the inflorescence, unequal, obtuse. Rachis hidden by densely disposed spikelets. Spikelets spreading, 3.0 - 3.25 × 0.7 - 0.8 mm, elliptic - lanceolate, trigonous, bearing 2 glumes and 1 - flower. Bracteoles setaceous, 1.5 - 2.0 mm long. Lower glume *c.* 3.0 × 1.4 mm, ovate, subacute to acute, 11 or 13 - nerved; upper glume *c.* 2.5 × 1.2 mm, lanceolate, acute. Nuts oblong - elliptic to oblong, trigonous, dark - brown.

Fl. & Fr. : August - October.

Rare, usually prefers moist sand of the river - beds. Often forming large tufts in desertic zones.

Selected specimens : Jaisalmer : Chandan, *Bhandari* 1102, 1106 (JAC), *Tondon* 515 (JAC).

2. *Mariscus compactus* (Retz.) Druce in Rep. Bot. Exch. Club Brit. Isls. 1916 : 634. 1917. *Cyperus compactus* Retz. Obs. Bot. 5 : 10. 1789. *C. dilutus* Vahl, Enum. Pl. 2 : 357. 1805. *Mariscus microcephalus* Presl, Reliq. Haenk. 1 : 182. 1828; Clarke in Hook. f. Fl. Brit. India 6 : 624. 1893. *M. dilutus* Nees in Wight, Contrib. Bot. Ind. 90. 1834; Duthie, Fl. Gangetic Plain 3 : 345. 1929.

Perennial sedge, with short, often corm - like rhizomes. Culms solitary or few together, obtusely trigonous to subterete. Leaves few, slightly longer or shorter than the culm, 5 - 10 mm wide, linear, canaliculate. Sheaths cylindrical, septate - nodulose, purple - brown. Bracts 3 - 5 (- 8), patent to divergent, unequal. Spikes with many, stellately arranged spikelets. Rachis very short. Spikelets jointed at the base, 5 - 15 × 0.8 - 1.5 mm, narrowly lanceolate to linear - subulate, subterete, pale green and tinged with rusty - brown. Rachilla flexuose with pale - white hyaline wings, jointed above the prophyll. Glumes erect, 3.0 - 4.5 × 1.0 - 1.5 mm, convolute, linear - lanceolate to linear - oblong, obtuse or subacute at apex, 5 to 7 - nerved. Nuts linear - oblong, trigonous, yellow - brown.

Fl. & Fr. : August - November.

Occasionally found in rice fields, in the south - eastern parts of Rajasthan.

Selected specimen : Kota : Near Right Canal, *Singh* 90612 (LWG).

3. *Mariscus cyperoides* (Roxb.) A. Dietr. Sp. Pl. 2 : 348. 1833. *Kyllinga cyperoides* Roxb. Fl. Ind. 1 : 182. 1832, non *Scirpus cyperoides* L.

Caurtoisia cyperoides (Roxb.) Nees in *Linnaea* 9 : 286. 1825 ; Clarke in *Hook. f. Fl. Brit. India* 6 : 625. 1893 ; Duthie, *Fl. Gangetic Plain* 3 : 340. 1929. *Cyperus pseudokyllingoides* Kükenth. in *Engler, Pflanzenreich* 101 : 501. 1936.

Annual, tufted, glabrous sedge, with fibrous roots. Culms caespitose, slender, trigonous, striate. Leaves usually longer than the culm, 2.5 - 5.0 mm wide, linear, acute. Umbel with 3 - 10 rays ; secondary rays 3 - 5, bearing dense, globose, yellowish - brown spikes composed of many spikelets. Bracts 3 - 7, leafy. Spikelets many, in globose heads, 4 mm long. Glumes usually 2, 4 mm long, boat - shaped, flattened, fertile one slightly mucronate, keel prominently winged throughout its length, sides membranous, shortly cuspidate at apex, usually only one glume nut - bearing. Nuts c. 3 mm long, trigonous, fusiform, tapering at both ends, beaked, embraced by the glume, chestnut - brown.

Fl. & Fr. October - February.

Occasionally found in wet sandy places in the south - eastern parts of the state.

Selected specimens : Kota : Atru, Singh 83753 (LWG) ; Jagpura, Singh 21427 (DD) ; Sirohi : Mt. Abu, Mehta 1278 (JAC). Also reported by Majumdar *et al.* (1969) from Chittorgarh district.

4. *Mariscus paniceus* (Rottb.) Vahl, *Enum. Pl.* 2 : 373. 1805 ; Clarke in *Hook. f. Fl. Brit. India* 6 : 620. 1893, includ. var. *roxburghiana* ; Duthie, *Fl. Gangetic Plain* 3 : 347. 1929 ; Koyama in *Gard. Bull. Singapore* 30 : 157. 1977. *Schaenoiles paniceus* Rottb. *Descr. Pl. Rar. Progr.* 15. 1772, *nom. provis.* *Kyllinga panicea* Rottb. *Descr. Ic. Rar. Nov. Pl.* 15. t. 4. f. 1. 1773. *Cyperus paniceus* (Rottb.) Boeck. in *Linnaea* 36 : 381. 1870, *pro parte*.

Perennial sedge, with more or less knotty, lignescent, decumbent, short rhizomes. Culms usually solitary, trigonous to triquetrous above, smooth. Leaves 3 - 7 to a culm, about half the length of culm, 1 - 3 mm wide, slender - linear, flattish - plicate, long acute at apex. Sheaths reddish - brown. Anthera open or somewhat digitate - contracted, light glaucous - green. Bracts 3 - 5, patent to spreading, usually overtopping the inflorescence. Spikes 8 - 15 × 4 - 6 mm, cylindrical, obtuse to sub - truncate at apex, bearing upto 40 spikelets. Spikelets horizontally divergent, 2.5 - 3.5 × 0.8 - 1.0 mm, ovate to lanceolate, slightly recurved, 1 - flowered. Glumes 4 ; lower 2 glumes c. 1 mm long, ovate, 3 or 5 - nerved ; third glume 2.5 - 3.5 mm long, ovate to lanceolate, obscurely 2 - nerved on each side, keel 3 - nerved. Nuts elliptic - oblong, trigonous, yellow - brown.

Fl. & Fr. : August - November.

Restricted to Mt. Abu in moist sandy localities.

Selected specimens : Sirohi : Mt. Abu, *Puri* 56716, 56693, 56772 (BSI), *Jain* 5310, 5623 (BSI).

5. *Mariscus squarrosus* (L.) Clarke in Hook. f. *Fl. Brit. India* 6 : 623. 1893 ; Koyama in *Gard. Bull. Singapore* 30 : 153. 1977. *Cyperus squarrosus* L. *Cent. Pl.* 2 : 6. 1756. *C. aristatus* Rottb. *Descr. Pl. Rar. Progr.* 22, 1772 *et Descr. Ic. Rar. Nov. Pl.* 23. t. 6. f. 1. 1773 ; Clarke in Hook. f. *l.c.* 6 : 606. 1893 ; Duthie, *Fl. Gangetic Plain* 3 : 328. 1929.

Annual, densely tufted sedge, with reddish - purple fibrous roots. Culms slender, triquetrous with almost wing - like angles, smooth. Leaves 3 - 5 to a culm, equalling or shorter than the culm, 1 - 3 mm wide, linear. Sheaths membranous, pale - green, stained with reddish - purple. Anthela open or reduced to a single hemispherical spike. Bracts 2 - 4, patent, unequal. Spikes 0.5 - 2.0 × 0.5 - 1.0 cm, broadly ellipsoidal to subglobose, more or less echinate, yellowish - green. Spikelets densely spicately disposed on a short rachis, 5 - 13 × 3 - 4 mm, broadly oblong - ovate or oblong - elliptic, membranous, pale - green, prominently 5, 7 or 9 - nerved. Nuts oblong or oblong - obovate, trigonous, obtuse and minutely apiculate at apex, greyish - brown.

Fl. & Fr. : August - December.

Commonly grows in road - side ditches, along the margins of tanks, particularly in the north - western parts.

Selected specimens : Barmer : Gypsum halt, *Tiwari* 968 (BSJO) ; Ganganagar : Karanpura, *Roy* 6442 (BSJO) ; Jaipur : Jaigarh, *Singh* Acc. No. 12492 (RUBL) ; Jaisalmer : Marelai tank, *Tiwari* 759 (BSJO) ; Jodhpur : Kui village, *Singh* 3170 (BSJO) ; Kota : Kishanganj, *Verma* 733 (BSA) ; Sirohi : Mt. Abu, *Mehta* 1017 (JAC).

6. *Mariscus sumatrensis* (Retz.) J. Raynal in *Adansonia* 15 : 110. 1975. *Kyllinga sumatrensis* Retz. *Obs. Bot.* 4 : 13. 1786. *Scirpus cyperoides* L. *Mant. Pl.* 2 : 181. 1771, non *Mariscus cyperoides* (Roxb.) A. Dietr. *Mariscus sieberianus* Nees ex Clarke in Hook. f. *Fl. Brit. India* 6 : 622. 1893 *et Illus. Cyper.* t. 23. f. 5 - 6. 1909. *Cyperus cyperoides* (L.) O. Ktze. *Rev. Gen. Pl.* 3(2) : 333. 1898.

Perennial sedge, with short woody rhizomes clothed with brown fibres. Culms solitary to many together, erect, triquetrous. Leaves many, shorter or equalling the culm, 3 - 6 mm wide, linear, flattish - plicate.

Spathes pale, eventually becoming brownish. Spikes cylindrical, 2 - 4 × 0.6 - 1.0 cm, densely bearing many spikelets, greenish. Bracts 3 - 10, leafy, unequal. Spikelets spreading or more or less reflexed, 3 - 5 × 0.7 - 0.9 mm, linear to linear-lanceolate, subterete, bearing 4 to 5 glumes, 1 or 2-fruited. Glumes c. 3.5 × 1.0 mm, lanceolate-oblong to ovate-oblong, subacute or mucronate at apex, margins inrolled, pale-green, keel 3-nerved. Nuts linear-oblong, trigonous, straw-coloured, minutely punctulate.

Fl. & Fr. : July - November.

Occasionally found in shady places or in open, grasslands on the edges of forests.

Selected specimens : Bundi : Sikarburj, *Singh* 74479 (LWG) ; Bara-talao, *Singh* 74678 (LWG) ; Jaisalmer : Vinjorai, *Wadhwa* 5304 A (BSA) ; Kota : Shahabad, *Verma* 651 (BSA) ; Sirohi : *Jain* 5623 (BSA).

12. PYCREUS P. Beauv.

- 1a. Epidermal cells of the nuts isodiametric, roundish or hexagonal. Nuts microscopically punctulate or finely reticulate :
- 2a. Glumes with 3-nerved keel and nerveless sides. Stamen usually 1. ... 6. *P. pumilus*
- 2b. Glumes with 3-nerved keel and distinctly nerved sides. Stamens usually 2 :
- 3a. Stem decumbent at the base, rooting at the nodes. Glumes with arcuate keel and usually with a depression on either side. Nuts obovate to almost orbicular. ... 7. *P. sanguinolentus*
- 3b. Stem erect, not rooting at the nodes. Glumes with straight keel, without depression. Nuts oblong or oblong-obovate :
- 4a. Spikelets c. 40-flowered, 1.5 - 2.0 mm broad, yellowish or reddish-brown. ... 3. *P. flavidus* var. *flavidus*
- 4b. Spikelets 6 to 12-flowered, 0.7-1.0 mm broad, pale straw-coloured. ... 4. *P. flavidus* var. *strictus*
- 1b. Epidermal cell of the nuts longitudinally stretched, oblong or linear. Nuts microscopically wrinkled by the prominent short sides of the epidermal cell running into wavy or broken transverse lines :
- 5a. Plants rhizomatous. Spikelets 20 to 60-flowered, ovate-oblong or oblong-lanceolate. ... 1. *P. diaphanus*

- 5b. Plants not rhizomatous. Spikelets upto 20 - flowered, linear or linear - oblong :
- 6a. Glumes pale yellow or straw - coloured. Nuts obovoid. ... 2. *P. flavescens*
- 6b. Glumes dark brown or deep chocolate - brown. Nuts globose-ovoid. ... 5. *P. malabaricus*

1. *Pycereus diaphanus* (Schrad. ex Roem. & Schult.) Hooper & Koyama in Nicolson & Saldanha, Fl. Hassan 691. 1976. *Cyperus diaphanus* Schrad. ex Roem. & Schult. Syst. Veg. Mant. 2 : 477. 1824 ; Raizada, Suppl. Duthie, Fl. Gangetic Plain 297. 1976, under var. *latespicatus* (Boeck.) Koen. *C. latespicatus* Boeck. in Flora 42 : 433. 1859 et in Linnaea 35 : 467. 1868. *Pycereus latespicatus* (Boeck.) Clarke in Hook. f. Fl. Brit. India 6 : 590. 1893.

Annual, tufted sedge. Culms rigid, trigonous. Leaves flat, 1.0 - 2.5 mm wide, gradually narrowed at apex. Inflorescence simple, often contracted, sometimes with 2 - 3 (- 5) rays or reduced to a single head. Bracts 2 - 3 (- 4), patent, unequal. Spikes broadly ovate, on short rachis. Spikelets 10 - 20 × 3 - 4 mm, horizontally spreading, oblong with nearly parallel margins, compressed, 20 to 40 - flowered. Glumes membranous, 2.5 - 3.0 × 1.75 - 2.0 mm, obliquely patent, keeled, ovate, obtuse ; keel 3 to 5 - nerved, sides nerveless. Nuts biconvex, laterally compressed, obovate to broadly obovate or elliptic, black.

Fl. & Fr. : August - November.

Rare, found along sandy beds of rivers, lakes, ponds etc., in the north - east and south - eastern parts of the state.

Selected specimens : Alwar : Siliserh, H. Lal 34581 (LWG) ; Jhalawar : Jhalapatan - along Kalisindh river - bed, Singh 83764 (LWG).

2. *Pycereus flavescens* (L.) Reichb. Fl. Germ. Exc. 72. 1830 ; Clarke in Hook. f. Fl. Brit. India 6 : 589. 1893. *Cyperus flavescens* L. Sp. Pl. 46. 1753 ; Shah, Fl. Gujarat 2 : 726. 1978.

Annual, tufted sedge. Culms slender, triquetrous. Leaves basal, flat or canaliculate, flaccid, about half the length of culm or longer, scabrid. Sheaths reddish - brown. Inflorescence subcompound or compound umbel. Bracts 3, overtopping the inflorescence, unequal. Spikes c. 2 cm long, pale or fulvous - brown, bearing about 15 spikelets. Spikelets c. 1.5 cm long, oblong. Rachilla flexuous, hardly winged. Glumes c. 2 mm long, broadly ovate, obscurely mucronulate, sides thin, hyaline, nerveless ;

keel 3 to 5 - nerved, yellow. Nuts broadly biconvex, obovoid, transversely lanceolate, obtuse, apiculate, brown.

Fl. & Fr. : October - December.

Rare, in the forests among grasses ; so far reported from Mt. Abu only.

Selected specimens : Sirohi : Mt. Abu, *Blatter, Hallberg & McCunn* 577 (BLAT), *Jain* 46573 (BSI), *Mehta* 1480 (JAC).

3. *Pycereus flavidus* (Retz.) Koyama in Journ. Jap. Bot. 51 : 313. 1976. *Cyperus flavidus* Retz. Obs. Bot. 5 : 13. 1788, non Clarke in Hook. f. Fl. Brit. India 6 : 600. 1893. *C. globosus* All. Fl. Pedem. Auct. 49. 1789, non Forsk. 1775. *C. capillaris* Koenig ex Roxb. Fl. Ind. 1 : 198. 1820. *Pycereus globosus* (All.) Reich. Fl. Germ. Exc. 2 : 140. 1830, *nom. illegit.* ; Duthie, Fl. Gangetic Plain 3 : 337. 1929. *P. capillaris* (Koenig ex Roxb.) Nees ex Clarke in Hook. f. Fl. Brit. India 6 : 591. 1893.

var. flavidus

Annual or perennial, densely tufted sedge. Culms slender, rigid, erect, obtusely trigonous, smooth. Leaves few, shorter than the culm, 1 - 2 mm wide, linear to setaceous, flatish - plicate or canaliculate; Inflorescence simple or partially compound, with 1 to 6 unequal rays, sometimes congested in a head - like cluster of spikelets. Spikes bearing 5 - 20 spikelets on short rachis. Spikelets 6 - 20 × 1.5 - 3.0 mm, spreading, linear or linear - oblong, strongly flattened, densely 12 to 50 - flowered, dark red-brown. Glumes 1.5 - 9.5 × 1.0 - 1.5 mm, ovate - oblong, folded, obtuse at apex, chartaceous, pale - brown ; keel prominently 3 - nerved. Nuts obovate to oblong - elliptic, apiculate, lenticular and laterally flattened, dark - brown.

Fl. & Fr. : August - November.

Common in the marshy habitats along the beds of tanks, ponds lakes etc.

Selected specimens : Banswara : Near Kushalgarh, *Singh* 3784 (BSJO) ; Bhilwara : Near Kharidam, *Singh* 6510 (BSJO) ; Ganganagar : Madeera - Q head, *Roy* 3959 (BSJO) ; Jaipur : Baragaon, *Sharma* 1905 (RUBL) ; Sirohi : Mt. Abu, *Mehta* 287 (JAC) ; Tonk : Near Niwai temple, *Shetty* 1012 (BSJO).

4. var. *strictus* (Lam.) Parmar, *comb. nov.* *Cyperus strictus* Lam. Encycl. 1 : 146. 1791. *Pycereus capillaris* (Koenig ex Roxb.) Nees ex

Clarke var. *stricta* (Lam.) Clarke in Hook. f. Fl. Brit. India 6 : 592. 1893. *Cyperus flavidus* Retz. var. *strictus* (Lam.) Korlahalli in Bull. Bot. Surv. India 9 : 235 - 239. 1964.

Very similar to var. *flavidus*, but can be distinguished by spikelets being narrower, straw - coloured or yellow, less compressed, frequently short, 6 to 12 - flowered, and glumes closely packed but loosely imbricate.

Fl. & Fr. : August - December.

Frequently found in the south - western parts of the state along Aravalli.

Selected specimens : Chittorgarh : Maslana, *Majumdar* 10162 (BSA) ; Sirohi : Mt. Abu, *Puri* 56692 (BSI) ; Udaipur : Khumblihat, *Kanodia* 82268, 82399 (BSA).

5. *Pycereus malaharicus* Clarke in Journ. Linn. Soc. 34 : 12. 1898. *Cyperus malabaricus* (Clarke) Cooke, Fl. Bombay 2 : 856. 1908.

Caespitose, slender sedge, c. 30 cm high. Roots fibrous. Leaves about two - third as long as stem, 2 - 3 mm broad, weak. Inflorescence c. 2.5 cm long and broad, composed of 6 - 12 spikelets arranged upon 2 - 3 sessile branchlets. Invol. - bracts 3, leaf - like. Spikelets c. 20 - flowered, linear - oblong, subacute, sides exactly parallel. Glumes boat - shaped, dark - brown with narrow white margins, acute when opened. Nuts globose ovoid, slightly laterally compressed, shortly apiculate, brown.

Fl. & Fr. : August - December.

Rare, in damp, muddy areas. So far considered endemic to Maharashtra and Gujarat.

Selected specimens : Sirohi : Mt. Abu, *Mehta* 89, 1470, 1633 (JAC).

6. *Pycereus pumilus* (L.) Nees ex Clarke in Hook. f. Fl. Brit. India 6 : 591. 1893, concerning the nomenclature, but excluding basionym ; Dom in Bibl. Bot. 85 : 417. 1915 ; Duthie, Fl. Gangetic Plain 3 : 339. 1929. *Cyperus pumilus* L. Cent. Pl. 2 : 6. 1756. *Pycereus nitens* Nees in Nova Actor. Acad. Caes. Leop. - Carol. Nat. Cur. 19. Suppl. 1 : 53. 1843 ; Clarke in Hook. f. Fl. Brit. India 6 : 591. 1893.

Annual, densely tufted sedge, with fine, yellowish fibrous roots. Culms slender, triquetrous, smooth. Leaves few, shorter or surpassing the culm, 1 - 2 mm. wide, narrowly linear. Anthela simple to decompound or frequently contracted to a head - like cluster of spikelets. Bracts 3 - 5,

patent to patulose, unequal. Spikes subglobose or ovoid, densely bearing many spikelets. Spikelets spreading, 3 - 10 × 1.5 - 2.5 mm, oblong to oblong - lanceolate, flattened, subacute, 8 to 35 - flowered, light greenish. Glumes 1.0 - 1.7 × 1.0 - 1.3 mm, ovate to ovate - elliptic, rounded - truncate to emarginate at apex, hyaline, pale; keel green or tinged with reddish - brown, 3 or 5 - nerved. Nuts elliptic to lanceolate - elliptic, laterally flattened, brownish.

Fl. & Fr. : August - November.

Common in marshy habitats near tanks, ponds, lakes, ditches etc.

Selected specimens : Barmer : Kalyanpura, *Shetty* 2179 (BSJO); Jaisalmer : Marelai tank, *Tiwari* 757 (BSJO); Jhalawar : Manoharthana, *Singh* 74462 (LWG); Jodhpur : Malar, *Singh* 4376 (BSJO); Sirohi : Mt. Abu, *Rao* 66595 (BSI); Tonk : Near Tordisagar, *Shetty* 1085 (BSJO); Udaipur : Khamblihat, *Kanodia* 82395 (BSI).

7. *Pycereus sanguinolentus* (Vahl) Nees ex Clarke in Hook. f. *Fl. Brit. India* 6 : 590. 1893; Duthie, *Fl. Gangetic Plain* 3 : 338. 1929. *Cyperus sanguinolentus* Vahl, *Enum. Pl.* 2 : 351. 1805.

Annual or short - lived perennial, with short rhizomes. Culms tufted, trigonous. Leaves born on the lower part of culm, shorter than the culm, 2 - 4 mm wide, linear, flattish - plicate. Anthela simple with 2 - 5 short rays or more or less in a head - like cluster. Spikes ovoid, densely bearing 3 - 17 spikelets on short rachis. Bracts leafy, 3 - 5, spreading, unequal. Spikelets 0.7 - 1.8 × 2.0 - 3.3 mm, narrowly ovate or lanceolate - oblong, subacute, flattened, 10 to 30 - flowered, brownish. Rachilla 4 - gonous, straight. Glumes 2.0 - 2.5 × 1.5 - 2.0 mm, ovate, obtuse, membranous, with nerveless sides, pale brown to dark - brown, keel 3 to 5 - nerved. Nuts broadly obovate, laterally puncticulate, black.

Fl. & Fr. : August - December.

Rare, found in marshy habitats. Restricted to Mt. Abu.

Selected specimens : Sirohi : Mt. Abu, *Duthie* 6772 (DD), *Raizada* 20600 (DD), *Blatter, Hallberg & McCann* 1901, 1904, (BLAT), *Rao* 66613 (BSI).

13. RIKLIELLA J. Raynal

Rikliella squarrosa (L.) Raynal in *Adansonia* 13 : 154. 1973. *Scirpus squarrosa* L. *Mant. Pl.* 181. 1771; Clarke in Hook. f. *Fl. Brit.*

India 6 : 663. 1893 ; Duthie, Fl. Gangetic Plain 3 : 361. 1929. *Isolepis squarrosa* (L.) Roem. & Schult. Syst. Veg. 2 : 111. 1817, non H.B.K. 1815.

Slender, annual sedge, with purplish fibrous roots. Culms erect, subterete or obtusely trigonous, glabrous, leaved at base. Leaves 2 or 3 to a culm, the lowest usually reduced to bladeless sheath, 1 - 7 × 0.06 - 0.1 cm, whitish green. Inflorescence a pseudolateral head, with 1 - 3 spikes. Bracts 1 or 2 ; lower leafy, somewhat triquetrous towards spinulose apex ; the upper, when present, reflexed, setaceous. Spikelets sessile, 3 - 6 × 2.0 - 3.5 mm, ovate - elliptic to oblong - elliptic, squarrose, deeply red - brown with pale green awn. Glumes spirally imbricate, 0.6 - 0.9 × 0.4 - 0.5 mm (excluding awns), obdeltoïd - obovate, cuncate, truncate and awned at apex, obscurely 2 - nerved on each side. Nuts obovate, trigonous, obtuse at apex, attenuate at base, pale - brown.

Fl. & Fr. : August - December.

Rare, found in open wet lands, in the south - eastern parts of the state.

Selected specimens : Kota : Atru, Singh 83708 (LWG), Shahabad, Majumdar 13145 (BSA).

14. SCHOENOPLECTUS (Reichb.) Palla *nom. cons.*

- 1a. Inflorescence terminal. Involucre bracts foliaceous, patent. ... 3. *S. grossus*
- 1b. Inflorescence pseudo - lateral. Lower involucre bract culm - like, erect, the base continuing down to the culm :
 - 2a. Inflorescence congested in a head, rarely corymbose with short rays :
 - 3a. Hypogynous bristles retrorsely scabrid :
 - 4a. Culms terete or subterete. Styles 2. ... 4. *S. juncoides*
 - 4b. Culms triquetrous. Styles 3. ... 7. *S. mucronatus*
 - 3b. Hypogynous bristles absent :
 - 5a. Culms flowering in the lower half, strongly septate when dry. Glumes acute, not or scarcely keeled. ... 1. *S. articulatus*
 - 5b. Culms usually flowering in the upper half, not or scarcely septate when dry. Glumes mucronate, distinctly keeled :

- 6a. Culms often septate when dry.
Glumes multistriate, lax, inflated in
fruit. ... 8. *S. roylei*
- 6b. Culms not septate when dry.
Glumes smooth, imbricating,
not inflated in fruit. ... 9. *S. supinus*
subsp. *lateriflorus*
- 2b. Inflorescence anthelate, open, with elongated
rays :
- 7a. Hypogynous bristles present :
- 8a. Hypogynous bristles soft, plumose. ... 6. *S. littoralis* subsp.
subulatus
- 8b. Hypogynous bristles harsh, retrorsely
scabrid. ... 5. *S. lacustris*
- 7b. Hypogynous bristles absent. ... 2. *S. corymbosus*

1. *Schoenoplectus articulatus* (L.) Palla in Bot. Jahrb. Syst. 10 : 229. 1889. *Scirpus articulatus* L. Sp. Pl. 47. 1753 ; Clarke in Hook. f. Fl. Brit. India 6 : 656. 1893 ; Parker in Duthie, Fl. Gangetic Plain 3 : 360. 1929.

Short - lived perennial, tufted sedge, without conspicuous rhizomes. Culms terete, hollow, smooth, dark green, clothed with 2 or 3 bladeless sheaths. Inflorescence a pseudo - lateral head, densely bearing several spikelets, light - green, tinged with brown. Bract one, culm like, 20 - 60 cm long, terete, septate. Spikelets 7 - 15 × 3 - 4 mm, cylindrical or oblong, subacute, densely many - flowered. Glumes tightly spirally imbricated, 3.5 - 5.0 mm long, ovate, membranous, finely many - veined, pale - green, tinged with red - brown on back, sharply keeled. Nuts broadly obovate, acute triquetrous, dark brown.

Fl. & Fr. : September - February.

Frequently found in the eastern part of the state in marshy places near ponds, ditches, tanks etc.

Selected specimens : Ajmer : *Lourie* 4895 (DD) ; Banswara : *Lodia* fank, *Kanodia* 51128 (BSI) ; Bundi : *Hindoli*, *Verma* 1898 (BSA) ; Chittorgarh : *Bansi*, *Verma* 1709 (BSA) ; Jalore : *Baragaon*, *Shetty* 6692 (BSJO) ; Kota : *Kelwara*, *Singh* 90833 (LWG).

2. *Schoenoplectus corymbosus* (Roth ex Roem. & Schult.) Raynal in Fabregues & J.B. Lebrun, Cat. Pl. Vasc. Niger 343. 1976 ; Hooper in Saldanha & Nicolson, Fl. Hassan 697. 1976. *Isalepis corymbosus* Roth ex Roem. & Schult. Syst. Veg. 2 : 110. 1817. *Scirpus corymbosus* auct. non

L. 1773, nec. Forsk. 1775 ; Clarke in Hook. f. Fl. Brit. India 6 : 657. 1893.

Stout, perennial sedge ; rhizomes 5 - 10 cm long, horizontal. Culms stout, terete, thick. Leaves reduced to sheaths, with a very oblique, cuspidate mouth. Inflorescence of 4 - 8 rays bearing clustered spikelets, often proliferous. Bracts about 3 cm long, erect, rigid. Spikelets c. 8×4 mm, ellipsoid, terete. Glumes 3 - 5 mm long, with a narrow minutely excurrent midrib, oblong, acute. Hypogynous bristles absent. Nuts c. 2 mm long, elliptic to obovoid, unequally triquetrous, shining, punctate, black.

Fl. & Fr. August - November.

Rare, along Aravalli ranges in marshy habitats.

Selected specimens : Sirohi : Mt. Abu, *Blatter* 1891, 1924 (BLAT), *Mehta* 1030 (JAC). Also reported from Alwar (Vyas, 1966 & 1967) and Sirohi districts (Jain, 1962).

3. *Schoenoplectus grossus* (L. f.) Palla in Allg. Bot. Z. Syst. 17 : Beibl. 3. 1911. *Scirpus grossus* L. f. Suppl. 104. 1781 ; Clarke in Hook. f. Fl. Brit. India 6 : 659. 1893 ; Bhandari, Fl. Ind. Desert 377. 1978. *S. kysoor* Roxb. Fl. Ind. 1 : 230. 1820. *S. grossus* L. f. var. *kysoor* (Roxb.) Clarke in Hook. f. l.c. 6 : 660. 1893.

Perennial, stoloniferous sedge. Culms solitary to few, tufted, acutely triangular, spongy, septate - nodose. Leaves usually equalling the culm; 1.5 - 3.0 mm wide, linear, 1 - ribbed, septate - nodose. Inflorescence a large terminal compound corymb. Bracts 3 - 4, leafy, exceeding the inflorescence. Spikelet solitary, 6 - 10×3.5 - 4.0 mm, ellipsoid, many-flowered, rounded at apex, light brownish - rusty. Glumes 3 - 4 mm long, elliptic, obtuse, mucronate, keeled, membranous, loosely imbricate. Hypogynous bristles 6, unequal, longer than the nut, retrorsely scabrid, brown. Nuts c. 2 mm long, obovoid, trigonous, with a minute conical tip, smooth, ashy-grey or yellowish - brown.

Fl. & Fr. : August - December.

Rare, in marshy habitats. Included on the authority of King (1879) from western Rajputana and Sarup (1951) from Jodhpur.

4. *Schoenoplectus juncooides* (Roxb.) Palla in Bot. Jahrb. Syst. 10 : 229. 1889. *Scirpus juncooides* Roxb. Fl. Ind. 1 : 228. 1820. *S. erectus* auct. plur. non Poir. 1805 ; Clarke in Hook. f. Fl. Brit. India 6 : 656. 1893 ; Parker in Duthie, Fl. Gangetic Plain 3 : 359. 1929.

Tufted sedge, without conspicuous rhizomes. Culms tall, subterete or obtusely many - angled, green, clothed at base with few sheaths only.

Sheaths 3 - 4, lower one scale - like, brownish, upper ones long, pale-green. Inflorescence a pseudo - lateral head, with 2 - 9 spikelets. Bracts dilated at base, 1 - furrowed on ventral side. Spikelets 6 - 18 × 3 - 6 mm, oblong to ovoid - oblong, densely many flowered, straw - coloured. Glumes 3 - 4 × 1.8 - 2.7 mm, oval to ovate - oval, pale and brownish tinged; keel broad, green, 1 or 3 - nerved. Hypogynous bristles 4 to 6, retrorsely scabrid on upper part, unequal. Nuts c. 2.0 × 1.5 mm, broadly obovate, unequally biconvex transversely wrinkled, dark - brown.

Fl. & Fr. : August - November.

Rare, in wet habitats. Included on authority of Vyas (1966 & 1967) and Ramdeo (1969) from Alwar and Udaipur districts respectively.

5. *Schoenoplectus lacustris* (L.) Palla in Sitzber. Zool. - Bot. Ges. Wien 38 : 49. 1888 *et* Bot. Jahrb. Syst. 10 : 298. 1889 *Scirpus lacustris* L. Sp. Pl. 48. 1753; Clarke in Hook. f. Fl. Brit. India 6 : 658. 1893; Parker in Duthie, Fl. Gangetic Plain 3 : 359. 1929.

Perennial sedge, with horizontal rhizomes. Culms tall, terete or somewhat obtusely trigonous at the top. Sheaths membranous, ending in an acute tip or blade. Spikelets terminal, 8 - 14 mm long, discrete or clustered in once or twice compound umbels; reduced sometimes to almost a small head. Lower bract 2.5 - 10.5 cm long, erect, appearing as a continuation of the stem. Glumes c. 4 mm long, ovate, concave, scarious, emarginate, margins pilose; keel excurrent as a small scabrid mucro. Hypogynous bristles 5 - 6, retrorsely scabrid. Nuts 2.0 - 2.5 mm long, obovoid, plano - convex, apiculate, smooth, dark - brown.

Fl. & Fr. : August - November.

Rare, found in the south and south - eastern parts of the state in marshy habitats.

Selected specimen : Chittorgarh : Sema, Verma 1623 (BSA).

6. *Schoenoplectus littoralis* (Schrad.) Palla subsp. *subulatus* (Vahl) Koyama in Dassanayake and Fosberg, Fl. Ceylon 5 : 157. 1985. *Scirpus subulatus* Vahl, Enum. Pl. 2 : 268. 1805. *S. littoralis sensu* Clarke in Hook. f. Fl. Brit. India 6 : 659. 1893, non Schrad. 1806; Parker in Duthie, Fl. Gangetic Plain 3 : 362. 1929.

Perennial, loosely tufted sedge, usually with stoloniferous rhizomes. Culms tall, erect, terete, obtusely triangular at apex, smooth, clothed at base with bladeless sheaths. Sheaths membranous, cylindrical, greyish-brown. Inflorescence a pseudo - lateral, simple, umbel - like corymb; rays somewhat compressed, scabrous on angles. Bracteoles scale - like.

Spikelets 7 - 12 × 3 - 4 mm, oblong - ovate or elliptic - ovate, many-flowered, rusty - brown. Glumes 3 - 4 mm long, oblong - ovate, slightly boat - shaped, membranous, brown ; keel slender, forming a short recurved mucro at the apex. Hypogynous bristles 3 - 4, somewhat plumose mostly fimbriate on the upper part and papulose near the base. Nuts *c.* 2.0 × 1.6 mm, broadly obovate, biconvex, chestnut - brown.

Fl. & Fr. : November - April.

Common throughout the state in marshy habitats along riverbeds, ponds etc.

Selected specimens : Alwar : Baraviar, *Parmar* 9718 (BSJO) ; Jaisalmer : North of Jaisalmer, *Blatter* 2903 (BLAT) ; Jodhpur : *Bhandari* 1277 (JAC) ; Kota : Shahabad, *Wadhwa* 9270 (BSA) ; Palli : Bandi riverbed, *Shetty* 1351 (BSJO) ; Sirohi : Abu road, *McCann* 1392 (BLAT) ; Tonk : Chandi village, *Shetty* 1026 (BSJO).

7. *Schoenoplectus mucronatus* (L.) Palla in Sitzber. Zool. - Bot. Ges. Wien 38 : 49. 1888. *Scirpus mucronatus* L. Sp. Pl. 50. 1753 ; Clarke in Hook. f. Fl. Brit. India 6 : 657. 1893 ; Parker in Duthie, Fl. Gangetic Plain 3 : 359. 1929. *S. triangulatus* Roxb. Fl. Ind. 1 : 219. 1820.

Perennial, loosely tufted sedge, with short, horizontal rhizomes. Culms tall, sharply triangular, striate when dry, surrounded at base with 2 - 3 sheaths. Sheaths membranous, lowest somewhat scale - like, the upper ones triangular - cylindrical, 7 - 20 cm long, faintly many - nerved. Inflorescence a hemispherical, pseudo lateral head with 2 - 10 spikelets. Bracts one, culm - like. Spikelets 6 - 13 × 3 - 5 mm, ovate or oblong, densely many - flowered, stramineous - brown. Glumes 2.8 - 4.0 × 2 - 3 mm, oval to ovate - orbicular, boat - shaped, membranous, minutely ciliolate along the upper margin, pale or brownish, many - nerved. Hypogynous bristles 6, equal or slightly shorter than the nut, retrorsely scabrous, reddish - brown. Nuts *c.* 2.2 × 2.0 mm, broadly obovate, obcompressed - triangular, transversely wrinkled, brownish - black.

Fl. & Fr. : August - December.

Rare, in the north - east & south - eastern parts of the state in marshy places, along dam sides etc.

Selected specimens : Alwar : Jaisamand, *H. Lal* 34597 (LWG) ; Ramgarh, *Sharma* Acc. No. 4978 (RUBL) ; Jhalawar : *N.K.S.* 374 (RUBL) ; Kota : Shahabad, *Verma* 699 (BSA).

8. *Schoenoplectus roylei* (Nees) Lye in Bot. Notiser 124 : 290 1971. *Isolepis roylei* Nees in Wight, Contrib. 107. 1834. *Scirpus quinquefarius* Buch. - Ham. ex Boeck. in Linnaea 36 : 701. 1870 ; Clarke in Hook. f. Fl. Brit. India 6 : 657. 1893. *S. roylei* (Nees) Parker in Duthie, Fl. Gangetic Plain 3 : 361. 1929.

Annual sedge, with fibrous roots. Culms slender, terete or slightly compressed, often transversely septate when dry. Sheaths loose, membranous, with oblique mouth. Leaves absent. Inflorescence a pseudolateral head. Spikelets 0.6 - 1.2 cm long, ovoid-oblong, obtuse, slightly compressed, pale greenish-brown. Glumes inflated in fruit, c. 4 mm long, usually 5-ranked, elliptic-lanceolate, membranous, acutely mucronate, apex slightly recurved, keeled. Hypogynous bristles absent. Nuts c. 1.6 mm long, obovoid, acutely trigonous, apiculate, rugose with transverse wavy lines, black.

Fl. & Fr. : August - December.

Common in marshy habitats.

Selected specimens : Ajmer : Bhim, *Duthie* 4917 (DD) ; Banswara : Near Banswara city, *Singh* 3710 (BSJO) ; Churu : Talchappar, *Roy* 4036 (BSJO) ; Jodhpur : Sikarpura tank, *Shetty* 287 (BSJO) ; Tonk : Near Tordi Sagar, *Shetty* 1317 A (BSJO) ; Udaipur : *Majumdar* 12475 (BSA).

9. *Schoenoplectus supinus* (L.) Palla subsp. *lateriflorus* (Gmelin) Koyama in Hara, Stearn & Williams, Enum. Fl. Pl. Nepal 1 : 119. 1978. *Scirpus lateralis* Retz. Obs. Bot. 4 : 12. 1786, non Forsk. 1775. *Scirpus lateriflorus* Gmelin, Syst. Vcg. 127. 1791. *S. supinus* auct. plur. non L. 1753 ; Clarke in Hook. f. Fl. Brit. India 6 : 655. 1893 et Illus. Cyper. t. 48. f. 13 - 14. 1909 ; Parker in Duthie, Fl. Gangetic Plain 3 : 360. 1929.

Perennial, tufted sedge, with fibrous roots. Culms slender, trigonous, clothed at base with 2 or 3 sheaths only. Sheaths membranous, pale-green. Inflorescence pseudolateral, head-like or corymbose, with upto 4 very short rays. Bracts 1 or 2, erect, ventrally sulcate. Spikelets 3 - 20 to an inflorescence, congested or clustered in groups of 2 - 7 at the apices of rays, 4 - 8 × 2 - 3 mm, ovate-lanceolate to oblong, pale-green, many-flowered. Glumes 1.8 - 2.5 mm long, elliptical, boat-shaped, with a prominent, green, 3-nerved keel. Nuts 1.0 - 1.3 mm long, broadly obovate, triangular, mucronate at apex, black.

Fl. & Fr. : October - March.

Common on marshy banks of tanks, ponds etc.

Selected specimens : Banswara : Near Loharia village, Singh 4249 (BSJO) ; Chittorgarh : Bansi, Verma 1708 (BSA) ; Churu : Talchappar, Roy 4034 (BSJO) ; Jaisalmer : Bhandari 949 (JAC) ; Jodhpur : Agolei tank, Shetty 302 (BSJO) ; Tonk : Near Tordi sagar, Shetty 1317 B (BSJO).

Notes : Very similar to subsp. *supinus* which is, however, confined to southern Europe, north Africa and western Asia. Later can be separated from subsp. *lateriflorus* by its culms which are not nodose above the base and slightly longer nuts.

15. SCLERIA Berg.

Leaves 3 - 4 mm broad. Disc uniseriate, 3 - lobed. Nuts globose.	...	1. <i>S. parvula</i>
Leaves 6 - 8 mm broad. Disc biseriate, each 3 - lobed. Nuts globosely ellipsoid.	...	2. <i>S. stocksiana</i>

1. *Scleria parvula* Steud. Synop. Pl. Glum. 2 : 174. 1855 ; Kern in Blumea 11 : 202. f. 7 i. 1951. *Scleria terrellata* auct. non Willd. 1805 ; Clarke in Hook. f. Fl. Brit. India 6 : 636. 1893 ; Duthie, Fl. Gangetic Plain 3 : 367. 1929.

Annual tufted sedge, with reddish - purple fibrous roots. Culms slender, tall, distantly 5 to 7 - nodose, triquetrous, scabrid on angles. Basal 1 to 3 sheaths bladeless or nearly so, acutely triquetrous. Leaves 2 - 35 × 0.2 - 0.6 cm, linear, 3 - costate, glabrous. Inflorescence with 2 to 4 partial panicles, occupying most of the length of culm. Staminate spikelets 4 - 5 mm long, lanceolate. Pistillate spikelets 4 - 5 mm long, obdeltoid. Glumes 3 - 5 mm long, ovate, acute and mucronate at apex, membranous, pale, stained with purplish brown. Nuts 2.0 - 2.3 × 1.7 - 2.0 mm, globose, cancellate with regularly arranged, transversely rectangular lacunae, more or less pubescent or glabrescent, shining white.

Fl. & Fr. : September - January.

Rare, in marshy places.

Selected specimen : Bhilwara : Bijolia, Singh 5703 (BSJO).

2. *Scleria stocksiana* Boeck. in Linnaea 38 : 474. 1874 ; Clarke in Hook. f. Fl. Brit. India 6 : 687. 1893 ; Cooke, Fl. Bombay 2 : 905. 1908.

Annual sedge, with fibrous roots. Culms erect, slender, striate, triquetrous above, scabrous on the margins, the minute spinules on the upper part pointing upwards, those below pointing downwards. Leaves 15 - 30 × 0.6 cm, linear, acuminate, scabrous - margined. Sheaths striate, truncate, usually hairy at the mouth. Panicles elongate, slender, the lower branches remote. Bracts of variable length, leaf - like. Spikelets with female and androgynous flowers more or less mixed with males, oblong, obtuse. Glumes ovate - lanceolate. Nuts 3 - 4 mm long, exceeding the glumes, globose ellipsoid, truncate at base, densely cancellate - reticulate.

Fl. & Fr. : August - December.

Rare, in marshy places on Aravalli hills.

Selected specimens : Sirohi : Mt. Abu, *Duthie* 6716 (DD), *Rao* 66632 (BSI), *Blatter* 1879, 2724 (BLAT).

CULTIVATED SPECIES

Cyperus flabelliformis Rottb. - Perennial, tufted, rhizomatous sedge. Leaves well developed or reduced to sheaths. Spikelets yellowish - brown or straw - coloured, ovate - lanceolate or ellipsoid, in terminal compound umbels. Nuts slightly trigonous, ellipsoid, or obovate, minutely transversely punctate. Native of Africa ; occasionally cultivated in ferneries and small ponds in the gardens as an ornamental sedge.

154. POACEAE (GRAMINEAE *nom. alt.*)

(R.P. Pandey)

- 1a. Culms tall, hard, arborescent or shrubby bamboos, covered with white, waxy powder. Leaves with a petiole - like base and articulated with the sheath. Lemmas many. Flowering and fruiting rare :
- 2a. Spikelets in dense clusters along the panicle - branches. Rachilla - internodes very short, not articulating. Culms not thorny. ... 25. *Dendrocalamus*
- 2b. Spikelets clustered or in open, compound leafy panicles. Rachilla - internodes elongate, upto half the length of the lemma, promptly or tardily disarticulating. Culms thorny. ... 11. *Bambusa*
- 1b. Culms small, soft, herbaceous, not covered with white, waxy powder. Leaves sessile, not articulated with the sheath. Lemmas few. Flowering and fruiting annually :

- 3a. Spikelets 1 to many - flowered, breaking up at maturity above the more or less persistent glumes, or if falling entire then not 2 - flowered. Spikelets usually laterally compressed or terete :
- 4a. Spikelets usually with two or more fertile florets, or if with one fertile floret then with sterile reduced floret above it :
- 5a. Low or moderately tall grass. Lemma and rachilla glabrous or hairy, but with the hairs not enveloping the lemma, or if so, then the lemma with a geniculate awn :
- 6a. Glumes usually shorter than the lowest floret and with the upper floret distinctly exserted, rarely longer and then with firm, dull margins like the lemmas, or if with hyaline margins then the lemma firmly keeled. Lemmas awnless or with a straight or curved awn from the entire or 2 - fid apex or several awned or lobed :
- 7a. Lemmas usually 5 to many - nerved :
- 8a. Lemma, if awned, with one awn, if awnless then lemmas not 7 to 9 - nerved, nor strongly compressed :
- 9a. Leaves with numerous cross - nerves. Starch - grains simple. ... 16. *Centotheca*
- 9b. Leaves tassellately nerved. Starch grains compound :
- 10a. Inflorescence a stiff, 2 - sided spike ; lemmas rounded on the back, mostly awned. ... 59. *Lolium*
- 10b. Inflorescence an open or contracted panicle. Lemmas keeled on the back, awnless. ... 76. *Poa*
- 8b. Lemmas 9 - nerved, or if awnless then lemmas 7 to 9 - nerved, strongly compressed or rounded :
- 11a. Grass not rhizomatous. Inflorescence a cylindrical panicle. Glumes similar. Lemmas 9 to many - nerved, with the nerves continued out as antorsely scabrid or ciliate awns. Hilum basal. ... 38. *Enneapogon*

- 11b. Rhizomatous grass, Inflorescence a globose head. Glumes unequal, Lemmas 7 to 9 - nerved ; nerves not produced as awns. Hilum punctiform. ... 2. *Aeluropus*
- 7b. Lemmas 1 to 3 - nerved :
- 12a. Inflorescence of panicles, if racemes or spikes then the spikelets not secund :
- 13a. Lemmas usually entire at the apex, obtuse, acute or acuminate, sometimes mucronate, or if two-toothed or nerved from the tip then glabrous near the margins and along the side nerves :
- 14a. Glumes aristate or aristate - acuminate. Spikelets sessile on the flattened branches of a narrow panicle, 2 to 3 - flowered. ... 32. *Dinebra*
- 14b. Glumes obtuse, acute or acuminate, rarely the upper one awned and the spikelets then in digitate spikes or in a short raceme of spikes :
- 15a. Internodes of the rachilla bearded at the tip with long hairs upto half the length of the lemma. ... 45. *Hatopyrum*
- 15b. Internodes of the rachilla glabrous or only shortly hairy :
- 16a. Spikelets in open, contracted or spike - like panicles or solitary, secund spikes or in globose dense clusters :
- 17a. Spikelets awnless :
- 18a. Inflorescence a panicle or spike - like. ... 40. *Eragrostis*
- 18b. Inflorescence a solitary secund spike. ... 39. *Eragrostiella*
- 17b. Spikelets awned, in dense globose clusters. ... 37. *Elytrophorus*

- 16b. Spikelets sessile or very shortly pedicelled, loosely to densely imbricate in digitate or racemously arranged spikes or spike-like racemes, very rarely in solitary spike :
- 19a. Axis of the spikes terminating into a sharp point. Upper glume mucronate or awned. ... 24. *Dactyloctenium*
- 19b. Axis and branches of the inflorescence ending in a spikelet :
- 20a. Spikelets falling entire at maturity from the axis of straight spikes ; the latter numerous and crowded into a long, narrow, dense panicle. Glumes 1 - nerved. ... 26. *Desmostachya*
- 20b. Spikelets breaking up at maturity. Spikes few to several :
- 21a. Spikes usually in pseudo-whorls or scattered. Lemmas with the lateral nerves running out into minute teeth and the middle nerve into a mucro or short awn. ... 1. *Acrachne*
- 21b. Spikes digitate or subdigitate. Lemmas entire :
- 22a. Spikes persistent. ... 35. *Eleusine*
- 22b. Spikes deciduous at maturity. ... 63. *Ochthochloa*

- 13b. Lemmas usually emarginate or 2 to 4 - lobed or toothed at the apex, rarely entire and then hairy along the nerves, frequently mucronate or awned :
- 23a. All florets fertile. Lemmas glabrous :
- 24a. Spikelets in panicles or in digitate or racemously arranged spike - like racemes :
- 25a. Racemes loosely spiculate. Spikelets linear - oblong, subterete. Lemmas more or less rounded on the back. ... 33. *Diplachne*
- 25b. Racemes densely spiculate, conspicuously secund. Spikelets oblong, laterally compressed. Lemmas keeled ... 57. *Leptochloa*
- 24b. Spikelets in terminal, solitary secund spikes. ... 97. *Tripogon*
- 23b. Upper 1 - 3 florets sterile, reduced to empty lemmas. Lemmas shortly hairy. ... 97. *Tetrapogon*
- 12b. Inflorescence a raceme or panicle of racemes ; the spikelets secund :
- 26a. Inflorescence terminal, spicate, neither digitate nor of racemose spikes. Lemmas not obovate :
- 27a. Inflorescence of pedunculate groups of awned spikelets on a simple rachis. ... 60. *Melanocenchris*
- 27b. Inflorescence a simple spike or spikes of awned or awnless, sessile spikelets :
- 28a. Spikelets awnless, more or less sunk in the thick tough rachis, ... 66. *Oropetium*
- 28b. Spikelets long-awned, not sunk in a thick rachis- ... 85. *Schoenefeldia*
- 26b. Inflorescence of digitate spikes or spikes racemose :
- 29a. Spikelets 1 - flowered, bisexual, usually without sterile floret above, sometimes a tiny vestigial floret present on the rachilla extension. Lemmas not widened above, glabrous :

- 30a. Lemmas long - awned. ... 85. *Schoenefeldia*
- 30b. Lemmas awnless. ... 23. *Cynodon*
- 29b. Spikelets obviously several-flowered, the lower 1 - 2 (- 4) bisexual. Rachilla produced and bearing 1 to several empty lemmas. Lemmas widened above, hairy :
- 31a. Spikes 1 to 3. Fertile florets 2 to 4. ... 93. *Tetrapogon*
- 31b. Spikes 4 or more. Fertile floret only one. ... 18. *Chloris*
- 6b. Glumes as long as the lowest floret, often as long as the spikelet and enclosing the florets, if shorter than the lowest floret then having the palea with two awns. Lemmas usually awned :
- 32a. Spikelets strictly 1 - flowered. Rachilla not prolonged :
- 33a. Spikelets falling entire attached to the pedicel or part of it. Callus absent. Glumes with long slender awns. ... 77. *Polypogon*
- 33b. Spikelets breaking up above the glumes or falling entire. Callus bearded. Glume acute. ... 14. *Calamagrostis*
- 32b. Spikelets with more than 1 floret. Rachilla produced :
- 34a. Annuals. Lemmas awned :
- 35a. Spikelets more than 10 mm long, pendent, in a large, open panicle upto 40 cm long. ... 10. *Avena*
- 35b. Spikelets less than 7.5 mm long, erect, in compact or lobed panicle, rarely over 6 cm long. ... 81. *Rostraria*
- 34b. Perennials. Lemmas awnless. ... 55. *Koeleria*
- 5b. Tall grass, with large, plume - like panicles. Lemmas or rachilla - joints bearing long, silky hairs which envelop the lemma ; lemmas awnless or with a straight awn from the tip, often thin :
- 36a. Ligule membranous. Rachilla glabrous. Lemmas hairy all over the back. ... 9. *Arundo*
- 36b. Ligule a line of hairs. Rachilla long villous. Lemmas glabrous. ... 74. *Phragmites*

- 4b. Spikelets with one fertile floret, with or without one or two male or barren florets below it, the latter often much reduced :
- 37a. Glumes minute or suppressed. Fertile lemma and palea similar in shape and texture. Stamens 6 :
- 38a. Leaf - blades ovate - oblong or ovate - lanceolate, with inflated sheath. A floating grass. Floret one. ... 48. *Hygroryza*
- 38b. Leaf - blades linear, acute or acuminate ; sheath not inflated. Aquatic grass, but not floating. Fertile lemma supported by 2 empty scales ; tip of pedicel with 2 lips. ... 67. *Oryza*
- 37b. Glumes well - developed. Fertile lemma and palea dissimilar. Stamens 3 :
- 39a. Spikelets with three florets. ... 73. *Phalaris*
- 39b. Spikelets with 1 or 2 florets only :
- 40a. Spikelets with 2 florets ; the lower male or barren, the upper bisexual :
- 41a. Glumes equal in size, obtuse or mucronate. Upper lemma unawned. ... 52. *Isachne*
- 41b. Glumes unequal, the lower acute, the upper one acuminate. Upper lemma with a perfect awn or at least a bristle. ... 8. *Arundinella*
- 40b. Spikelets with one fertile floret :
- 42a. Spikelets very rarely falling entire and then with firmly membranous to coriaceous, awned or 5 - nerved lemmas :
- 43a. Lemmas hyaline or membranous at maturity, rarely indurated and then laterally compressed :
- 44a. Lemmas usually 3 to 5 - nerved, frequently awned, Glumes longer and firmer than the hyaline lemma or when the lemma is longer than the latter indurated. Grains with an adhering pericarp :

- 45a. Spikelets falling entire attached to the pedicel or part of it. Callus absent. Glumes with long, slender awns. ... 77. *Polypogon*
- 45b. Spikelets breaking up above the glumes or falling entire. Callus bearded. ... 14. *Calamagrostis*
Glumes acute.
- 44b. Lemmas 1 to 3 - nerved, awnless. Glumes and lemmas very similar in texture, hyaline or thinly membranous, shining. Grains with a free pericarp :
- 46a. Inflorescence a spreading panicle or spike - like and elongate ; no inflated sheath at base :
- 47a. Inflorescence a panicle. Grains without a beak. ... 91. *Sporobolus*
- 47b. Inflorescence elongate, spike-like. Grains with a conspicuous beak. ... 99. *Urochondra*
- 46b. Inflorescence spicate, very dense, subtended by an inflated sheath bearing a rudimentary blade. ... 21. *Cryptis*
- 43b. Lemmas indurated or rigid at maturity, terete or dorsally compressed :
- 48a. Awns trifid ;
- 49a. Central awn - branch glabrous. ... 6. *Aristida*
- 49b. Central awn - branch plumose. ... 92. *Stipagrostis*
- 48b. Awns simple, sometimes flanked by two bristles. ... 75. *Piptatherum*

- 42b. Spikelets falling entire at maturity, either singly or in clusters from the axis of slender spike-like panicle or raceme. Lemma delicate, 1 to 3-nerved :
- 50a. Spikelets fascicled or solitary. Glumes not awned :
- 51a. Spikelets arranged in erect racemes. Glumes of the spikelets with recurved spines or one armed and other smooth :
- 52a. Spikelets solitary, distant on flattened wedge-shaped pedicels. Glumes tuberculate. ... 58. *Leptothrium*
- 52b. Spikelets in pairs, almost sessile. Glumes covered with rows of hooked spines. ... 96. *Tragus*
- 51b. Spikelets arranged in rigid, erect spikes. Glumes of the spikelets smooth, compressed, shining. ... 30. *Dignathia*
- 50b. Spikelets solitary, Glume awned. ... 72. *Parotis*
- 3b. Spikelets 2-flowered, falling entire at maturity, with the upper floret bisexual and the lower one male or barren and in the latter case often much reduced. Spikelets usually dorsally compressed :
- 53a. Spikelets solitary or rarely paired ; in latter case the spikelets all alike. Glumes usually membranous, the lower mostly smaller or sometimes suppressed. Lower lemma mostly resembling the upper glume in texture ; upper lemma papery to very tough and rigid, awnless :
- 54a. Spikelets finely awned or mucronate from the notched tips of the upper glume and lower lemma, delicately pedicelled. Lower glume minute. Upper lemma rigidly membranous. ... 80. *Rhynchelytrum*

- 54b. Spikelets not awned or if awned then subsessile in the false secund variously arranged spikes and with awns from the entire tips of the upper glumes and lower lemmas or from the tips of both glumes. Upper lemma mostly crustaceous, rarely chartaceous :
- 55a. Spikelets solitary or in clusters, with an involucre of bristles or subtended by a solitary bristle and falling with or without the bristles at maturity :
- 56a. Bristles caducous. Upper lemma smooth :
- 57a. Bristles many, formed of highly modified bristles or spine - like branchlets :
- 58a. Involucre of free, naked or plumose bristles. ... 71. *Pennisetum*
- 58b. Involucre of spines or rigid bristles united at the base into a hard cup. ... 15. *Cenchrus*
- 57b. Bristles solitary, formed by the prolongation of the branch beyond the terminal spikelet. ... 79. *Pseudoraphis*
- 56b. Bristles persistent. Upper lemma transversely rugose. ... 88. *Setaria*
- 55b. Spikelets falling singly, not subtended by bristles, or if so, then the bristles persisting after the spikelets have fallen :
- 59a. Spikelets arranged in more or less open panicles, or panicles contracted and spike - like :
- 60a. Spikelets arranged in open or contracted panicles. ... 68. *Panicum*

- 60b. Spikelets arranged in cylindrical spike-like panicles :
- 61a. Spikelets more or less gibbous. Upper lemma and palea indurated and closed at apex. Upper glume inflated. ... 84. *Sacciolepis*
- 61b. Spikelets lanceolate. Upper lemma and palea membranous, gaping at apex. ... 49. *Hymenachne*
- 59b. Spikelets arranged in one-sided spikes or spike-like racemes ; spikes or racemes digitate or scattered, rarely solitary :
- 62a. Lemma of the upper floret more or less crustaceous or coriaceous, usually with narrow inrolled margins, exposing much of the palea :
- 63a. Lower glume and lowest internode of the rachilla not forming a swollen callus at the base of the spikelet :
- 64a. Lower glume turned away from the rachis of the racemes or spike, the back of the upper lemma facing it, i.e. spikelets abaxial :
- 65a. Lower glume developed, although sometimes small :
- 66a. Glumes acuminate or awned, rarely acute. Upper lemma not mucronate :
- 67a. Culms erect or suberect. Leaf-blade linear. Racemes dense. ... 34. *Echinochloa*
- 67b. Culms creeping and ascending. Leaf-blade lanceolate to ovate. Racemes loose to moderately dense. ... 65. *Oplismenus*
- 66b. Glumes awnless, if acuminate, then with the upper lemma mucronate :
- 68a. Upper lemma acute, not mucronate. ... 69. *Paspalidium*

- 68b. Upper lemma obtuse, mucronate or very shortly awned. ... 98. *Urochloa*
- 65b. Lower glumes usually absent. Spikelets plano-convex. ... 70. *Paspalum*
- 64b. Lower glume turned towards the rachis, the back of the upper lemma turned away from it, i.e. spikelets adaxial. ... 13. *Brachiaria*
- 63b. Lower glume and lowest internode of the rachilla forming a swollen callus at the base of the spikelet. Upper lemma mucronate or short-awned. ... 41. *Eriochloa*
- 62b. Lemma of the upper floret thinly cartilaginous, usually with flat hyaline margins:
- 69a. Spikelets awnless. ... 29. *Digitaria*
- 69b. Spikelets awned. ... 3. *Alloteropsis*
- 53b. Spikelets typically paired, with one sessile and the other pedicelled, those of each pair usually dissimilar, rarely solitary and all alike. Glumes as long as the spikelet and enclosing the floret, more or less rigid and firm than the hyaline or membranous lemmas. Upper lemma often with a geniculate awn:
- 70a. Spikelets unisexual, the sex in separate inflorescences or in different parts of the same inflorescence:
- 71a. Female spikelets completely enclosed in a metamorphosed leaf-sheath (cupule) which takes the form of a spherical or cylindrical osseous or ivory bead-like structure. ... 20. *Coix*
- 71b. Female spikelets not enclosed in a cupule as above. ... 17. *Chionachne*
- 70b. Spikelets all bisexual; or each bisexual spikelet paired with a male or barren one:
- 72a. Spikelets solitary, almost sessile or shortly pedicelled at the nodes of a tough or fragile rachis. Inflorescence of a single raceme or of several racemes. ... 31. *Dimeria*
- 72b. Spikelets in pairs, rarely in threes, similar or dissimilar, a sessile and other pedicelled or one short, the other long-pedicelled, rarely the pedicelled reduced or very rarely the sessile reduced to a scale or two, and the pedicelled spikelet developed:

- 73a. Spikelets of each pair similar, the sessile and the pedicelled both hermaphrodite. Joints of the panicle thin, linear or somewhat expanded at the top :
- 74a. Spikelets arranged in more or less simple panicles or compound racemes arranged along a central axis :
- 75a. Rachis of racemes tough or tardily breaking up :
- 76a. Lemma unawned. Spikelets in pairs, one sessile, the other pedicelled. ... 50. *Imperata*
- 76b. Lemma awned. All spikelets pedicelled. ... 61. *Miscanthus*
- 75b. Rachis of the racemes breaking up :
- 77a. Spikelets awned. ... 90. *Spodiopogon*
- 77b. Spikelets unawned. ... 83. *Saccharum*
- 74b. Spikelets arranged in a single or in several racemes, the latter being digitate or arranged along a very short main axis :
- 78a. Upper lemma two-toothed, awned. ... 43. *Eulaliopsis*
- 78b. Upper lemma deeply cleft, awned in the cleft, rarely stipitiform. ... 42. *Eulalia*
- 73b. Spikelets in each pair dissimilar, the sessile hermaphrodite, the pedicelled male or sterile or completely absent or if more or less similar then the joints of the raceme and the pedicel thick and swollen :
- 79a. Sessile spikelets with a male and a hermaphrodite floret. Upper lemma mostly awned :
- 80a. Joints of the rachis and pedicel of the pedicelled spikelets swollen, 3-angled, rounded or flattened :

- 81a. Racemes 1 - noded, reduced to three heteromorphous spikelets, enclosed in a boat - shaped spathe. ... 5. *Apluda*
- 81b. Racemes many - noded, not enclosed in a spathe - like sheath :
- 82a. Racemes solitary, terminal. Lower glume of sessile spikelet not transversely grooved ... 87. *Setima*
- 82b. Racemes two to many. Lower glume of sessile spikelet often with nodules on the margins or transversely furrowed :
- 83a. Pedicelled spikelets developed. Lower glume usually coriaceous below, often transversely wrinkled, furrowed or with nodules on the margins. ... 53. *Ischaemum*
- 83b. Pedicelled spikelet reduced to a linear curved pedicel. Lower glume coriaceous, convex, covered all over with transverse ridges which are often broken up into warts or teeth, not keeled. ... 94. *Thelepogon*
- 79b. Sessile spikelet with a hermaphrodite floret only or occasionally with a male floret below. Upper lemma awnless :
- 84a. Sessile spikelet spherical. Lower glume pitted all over. Pedicelled spikelet reduced. ... 44. *Hackettchloa*
- 84b. Sessile spikelet not spherical. Lower glume not pitted. Pedicelled spikelet well developed or absent :
- 85a. Spikelets similar. Rachis very tough. Joints and pedicel fused. ... 46. *Hemarthria*
- 85b. Spikelets more or less dissimilar. Rachis breaking up. Joints and pedicels usually free :
- 86a. Racemes covered with shaggy hairs :
- 87a. Lower glumes covered on the margins with bearded warty projections. All the sessile spikelets on one side of the rachis. Spikelets in pairs. ... 36. *Elyonurus*

- 87b. Lower glumes without warty projections. Sessile spikelets alternating at each node of the rachis. Spikelets in threes, one sessile and other two pedicelled. ... 56. *Lasiurus*
- 86b. Racemes usually glabrous, not conspicuously hairy :
- 88a. Axis of the spikes tough. ... 46. *Hemarthria*
- 88b. Axis of the spikes fragile :
- 89a. Sessile spikelets in pairs at each node of the axis. ... 62. *Mnesithea*
- 89b. Sessile spikelets solitary at each node of the axis :
- 90a. Spikelets paired, one sessile, the other pedicelled. Racemes cylindrical. ... 82. *Rottboellia*
- 90b. Spikelets solitary, sessile, the pedicelled suppressed or rudimentary. Spikes cylindrical, with the spikelets in opposite rows. ... 64. *Ophiuros*
- 80b. Joints of the rachis and the pedicel narrow, seldom thickened upwards, occasionally with a translucent longitudinal groove ;
- 91a. Inflorescence a terminal raceme. ... 87. *Setaria*
- 91b. Inflorescence a panicle :
- 92a. Spikelets in racemes which are not interrupted by spathes or solitary at the ends of the branches ; the racemes collected into whorled panicles. Joints and pedicels not furrowed ;
- 93a. Spikelets dorsally compressed. ... 89. *Sorghum*
- 93b. Spikelets compressed from the sides :
- 94a. Spikelets in many pairs, arranged in whorled racemes. Lower glume tuberculate. ... 100. *Veriveria*

- 94b. Spikelets in groups, each consisting of a sessile and two, more or less reduced pedicelled spikelets or a raceme of several pairs. Lower glume smooth. ... 19. *Chrysopogon*
- 92b. Panicles of racemes which are interrupted by spathes, or the espatheate racemes digitate or in pairs or solitary and terminal, sometimes the joints and/or pedicels with a translucent median furrow :
- 95a. Upper lemma of the sessile spikelet with a basal awn. ... 7. *Arthraxon*
- 95b. Upper lemma of the sessile spikelet awned from the tip or from the cleft or upper lemma reduced to the hyaline base of the awn, very rarely unawned :
- 96a. Margins of the lower glume of the sessile spikelets sharply infolded, 2-keeled. Awn glabrous :
- 97a. Upper lemma of the sessile spikelet not cleft, often stipitate and passing into the awn :
- 98a. Joints and pedicel with a translucent longitudinal furrow. ... 12. *Bothriochloa*
- 98b. Joints and pedicels without a translucent furrow :
- 99a. All the spikelets, both sessile and pedicelled, more or less alike; borne in the racemes. Glumes herbaceous, green. ... 27. *Dichanthium*

- 99b. Lower 1-3 spikelets homomorphous, the remaining heteromorphous. Lower glumes of the sessile hermaphrodite spikelets chartaceous, white. Glumes of lower homogamous spikelets and those of pedicelled spikelets turning red. ... 51. *Indochloa*
- 97b. Upper lemma of the sessile spikelet 2-lobed or 2-cleft, awned in the sinus :
- 100a. Aromatic grass. Racemes in pairs, supported by spathes, often collected into huge panicles. ... 22. *Cymbopogon*
- 100b. Grass not aromatic. Racemes in pairs or digitate or solitary : spathe usually absent :
- 101a. Racemes solitary at the end of the culms and their branches. Joints and pedicels often somewhat stout. Pedicelled spikelets male, neuter or suppressed :
- 102a. Pedicelled spikelets very much larger than the sessile. Upper glume awned. Joints and pedicels bucciniform. ... 28. *Diectomis*
- 102b. Pedicelled spikelets not so large, often small to very small. Upper glume awnless. Joints and pedicels clavate, 2-toothed. ... 86. *Schizachyrium*
- 101b. Racemes 2-nate or more rarely digitate, usually all pairs of spikelets heterogamous and all sessile spikelets hermaphrodite and alike or the lowest more or less reduced and barren, but still resembling the upper fertile spikelets. ... 4. *Andropogon*
- 96b. Margins of the lower glumes inturned and rounded at the sides, at the most keeled upwards. Awns hairy :
- 103a. Racemes surrounded at the base by an involucre :
- 104a. Involucral spikelets pedicellate, deciduous. Callus of fertile spikelets very short, truncate or obtuse. ... 54. *Iseilama*
- 104b. Involucral spikelets sessile, persistent. Callus of the fertile spikelets pointed. ... 95. *Themeda*

103b. Racemes without an involucre :

- 105a. Racemes straight or very slightly curved. Glumes often with tubercle-based bristles. Lower glume of sessile spikelet terete, grooved or not on the back, usually covered with short hairs. ... 47. *Heteropogon*
- 105b. Racemes markedly curved. Glumes glabrous. Lower glume of the sessile spikelet keeled and broadly winged, glabrous. ... 78. *Pseudodichanthium*

1. ACRACHNE Wt. & Arn. ex Chiov.

Acrachne racemosa (Heyne ex Roem. & Schult.) Ohwi in Bull. Tokyo Sci. Mus. no. 18 : 1. 1947 ; Bor. Grass. Burm. Ceyl. Ind. Pak. 487. 1960 ; Mahesh. Illus. Fl. Delhi f. 262. 1966. *Eleusine racemosa* Heyne ex Roem. & Schult. Syst. Veg 2 : 583. 1817. *E. verticillata* Roxb. Fl. Ind. 1 : 346. 1820 ; Hook. f. Fl. Brit. India 7 : 295. 1896.

Tufted, erect or geniculately ascending annual grass, upto 60 cm high. Leaves 5 - 15 × 0.5 - 1.0 cm, flat, glabrescent, acuminate ; ligule of a few hairs. Spikes many, upto 7.5 cm long. Spikelets many - flowered, each 4.5 - 7.5 mm long, shining, greenish - brown. Glumes unequal, finely acuminate or aristulate. Lemmas 1.75 - 2.5 mm long, 3 - nerved, with a stout awn point. Caryopsis rugose.

Fl. & Fr. : August - November.

Fairly common in sandy loam soils and in rocky habitats. It is said to be good fodder grass liked by the cattle.

Selected specimens : Ajmer : *Lourie* 4953 (DD) ; Bikaner : *Gajner, Roy* 2059 (BSJO) ; Jaipur : *Raizada* Acc. No. 130118, 130119 (DD) ; Jaisalmer : *Pokaran, Wadhwa* 4955 (BSA) ; Jodhpur : *Bap, Singh* 4379 (BSJO) ; Pali : Dhara-ar Mahadev temple, *Shetty* 1822 (BSJO) ; Sirohi : Mt. Abu, *Blatter* 8551 (BLAT).

2. AELUROPUS Trin.

Aeluropus lagopoides (L.) Trin. ex Thw. Enum. Pl. Zeyl. 374. 1864, *sphalm. lagopoidioides* ; Bor. Grass. Burm. Ceyl. Ind. Pak. 380. 1960 ;

Mabesh. Illus. Fl. Delhi f. 247. 1966. *Dactylis lagopoides* L. Mant. Pl. 1 : 33. 1767. *Aeluropus villosus* Trin. ex C.A. Mey. Verz. Pfl. Cauc. 18. 1831 ; Hook. f. Fl. Brit. India 7 : 334. 1896.

Tufted, rigid, rhizomatous perennials, upto 20 cm high. Leaves 2.5 - 3.75 × 0.25 - 0.5 cm, more or less distichous, narrowly lanceolate, pungent. Heads 1.0 - 2.25 × 1.0 - 1.5 cm, globose or elliptic-oblong. Spikelets 2 - 3 mm long, 4 to 8 - flowered. Lower glume 1 to 3 - nerved, hairy, with ciliate margins, upper one 3 to 5 - nerved. Lemmas upto 2.75 mm long, many - nerved, villous. Caryopsis c. 0.5 mm long, dorsally compressed.

Fl. & Fr. : Throughout the year.

Commonly found in saline and water - lodged habitats.

Selected specimens : Barmer : Rani ka Bara, *Shetty* 2330 (BSJO) ; Jaipur : Sambhar, *Mishra* Acc. No. 1210 (RUBL) ; Jaisalmer : Rann near Ramgarh, *Tiwari* 811 (BSJO) ; Jodhpur : Radia dry river - bed, *Shetty* 243 (BSJO) ; Pali : Khairlao tank, *Shetty* 1995 (BSJO).

3. ALLOTROPSIS J.S. Presl ex C.B. Presl

Allotroopsis cimicina (L.) Stapf in Prain, Fl. Trop. Africa 9 : 487. 1919 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 276. 1960 ; Raizada & Jain in Ind. For. Rec. (n.s.) Bot. 5 : 179. Pl. 7. f. 1. 1965. *Milium cimicinum* L. Mant. Alt. 2 : 184. 1771. *Panicum cimicinum* (L.) Retz. Obs Bot. 3 : 9. 1783. *Axonopus cimicinus* (L.) P. Beauv. Ess. Agrost. 120. 1812 ; Hook. f. Fl. Brit. India 7 : 64. 1896.

Erect or ascending annuals, upto 1 m high, with hairy nodes. Leaves 2.5 - 10.0 × 0.75 - 2.75 cm, ovate - lanceolate, amplexicaul at base, acute, margins ciliate ; ligule reduced to a ciliate rim. Inflorescence made up of 2 - 10, spike - like racemes seated on the top of peduncle. Spikelets - 3 - 5 mm long, green, ovate - ellipsoid. Lower glume acuminate, 3 to 5 - nerved ; upper one subulate - acuminate, margins with appressed hairs. Upper lemma awned ; the palea with globular, purplish hairs. Caryopsis suborbicular to elliptic - oblong.

Fl. & Fr. : July - October.

Sporadic grass found on the hills and in the wastelands.

Selected specimens : Ajmer : Sanalpura, *Raizada* Acc. No. 130089 (DD) ; Alwar : Bandipur Forest block, *Farmar* 9632 (ESJO) ; Banswara :

Kanodia 75409 (BSI) ; Dungarpur : Ratanpur, *Kanodia* 82075 (BSI) ; Jaipur : Ramgarh, *Sharma* 2040 (RUBL) ; Kota : Jagpura, *Singh* 21439 (DD) ; Udaipur : Chhapli, *Kanodia* 82517 (BSI).

4. ANDROPOGON L.

Andropogon pumilus Roxb. Fl. Ind. 1 : 277. 1820 ; Hook. f. Fl. Brit. India 7 : 170. 1896 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 93. 1960 ; Raizada *et al.* in Ind. For. Rec. (n.s.) Bot. 4 : 238. 1961. *A. pachyarthrus* Hack. in DC. Monogr. Phan. 6 : 449. 1889. 'Bhanjuri' (Hindi).

Erect or geniculately ascending annuals, upto 50 cm high. Leaves 2 - 10 × 0.25 - 0.5 cm, linear, acuminate ; ligule short, membranous. Racemes c. 1.75 cm long, spatheate, with paired spikelets. Sessile spikelets 3.75 - 5.0 mm long. Glumes almost equal, membranous, keeled, awned. Lemmas hyaline, upper one awned. Pedicellate spikelets unawned, male.

Fl. & Fr. ; August - November.

Common in dry sandy habitats. Considered to be a very nutritious grass for cattle.

Selected specimens : Banswara : *Raizada* 7/55 (DD) ; Bhilwara : Shahapura, *Singh* 5731 (BSJO) ; Jaipur : Baragaon, *Sharma* 1894 (RUBL) ; Jaisalmer : Pokaran, *Raizada* 27/55 (DD) ; Jhalawar : *Raizada* 1/55 (DD) ; Udaipur : Bhatewas, *Majumdar* 12473 (BSA).

5. APLUDA L.

Annual grass, upto 13 cm long. Panicles 3 cm long.

Sessile spikelets with solitary floret. ...

1. *A. blatteri*

Perennial grass, upto 1.5 m high. Panicles more than 5 cm long. Sessile spikelets with more than one floret. ...

2. *A. mutica*

1. *Apluda blatteri* Sur in Bull. Bot. Surv. India 28 : 193-194. 1988.

Annual, glabrous grass, upto 13 cm high. Leaves 1.5 - 3.1 × 0.15 - 0.25 cm, linear - lanceolate, acuminate ; ligules short, ciliate. Panicles upto 3 cm long. Spathe ovate to ovate - oblong. Sessile spikelets hermaphrodite, c. 6 mm long, one - flowered. Lower glume c. 6.0 × 1.5 mm, chartaceous, many - nerved, bidentate, upper one c. 5.5 × 3.0 mm, boat-shaped, compressed, keeled, 5 to 7 - nerved. Lemmas c. 4 mm long, bidentate, awned. Stamens 3. Stigmas 2. Pedicelled spikelets c. 4.25 mm

long. Lower glume c. 4.25×1.5 mm, lanceolate, multi-nerved; upper one c. 4.1×1.5 mm, lanceolate, 5 to 6-nerved. Lemmas 4 mm long, lanceolate, acute. Upper floret hermaphrodite. Stamens 3. Styles 2 stigmas plumose.

Fl. & Fr. : September - December.

Rare, on the hills. Endemic to Mt. Abu.

Selected specimen : Sirohi : Mt. Abu, *Blatter* 2594 (CAL, Holotype).

2. *Apluda mutica* L. Sp. Pl. 82. 1753; Bor, Grass. Burm. Ceyl. Ind. Pak. 93. 1960; *Raizada et al.* in Ind. For. Rec. (n.s.) Bot. 4 : 203. 1961; Murty in Bull. Bot. Surv. India 14 (1-4) : 150. 1975. *A. aristata* L. Amoen. Acad. 4 : 303. 1956. *A. varia* Hack. in DC. Monogr. Androp. 6 : 197. 1889, includ. subsp. *aristata* & *mutica*; Hook. f. Fl. Brit. India 7 : 150. 1896. *A. mutica* L. var. *aristata* (L.) Hack. ex Backer, Handb. Fl. Java 2 : 54. 1928.

Ascending or rambling, perennials, upto 1.5 m high. Leaves 5 - 30×0.25 - 1.25 cm, linear-lanceolate, long acuminate, base narrowed; ligule membranous, rounded. Panicles of 2 to many, simple racemes terminating the culms, enclosed in a peduncled spathe. Spikelets in threes, one sessile and two pedicelled; one of the pedicelled is seated upon a broad, strap-like, glabrous pedicel. Sessile spikelets c. 4.5 mm long, hermaphrodite. Glumes equal, chartaceous. Upper lemma awned or mucicous. Stamens 3. Caryopsis oblong.

Fl. & Fr. : August - February.

Common on the hills, among hedges of cultivated fields and bushes in wastelands, preferring moist places.

Selected specimens : Alwar : Kankwari R.F., *Parmar* 9435 (BSJO); Barmer : Haldeshwar Mahadeo R.F., *Pandey* 7932 (BSJO); Bhilwara : Badnor, *Singh* 6482 (BSJO); Jaipur : Ramgarh, *Sharma* 2183 (RUBL); Kota : Chandrapura, *Verma* 1820 (BSA); Sirohi : Mt. Abu, *McCann* 255 (BLAT), *Sharma* 3574 (RUBL).

6. ARISTIDA L.

1a. Articulation between lemma and awns present :

2a. Articulation between lemma and awns is situated at the top of the column, i.e. just below the spreading awns.

... 7. *A. mutabilis*

- 2b. Articulation is situated between the tip of the lemma and the base of the column :
- 3a. Lower glume always longer than the upper one ; base of the callus pointed :
- 4a. Column of the awns less than 2 cm long. ... 9. *A. royleana*
- 4b. Column of the awns more than 2.5 cm long :
- 5a. Column more than 3.5 cm long. Central awn upto 5 cm long, the lateral ones upto 4.5 cm long. ... 3. *A. funiculata* var. *funiculata*
- 5b. Column less than 2.75 cm long. Central and lateral awns upto 3.5 cm long. ... 4. *A. funiculata* var. *mallica*
- 3b. Lower glume shorter than the upper one ; base of the callus forked. ... 5. *A. hystriola*
- 1b. Articulation between the lemma and awn absent :
- 6a. Lateral awns much reduced and of a different texture from the third awn. ... 8. *A. redacta*
- 6b. Lateral awns well developed, if shorter, than the central awn of the same texture :
- 7a. Glumes awned :
- 8a. Panicles contracted. ... 10. *A. setacea*
- 8b. Panicles effuse. ... 6. *A. hystrix*
- 7b. Glumes not awned :
- 9a. Dwarf plants. Lemma much longer than the upper glume. ... 2. *A. adscensionis* var. *pumila*
- 9b. Erect, considerably tall plants. Lemma shorter or as long as the upper glume. ... 1. *A. adscensionis* var. *adscensionis*

1. *Aristida adscensionis* L. Sp. Pl. 82. 1753 ; Hook. f. Fl. Brit. India 7 : 224. 1896 ; Bor. Grass. Burm. Ceyl. Ind. Pak. 407. 1960 ; Mahesh. Illus. Fl. Delhi f. 271. 1966. *A. depressa* Retz. Obs. Bot. 4 : 22. 1786 ; Bor, l.c. 409. 1960. '*Lamp, Lampro*' (Hindi).

var. *adscensionis*

Erect or ascending, annual or perennial grass, upto 60 cm high. Leaves 5 - 25 × 0.1 - 0.35 cm, convolute, filiform; ligule a ridge of short hairs. Panicles 5 - 30 cm long, contracted, unequally branched; rachis filiform. Spikelets 6 - 8 mm long, one-flowered, greenish - purple. Glumes unequal, linear - lanceolate, scaberulous on the keel, emarginate, acute. Lemma exceeding the glumes, laterally compressed, convolute, passing into the awn; central branch of the awn upto 2.75 cm long, the laterals shorter; callus linear - oblong, 2.75 - 5.0 mm long. Caryopsis linear - oblong.

Fl. & Fr. : August - December.

Commonly found in sandy to rocky habitats, sometimes forming pure formations in the plains.

Selected specimens : Ajmer : Todgarh, *Lourie* 5245 (DD) ; Alwar : Algal, *Sharma* 3976 (RUBL) ; Banswara : *Raizada* 8/55 (DD) ; Bikaner : Lunkaransar, *Roy* 2423 (BSJO) ; Jaipur : Shahapura, *Kaul* 8394 (LWG) ; Kota : *Majumdar* 12426 (BSA) ; Sirohi : Gomukh, *Sharma* 3609 (RUBL).

2. var. *pumila* (Decne.) Coss. & Dur. *Fl. d' Alger. Glum.* 84. 1855 ; *Bor, Grass. Burm. Ceyl. Ind. Pak.* 409. 1960. *A. pumila* Decne. in *Ann. Sci. Nat. ser. 2.* 4 : 85. 1835. *A. adscensionis* L. var. *aethiopica* Trin. & Rupr. in *Mem. Acad. Petersb. ser. 6.* 7 : 134. 1843 ; *Hook. f. Fl. Brit. India* 7 : 225. 1896.

Erect, dwarf annuals. Lemma much longer than the upper glume, upto 1.25 cm long and dark brown. Callus rounded at the base, not much elongated.

Fl. & Fr. : August - October.

Occasional, found in open wastelands.

Selected specimens : Ajmer : Bwar, *Duthie* 6575 (DD) ; Banswara : Dani talai, *Verma* 1768 (BSA) ; Barmer : Haldeshwar Mahadeo R.F., *Pandey* 7993 (BSJO) ; Jhalawar : Shyamgarh, *Majumdar* 10066 (BSA) ; Jodhpur : *Bhandari* 8451 (JAC) ; Pali : Guru Pratap Singh hills, *Shetty* 1386 (BSJO).

3. *Aristida funiculata* Trin. & Rupr. *Sp. Gram. Stip.* 159. 1842 & in *Mem. Acad. Sci. Petersb. ser. 6.* 7 : 159. 1843 ; *Hook. f. Fl. Brit. India* 7 : 226. 1896 ; *Bor, Grass. Burm. Ceyl. Ind. Pak.* 410. 1960. '*Lampī*' (Hindi).

var. *funiculata*

Geniculately ascending annuals, upto 50 cm high. Leaves upto 15.0×0.25 cm, flat or convolute, ciliate; ligule a small, ciliate membrane. Panicles 5 - 15 cm long, lax. Spikelets upto 2.25 cm long, green with purplish tinge. Lower glume upto 2.25 cm long, linear - lanceolate, acute, 1 - nerved, awned; the upper one shorter or rarely equal to lower one. Lemma 3.5 - 5.0 mm long, articulated at the top; column upto 4.5 cm long, twisted, awn - branches upto 5 cm long and subequal; callus conical, pungent.

Fl. & Fr. : August - November.

Common in open rocky - gravelly wastelands; sometimes abundant and forming pure formations.

Selected specimens : Ajmer : *Lourie* 200/108 (DD); Banswara : *Verma* 249 (BSA); Barmer : *Gadra* road, *Agrawal* 537 (DD); Jaipur : *Ramgarh*, *Sharma* 820 (RUBL); Jhalawar : *Ghatoli*, *Wadhwa* 7575 (BSA); Jodhpur : *Beriganga*, *Nanda* 546 (DD); Tonk : *Bani* plantation, *Raizada* 15/55 (DD).

4. var. *mallica* (Edgew.) Henrard in *Mededeel. Van's Rijks - Herb.* No. 54(1) : 388. 1927 & *Monogr. Aristida* 90. 1929; *Bor, Grass. Burm. Ceyl. Ind. Pak.* 410. 1960; *Kanodia & Nanda* in *Ind. For.* 94 : 296 - 302. 1968. *A. mallica* Edgew. in *Journ. Linn. Soc. Bot.* 6 : 209. 1862.

This taxon is very similar to var. *funiculata*, but can be differentiated by having column about 2 cm long, central and lateral awns upto 3.5 cm long.

Fl. & Fr. : August - November.

Rare, found in open wastelands.

Selected specimens : Jaipur : *Dausa*, *Wadhwa* 8107 (BSA); Jaipur : *Devikot*, *Wadhwa* 5288 (BSA); Jhalawar : *Ghatoli*, *Wadhwa* 7574 (BSA); Tonk : *Deoli*, *Patil* 406 (DD).

5. *Aristida hystriacula* Edgew. in *Journ. Linn. Soc. Bot.* 6 : 208. 1862; *Hook. f. Fl. Brit. India* 7 : 227. 1896; *Bor, Grass. Burm. Ceyl. Ind. Pak.* 410. 1960.

Tufted, erect annuals, upto 15 cm high. Leaves 2.5 - 5.0×0.1-0.25 cm, convolute, curved, glabrous; ligule a small line of hairs. Panicles 2.5 - 4.0 cm long, with erect, capillary branches. Spikelets upto 1.25 cm long, greenish with purplish tinge. Lower glume 4.5 - 5.0 mm long, linear - oblong, with a short awn, upper ones upto 1.25 cm long, narrowly lanceolate, bifid at the apex with a small awn. Lemma 2 - 4 mm

long, terete, convolute, pubescent, articulated at the top ; column c. 2 cm long, twisted ; central branch of the awn 4 - 6 cm long, lateral c. 2.25 cm long ; callus oblong, hairy, 2 - toothed.

Fl. & Fr. : August - October.

Rather common in open, dry gravelly to rocky plains.

Selected specimens : Ajmer : Kishangarh, Raizada Acc. No. 130153 (DD) ; Barmer : Sheo, Tiwari 923 (BSJO) ; Bikaner : Devikot sagar, Roy 1732 (BSJO) ; Jaisalmer : Blatter 4026 (BLAT). Also reported by Nair & Nathawat (1957) from Sikar.

6. *Aristida hystrix* L. f. Suppl. Pl. 113. 1781 ; Hook. f. Fl. Brit. India 7 : 225. 1896 ; Blatt. & McC. Bombay Grasses 211. pl. 140. 1935 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 410. 1960.

Geniculately ascending or diffusely branched perennials. Leaves 3.5 - 8.5 × 0.15 - 0.35 cm, convolute, acute, glabrous ; ligule hairy. Panicles upto 15 cm long ; rachis angular. Spikelets 7.5 - 10.0 mm long, greenish - pale to brown. Lower involucral glume lanceolate, acuminate, 1 - nerved, with an awn ; upper one longer, 1 - nerved, acuminate, toothed at the top, glabrous. Lemmas subequal, c. 1 cm long ; callus pointed, villous ; awns not articulated with the glumes, scabrid.

Fl. & Fr. : August - November.

A sporadic grass found in dry sandy to rocky habitats.

Selected specimens : Sirohi : Mt. Abu, Mehta 1874 (JAC) ; Tonk : Maheshwari 53209 (LWG). Also reported from Churu (Sharma, 1965), Jodhpur (Satyanarayan & Gaur, 1968), Sikar (Nair & Malhotra, 1961) and Udaipur (Vyas, 1965).

7. *Aristida mutabilis* Trin. & Rupr. Sp. Gram. Stip. 150. 1842 & in Mem. Acad. Sci. Petersb. ser. 6. 7 : 150. 1843 ; Hook. f. Fl. Brit. India 7 : 226. 1896 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 411. 1960. 'Lamp' (Hindi).

Erect or ascending annuals, 20 - 60 cm high, Leaves upto 10.0 × 0.25 cm, convolute, smooth. Panicles 5 - 15 cm long ; rachis smooth. Spikelets 5 - 7 mm long, green. Glumes sub - equal ; lower glume scabrous at keel, shortly awned ; upper one slightly longer, awned, 2-toothed. Lemmas 3 - 5 mm long, terete, scabrid at the top ; callus bearded ; column upto 5 mm long, articulated with the glume ; awn-branches upto 3 cm long.

Fl. & Fr. : August - November.

Common in dry sandy habitats.

Selected specimens : Banswara : Verma 248 (BSA) ; Jaipur : Delhird, Kaul 18662 (LWG) ; Jaisalmer : Dhauba, Pandey 7858 (BSJO) ; Jodhpur : Shergarh, Wadhwa 4704 (BSA) ; Pali : Raizada 6/55 (DD).

8. *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. *Stipa aristoides* Stapf ex Lisboa in Journ. Bombay Nat. Hist. Soc. 7 : 358. 1892.

Tufted, annual grass, c. 50 cm high. Leaves upto 15.0×0.25 cm, convolute, margins scabrous ; ligule ciliate. Panicles upto 20 cm long. Spikelets c. 1 cm long, green with purplish tinge. Glumes subequal, narrowly lanceolate, aristate. Lemma c. 4.5 mm long, passing into coriaceous, swollen, twisted column ; lateral branches of the awn much shorter ; callus purplish.

Fl. & Fr. : August - October.

Occasionally found on open hillocks and in wastelands, particularly in the east of Aravalli.

Selected specimens : Banswara : Majumdar 10281 (BSA) ; Chittorgarh : Majumdar 12250 (BSA) ; Jhalawar : Shyamgarh, Majumdar 10081 (BSA) ; Jodhpur : Beriganga, Agrawal 550 (DD) ; Kota : Baran, Majumdar 10459 (BSA).

9. *Aristida royleana* Trin. & Rupr. Sp. Gram. Stip. 160. 1842 & in Mem. Acad. Sci. Petersb. ser. 6. 7 : 160. 1843 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 412. 1960 ; Bhandari, Fl. Ind. Desert 389. 1978. *A. funiculata* Trin. & Rupr. var. *royleana* (Trin. & Rupr.) Hook. f. Fl. Brit. India 7 : 227. 1896.

Small, tufted annuals, 10 - 20 cm high. Leaves c. 7.5×0.35 cm, flat or convolute, glabrous. Panicles effuse. Spikelets 10 - 14 mm long. Lower glumes upto 18.5 mm long, upper one upto 15 mm long. Articulation between lemma and awn present ; column of awns c. 15 mm long ; awn - branches subequal.

Fl. & Fr. : September - November.

Rare, found in sandy habitats. Endemic to N.W. India (Bor, *l.c.*).

Selected specimen : Jodhpur : Bhandari 1700 (JAC). Also reported from Jalore (Gupta & Sharma, 1971), Pali (Gupta & Sharma, *l.c.*) and from N.W. Rajasthan (Majumdar, 1969).

10. *Aristida setacea* Retz. Obs. Bot. 4 : 22. 1786 ; Hook. f. Fl. Brit. India 7 : 225. 1896 ; Blatt. & McC. Bombay Grasses 211. pl. 139. 1935 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 412. 1960.

Tufted, erect or geniculately ascending grass, 50-80 cm high. Leaves 10 - 25 × 0.25 - 0.5 cm, coriaceous, convolute ; ligule hairy. Panicles upto 25 cm long, open or contracted ; rachis smooth. Spikelets 12 - 15 mm long. Lower glume 1 - nerved, shorter than upper one ; upper glume notched at the top, 1 - nerved, awned, 15 - 20 mm long. Lemma c. 15 mm long, 3 - nerved ; articulation between lemma and awns absent ; callus long, bearded. Awns subequal.

Fl. & Fr. : August - October.

Common on low hillocks and in open gravelly rocky habitats in desertic zones.

Selected specimen : Jaisalmer : Kuri, *Wadhwa* 5271 A (BSA). Also reported from Jhunjhunu (Nair & Kanodia, 1959) and Jodhpur (Satyanarayan & Saxena, 1966).

7. ARTHRAXON P. Beauv.

- 1a. Margins of the lower glume of the sessile spikelets inflexed, at least the marginal nerves with broad-based spicules or with wing. Stamens mostly 3 ; anthers nearly as long as upper lemma :
- 2a. Spikelets all sessile, never awned. ... 1. *A. hispidus*
var. *hispidus*
- 2b. Spikelets sessile and pedicellate, awned :
- 3a. Tall grass, reaching 90 cm high. Joints of rachis sparsely hairy. Lower glume acuminate. Broad-based spicules on at least the marginal and submarginal nerves of the lower glume of the sessile spikelet with at most a single stiff-hair. ... 2. *A. lanceolatus*
var. *lanceolatus*
- 3b. Prostrate, weak, small grass, upto 30 cm high. Joints of rachis densely clothed with silvery white hairs. Lower glume 2-fid. Broad-based spicules on the marginal and submarginal nerves of the lower glume of the sessile spikelet with bundles of stiff-hairs ... 3. *A. lanceolatus*
var. *meeboldii*

1b. Margins of the lower glume of the sessile spikelets flat, not inflexed, marginal nerves with small spicules, never winged. Stamens mostly 2; anthers not half the length of the upper lemma

... 4. *A. lancifolius*

1. *Arthraxon hispidus* (Thunb.) Makino, Bot. Mag. Tokyo 26 : 214. 1912; Bor, Grass. Burm. Ceyl. Ind. Pak. 99. 1960. *Phalaris hispida* Thunb. Fl. Jap. 44. 1784. *Arthraxon ciliaris* P. Beauv. Agrost. 111 : 152. t. 11. f. 6. 1812, 'ciliare', pro parte; Hook. f. Fl. Brit. India 7 : 145. 1896. *Alectoridia quartiniana* A. Rich. Tent. Fl. Abyss. 2 : 448. pl. 99. 1851. *Arthraxon inermis* Hook. f. Fl. Brit. India 7 : 145. 1896; Blatt. & McC. Bombay Grasses 74. pl. 45. 1935. *Arthraxon quartinianus* (A. Rich.) Nagh in Am. Fl. 17 : 99. 1912.

var. hispidus

Prostrate annuals, 10 - 40 cm high. Leaves 0.5 - 7.0 × 0.25 - 0.75 cm, linear - lanceolate, margins with bulbous - based hairs. Inflorescence upto 7.5 cm long. Spikelets 1.5 - 7.5 mm long, ovate - lanceolate. Lower glume slightly longer than the upper one, dorsally smooth or with spicules along the nerves. Lower lemma present. Pedicellate spikelets present as a vestigial lower glume or absent. Caryopsis 0.75 - 3.25 × 0.17 - 0.5 mm.

Fl. & Fr. : August - November.

Mostly found in open grasslands or in shady habitats in the forests, particularly in the eastern parts of the state.

Selected specimens : Jaipur : Sagar, Sharma 2256 (RUBL); Jhalawar : Verma 3342 (BSA); Kota : Darah, Singh 74608 (LWG); Sawai Madhopur : Ranthambhore, Sharma 3101 (RUBL); Sirohi : Mt. Abu, Duthie 6750, 6761, 6761 b (DD).

2. *Arthraxon lanceolatus* (Roxb.) Hochst. Flora 39 : 188. 1856; Hook. f. Fl. Brit. India 7 : 143. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 100. 1960. *Andropogon lanceolatus* Roxb. Fl. Ind. 1. 262. 1820. *A. serrulatus* Hochst. ex A. Rich. Tent. Fl. Abyss. 2 : 458. 1851, non Link 1827. *A. prionodes* Steud. Syn. Pl. Glum. 1 : 383. 1854. *Arthraxon serrulatus* Hochst. l.c. 39 : 188. 1856. *A. prionodes* (Steud.) Dandy in Andrews, Flow. Pl. Sudan 3 : 399. 1956; Bor, l.c. 101. 1960.

var. lanceolatus

Tufted, tall annuals, with silky - pilose cataphylls. Leaves upto 7.5 × 2.0 cm, ovate - lanceolate, acuminate, margins with bulbous - based hairs, base cordate - amplexicaul; ligule hairy. Racemes upto 10 cm

long, 2 to 6 nate ; joints with white hairs. Sessile spikelets 4 - 8 mm long. Lower glume rounded on the back, 7 to 10 nerved, with broad based spicules ; upper glume inconspicuously 3 to 5 - nerved. Lower lemma c. 3.5 mm long ; upper one slightly longer. Stamens 3. Pedicellate spikelets male, ovate - lanceolate, pilose.

Fl. & Fr. : August - October.

Commonly found in moist and shaded localities.

Selected specimens : Ajmer : Duthie 4938 (DD) ; Alwar : Pandupole, Parmar 9724 (BSJO) ; Barmer : Haldeshwar Mahadev - Siwana, Pandey 7992 (BSJO) ; Jaipur : Sagar, Sharma 2256 (RUBL) ; Jhalawar : Dug, Verma 6764 (BSA) ; Sirohi - Mt. Abu, McCann 239 (BLAT), Sharma 2559 (RUBL).

3. var. *meeboldii* (Stapf) Welzen in *Blumea* 27 : 285. f. 10. 1981. *Arthraxon meeboldii* Stapf in *Kew Bull.* 1908 : 449. 1908 ; Bor, Grass. *Burm. Ceyl. Ind. Pak.* 101. 1960 ; Jain in *Journ. Ind. Bot. Soc.* 51 : 105. pl. 23. 1972. *A. purandharensis* Bharucha & Satyanarayan in *Journ. Bombay Nat. Hist. Soc.* 52 : 481. 1954.

This variety can be identified by sessile spikelets being 7.0 - 9.5 × 1.0 - 1.35 mm ; lower glume 7 - nerved, dorsally glabrous ; marginal and submarginal nerves in respectively the upper 0.7th and 0.3rd part with broad - based spicules which are provided with bundles of stiff hairs, all other nerves at the most with small spicules. Stamens (- 2) 3.

Fl. & Fr. : August - November.

Rare, found in open grassy plains and as a forest undergrowth in moist and shaded places on the Aravalli hills.

Selected specimens : Sirohi : Mt. Abu, Duthie 675½ (DD), Jain 46608 (BS).

4. *Arthraxon lancifolius* (Trin.) Hochst. in *Flora* 39 : 188. 1856 ; Bor, Grass. *Burm. Ceyl. Ind. Pak.* 100. 1960. *Andropogon lancifolius* Trin. in *Mem. Acad. Sci. St. Petersburg, ser. 6.* 2 : 271. 1832. *A. microphyllus* Trin. *l. c.* 2 : 275. 1832. *Arthraxon microphyllus* (Trin.) Hochst. *l. c.* 39 : 188. 1856 ; Hook. f. *Fl. Brit. India* 7 : 147. 1896.

Tufted, decumbent annuals, 10 - 40 cm high, with pubescent nodes. Leaves 0.5 - 4.0 × 0.25 - 1.25 cm, lanceolate, with amplexicaul base, margins with bulbous - based hairs ; ligule membranous, c. 1.75 mm long. Inflorescence upto 2.75 cm long ; joints and peduncles pilose. Sessile

spikelets 2 - 7 mm long, with hairy callus. Lower glume rounded on the back, 3 to 7 - nerved, scabrid on the top ; upper one often awned. Lower lemma nerveless ; upper ones 1 - nerved. Stamens 2. Caryopsis 1.5 - 3.5 mm long. Pedicellate spikelets male or sterile, sometimes absent.

Fl. & Fr. : August - November.

Common in open and dry to damp and shaded localities.

Selected specimens : Alwar : Umarai forest block, *Parmar* 9600 (BSJO) ; Banswara : Punapathar forest, *Singh* 3665 (BSJO) ; Jaipur : Amer, *Sharma* 866 (RUBL) ; Jhalawar : Mishroli, *Wadhwa* 7658 (BSA) ; Sirohi : Mt. Abu, *Tatake* 46546 (BSA), *Duthie* 6761 A (DD) ; Udaipur : Khamblighat, *Kanodia* 82447 (BSI).

8. ARUNDINELLA Raddi

- | | | |
|---|-----|-------------------------|
| 1a. Upper lemma not awned. | ... | 1. <i>A. leptochloa</i> |
| 1b. Upper lemma with a geniculate awn : | | |
| 2a. Spikelets upto 2 mm long. Inflorescence an effuse, branched panicle. | ... | 2. <i>A. pumila</i> |
| 2b. Spikelets more than 4 mm long. Inflorescence cylindric, very densely spicate. | ... | 3. <i>A. spicata</i> |

1. *Arundinella leptochloa* (Nees ex Steud.) Hook. f. *Fl. Brit. India* 7 : 76. 1896 ; Bor, *Grass. Burm. Ceyl. Ind. Pak.* 423. 1960. *Panicum leptochloa* Nees ex Steud. *Syn. Pl. Glum.* 1 : 62. 1854. *Arundinella gigantea* Dalz. in Dalz. & Gibs. *Bombay Fl.* 293. 1861 ; Hook. f. *l.c.* 7 : 76. 1896. *A. lawsonii* Hook. f. *l.c.* 7 : 76. 1896.

Tufted, perennial grass, upto 1.75 m high, with glabrous nodes. Leaves 25 - 50 × 2.0 - 3.5 cm, linear - lanceolate, acuminate, base rounded or cordate ; ligule membranous. Panicles thyrsiform, upto 15 cm long ; rachis angular, scabrid. Spikelets 2 - 3 mm long. Lower glume 3 - nerved, acute, keeled ; upper one longer, 5 - nerved, acuminate. Lower lemma awned.

Fl. & Fr. : July - November.

Rare, found in moist situations.

Selected specimen : Udaipur : Barpal, *Majumdar* 10357 (BSA). Also reported from Churu and Jodhpur (*Puri et al.*, 1964).

2. *Arundinella pumila* (Hochst. ex A. Rich.) Steud. Syn. Pl. Glum. 1 : 114. 1854 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 423. 1960. *Acrantherum pumilum* Hochst. ex A. Rich. Tent. Fl. Abyss. 2 : 414. t. 100. 1851. *Arundinella tenella* Nees ex Steud. l. c. 1 : 115. 1854 ; Hook. f. Fl. Brit. India 7 : 71. 1896.

Tufted, erect annuals. Leaves upto 7.5×2.0 cm, linear-lanceolate or ovate, acuminate ; sheaths with ciliate margins. Panicles 10 - 20 cm long ; rachis slender, erect. Spikelets upto 1 mm long. Lower glume c. 1.5 mm long, ovate - lanceolate, acute, 3 - nerved. Lower one upto 2 mm long, acuminate, 5 - nerved. Lower lemma ovate, obtuse ; upper one awned.

Fl. & Fr. : August - October.

Occasional, found in moist, shady or rocky habitats.

Selected specimens : Jaipur : Samod hills, *Sharma* 1069 (RUBL) ; Sirohi : Mt. Abu, *Sharma* 3308 (RUBL) ; Udaipur : Kodra dam, *Rao* 66527 (BSA). Also reported from N.W. Rajasthan (*Sankhala*, 1951).

3. *Arundinella spicata* Dalz. in Dalz. & Gibs. Bombay Fl. 293. 1861 ; Hook. f. Fl. Brit. India 7 : 77. 1896 ; Blatt. & McC. Bombay Grasses 197. pl. 129. 1935 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 425. 1960.

Erect, annual grass, 10 - 30 cm high. Leaves upto 3.75×0.5 cm, linear - lanceolate, acute, hairy ; sheaths densely hispid ; ligule a minute hairy ring. Inflorescence 2.5 - 5.0 cm long. Spikelets 4 - 6 mm long. Lower glume 1.5 - 2.0 mm long, lanceolate, acuminate, with scattered, bulbous - based hairs, 3 - nerved ; upper one upto 6 mm long, acuminate, 3 - nerved, hairy. Lower lemma c. 2.5 mm long, glabrous ; upper one c. 1.25 mm long, obtuse, awned.

Fl. & Fr. : August - November.

Rare, found in open grassy plains. So far known to be endemic in Maharashtra. Included on the authority of *Sankhala* (1951).

9. ARUNDO L.

Arundo donax L. Sp. Pl. 81. 1753 ; Hook. f. Fl. Brit. India 7 : 302. 1896 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 413. f. 44. 1960. 'Doka' (Hindi).

Erect, stout, tall perennial grass, upto 2.5 m high, with creeping woody rhizomes. Culms fistular. Leaves 15 - 50 \times 2 - 5 cm, distichous,

linear - lanceolate, cordate or rounded at the base, acuminate, smooth. Panicles plumose, upto 70 cm long. Spikelets 1.0 - 1.5 cm long, light brown, 2 - flowered. Glumes subequal, glabrous. Lemmas 7.5 - 12.5 mm long, upto 5 - nerved, aristate, long hairy on the back in the lower half. Stamens 2 - 3. Caryopsis with linear hilum.

Fl. & Fr. : August - October.

Commonly found in marshy habitats along the rivers and streams, particularly in dried up beds. The hollow stem is used for making pens, mats, ropes, baskets etc.

Selected specimens : Ajmer : *Lourie* 4995 (DD) ; Bharatpur : Bird Sanctuary, *Parmar* 8714 (BSJO) ; Ganganagar : Kumbharwali, *Roy* 3923 (BSJO) ; Jaipur : Ramgarh, *Sharma* 1758 (RUBL) ; Jhunjhunu : Pilani, *Sukumasan* 10 (DD) ; Kota : Tipta, *Singh* 90506 (LWG) ; Sirohi : Mt. Abu, *Mehta* 1896 (JAC) ; Udaipur : *Majumdar* 11627 (BSA).

10. AVENA L.

Avena sterilis L. var. *culta* Raizada in Ind. For. 80 : 36. 1854 ; Mahesh. Illus. Fl. Delhi f. 272. 1966. *A. sativa auct.* non L. 1753 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 434. 1960.

Tufted, erect annuals, 25 - 125 cm high, stems stout, glabrous, fistular. Leaves 20 - 40 × 1 - 2 cm, linear lanceolate, acute ; ligule 3.5 - 5.5 mm long. Panicles upto 20 cm long, lax, terminal, hanging from one side. Spikelets 2.25 - 2.75 cm long, 2 to 3 - flowered ; rachilla articulated above the glumes. Glumes lanceolate, whitish on maturation, acute. Lemmas 1.5 - 2.0 cm long, bearded, awned. Caryopsis silky.

Fl. & Fr. : November - January.

Usually cultivated for fodder and grains which are very nutritious to cattle ; rarely escapes near habitations.

Selected specimens : Bhilwara : Mandelgarh, *Singh* 7176 (BSJO) ; Churu : Adasar Farm, *Roy* 2637 (BSJO) ; Kota : Kelwara, *Singh* 74473 (LWG). Also reported from Jhunjhunu (Joshi & Sharma, 1966).

11. BAMBUSA Schreb. *nom. cons.*

Culm and branches spinous.	...	1. <i>B. arundinacea</i>
Culm and branches unarmed.	...	2. <i>B. vulgaris</i>

1. *Bambusa arundinacea* (Retz.) Roxb. Corom. Pl. 1 : 56. f. 79. 1796 ; Gamble in Hook. f. Fl. Brit. India 7 : 395. 1896. *Bambos arundinacea* Retz. Obs. Bot. 5 : 24. 1789. *Bambusa bambos* Voss in Vilm. Blumeng. 1 : 1169. 1896. 'Bans' (Hindi).

Tufted, stout, woody, thorny reed - bamboo, upto 20 m tall, with 2-3, stout, recurved spines at nodes. Stem sheath coriaceous, striate with golden hairs. Leaves 5-20 cm long, triangular-lanceolate, acuminate, base rounded, glandular, densely hirsute within, margins thickly ciliate ; ligule narrow. Panicles often occupying the entire stem. Spikelets 1.25-2.5 mm long, loose, suberect, pale, lanceolate, acute, glabrous. Glumes 5-8 mm long, ovate lanceolate, mucronate, many-nerved. Upper lemmas 1-3, male or neuter. Lodicules 3. Caryopsis 5-8 mm long, oblong, with persistent style - base, grooved.

Fl. & Fr. : Flowering after long intervals.

Sparsely distributed in dry deciduous forests on the Aravalli hills forming small patches. A perusal of literature revealed that this taxon was quite common in southern parts of the state, but now has almost disappeared due to over exploitation.

Selected specimens : Banswara : Kanodia 44 (BSI) ; Jhalawar : Lolita Jhil, Wadhwa 93 (BSA) ; Raipur, Wadhwa 5493 (BSA). Also reported from Sikar (Nair & Nathawat, 1957) and N.W. Rajasthan (Sankhala, 1951).

2. *Bambusa vulgaris* Schrad. in Wendl. Collect. Pl. 2 : 26. t. 47. 1810 ; Gamble in Hook. f. Fl. Brit. India 7 : 391. 1896 ; Blatt. & McC. Bombay Grasses 282. 1935. 'Bans' (Hindi).

Tall, stout, arborescent, reed - bamboo, upto 15 m high ; nodes not raised, with a ring of brown hairs. Stem - sheath streaked with yellow, retuse. Leaves 10-25 × 1.5-4.0 cm, linear lanceolate, petioled, glabrous, glandular ; ligule ciliate, short. Panicles large, leafy. Spikelets upto 2 cm long, in clusters of 3-10, oblong, acute. Lemmas more than 5. Palea keeled, ciliate. Anthers hairy. Ovary hairy.

Fl. & Fr. : Flowering after long intervals.

Rather less common than preceding species. Found in dry deciduous forests, along the streams and in the valley.

Selected specimens : Jhalawar : Wadhwa 3599 (BSA) ; Sirohi : Mt. Abu, Rao 66561, Jain 60157 (BSI) ; Udaipur : Kodra dam, Rao 66561 (BSA). Also reported by Sankhala (1951) from N.W. Rajasthan.

12. BOTHRIOCHLOA O. Ktze.

Inflorescence subdigitate. Lower racemes longer than the main rachis. Lower glume of the sessile spikelets without a pit.

... 2. *B. ischaemum*

Inflorescence with a long central axis. Lower racemes shorter than the main rachis. Lower glume of the sessile spikelets pitted.

... 1. *B. bladhii*

1. *Bothriochloa bladhii* (Retz.) S.T. Blake in Proc. R. Soc. Queensland 80 : 62. 1969. *Andropogon bladhii* Retz. Obs. Bot. 2 : 27. 1781. *A. intermedius* R. Br. Prodr. 202. 1810 ; Hook. f. Fl. Brit. India 7 : 175. 1896. *A. punctatus* Roxb. Fl. Ind. 1 : 268. 1820. *Bothriochloa intermedia* (R. Br.) A. Camus var. *punctata* (Roxb.) Keng, Clav. Gram. Prim. Sin. 244. 1957 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 108. 1960. *Dichanthium glabrum* (Roxb.) Jain & Deshpande var. *punctatum* (Roxb.) Deshpande in Fl. India Fasc. 15 : 14. 1984.

Tufted, erect, rhizomatous perennials, 30 - 120 cm high. Leaves 7.5 - 40.0 × 0.25 - 1.25 cm, linear, acute. Panicles simple ; each raceme upto 5 cm long, pubescent. Sessile spikelets 3 - 4 mm long, narrowly elliptic, usually pitted. Lower glume chartaceous, pubescent below the middle, awned. Pedicellate spikelets glabrous, with or without pits.

Fl. & Fr. : July - October.

Occasionally found in open grassy localities and as a forest undergrowth, particularly in the east of Aravalli. It is a highly polymorphic species and so many hybrids have been reported.

Selected specimens : Dungarpur : Dani talai, Verma 1775, 1756 - A (BSA) ; Jhalawar : Shyamgarh, Majumdar 10094 (BSA). Also reported from Chittorgarh by Majumdar et al. (1969).

2. *Bothriochloa ischaemum* (L.) Keng in Contr. Biol. Lab. Sci. Soc. China Bot. ser. 10. 201. 1936 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 108. 1960. *Andropogon ischaemum* L. Sp. Pl. 1047. 1753 ; Hook. f. Fl. Brit. India 7 : 171. 1896. *Dichanthium ischaemum* (L.) Roberty in Boissiera 9 : 160. 1960 ; Deshpande, Fl. Ind. Fasc. 15 : 16. f. 23 - 24. 1984.

Tufted, erect or geniculately ascending perennials, 50 - 70 cm high. Leaves 2 - 12 × 0.25 - 0.5 cm, linear - lanceolate, acuminate. Inflorescence of 4 - 15, subdigitate racemes ; each raceme 3 - 5 cm long, pedunculate. Sessile spikelets 3 - 5 mm long, oblong - lanceolate. Lower glume chartaceous, acute, hairy, with an awn up to 1.5 cm long. Pedicellate spikelets glabrous, not pitted.

Fl. & Fr. : July - November.

Rare, found in rocky habitats. Included on the authority of Joshi & Sharma (1966) and Majumdar (1969) from Jhunjhunu.

13. BRACHIARIA (Trin.) Griseb.

- 1a. Rachis more or less flat, ribbon-like :
- 2a. Annuals. Spikelets upto 3 mm long. Upper lemma rugulose. ... 3. *B. distachya*
- 2b. Perennials. Spikelets more than 3.5 mm long. Upper lemma almost smooth. ... 1. *B. decumbens*
- 1b. Rachis triquetrous, filiform :
- 3a. Panicles linear, with erect racemes of closely crowded spikelets. Upper lemma smooth. ... 4. *B. eruciformis*
- 3b. Panicles various, oblong, lanceolate or spreading. Upper lemma granulose to rugulose :
- 4a. Spikelets solitary :
- 5a. Spikelets upto 2.5 mm long, elliptic, turgid. ... 11. *B. villosa*
- 5b. Spikelets 3-4 mm long, ovate to lanceolate, not turgid. ... 10. *B. setigera*
- 4b. Spikelets paired or fascicled, distant or clustered :
- 6a. Spikelets upto 2 mm long. Lower glume truncate. ... 9. *B. reptans*
- 6b. Spikelets more than 2.5 mm long. Lower glume acute to subacute :
- 7a. Spikelets approximate ; the distance upto 1.5 mm :
- 8a. Sheath and blades puberulent. Leaf-blades wavy, with amplexicaul base. ... 6. *B. lata* var. *pubescens*
- 8b. Sheath and blades glabrous. Leaf blades entire, with cordate base :
- 9a. Spikelets glabrous. ... 7. *B. ramosa* var. *ramosa*
- 9b. Spikelets pubescent. ... 8. *B. ramosa* var. *pubescens*

7b. Spikelets distant ; the distance
1-2 cm :

- 10a. Leaves upto 15 cm long.
Spikelets subacute or apiculate.
The pedicels longer than the
spikelets. ... 2. *B. deflexa*
- 10b. Leaves less than 8 cm long.
Spikelets acute. Pedicels shorter
than the spikelets. ... 5. *B. kurzii*.

1. *Brachiaria decumbens* Stapf in Prain, Fl. Trop. Africa 9 : 528. 1919 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 281. 1960. '*Para - ghas*' (Hindi).

Tufted, decumbent, much - branched perennials. Spikelets c. 4 mm long, ovate - elliptic, acute, pubescent, secund.

Fl. & Fr. : August - May.

Native of Tropical Africa. Commonly found in moist and sandy localities. Plants are very resistant to drought.

Selected specimen : Bundi : Singh 74034 (LWG).

2. *Brachiaria deflexa* (Schumach.) C.E. Hubbard ex Robyns in Bull. Jard. Bot. Brux. 9 : 181. 1932 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 281. 1960 ; Raizada & Jain in Ind. For. Rec. (n.s.) Bot. 5 : 165. pl. 2. f. 5. 1965. *Panicum deflexum* Schumach. Beskr. Guin. Pl. 63. 1827.

Tufted, ascending annuals, 10 - 50 cm high. Leaves 2.5 - 15.0 × 0.25 - 2.25 cm, linear, acute. Racemes upto 15, each upto 8.5 cm long, bearing paired, distant spikelets. Spikelets 2.5 - 3.5 mm long, broadly elliptic, glabrescent. Lower glume upto half the length of spikelets. Upper lemma rugose, acutish.

Fl & Fr. : August - October.

Occasional, found in shady localities and on low hills.

Selected specimens : Chittorgarh : Maslana, *Majumdar* 10189 (BSA) ; Jhalawar : Aklera, *Wadhwa* 9604 (BSA) ; Kota : Darah, *Singh* 74847-A (LWG) ; Pali : Erinpura, *Rao* 66759 (BSA) ; Sirohi : Mt. Abu, *Rao* 66571 A (BSA) ; Udaipur : *Without collector name* 11693 (BSA).

3. *Brachiaria distachya* (L.) Stapf in Prain, Fl. Trop. Africa 9 : 565. 1919 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 281. 1960 ; Raizada & Jain in Ind. For. Rec. (n.s.) Bot. 5 : 164. pl. 2. f. 3. 1965. *Panicum distachyon* L.

Mant. pl. 2 : 183. 1771 ; Hook. f. Fl. Brit. India 7 : 37. 1896, '*distachyum*'.

Creeping or ascending annuals, rooting at the lower nodes. Leaves 2 - 7 × 0.25 - 0.5 cm, linear - lanceolate, acuminate, amplexicaul at base, pubescent ; ligule a hairy ring. Racemes 2 - 3, each upto 3.5 cm long. Spikelets 2.5 - 3.0 mm long, elliptic - obovate, subacute, glabrous. Lower glume c. 1.5 mm long, 5 to 7 - nerved ; upper one ovate, acuminate, 7 - nerved. Upper lemma c. 2.5 mm long, rugulose, subcoriaceous, 3 - nerved.

Fl. & Fr. : August - November.

Rare, found near moist - shaded localities.

Selected specimens : Alwar : Naldeshwar forest, *Parmar* 9530 (BSJO) ; Bharatpur : Gajipura, *Parmar* 8753 (BSJO) ; Jaipur : *Wadhwa* 4857 (BSA), *Sharma* 2196 (RUBL) ; Udaipur Menor, *Majumdar* 12492 (BSA).

4. *Brachiaria cruciformis* (J.E. Smith) Griseb. in Ledeb. Fl. Ross. 4 : 469. 1853 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 283. 1960 ; Raizada & Jain in Ind. For. Rec. (n.s.) Bot. 5 : 163. pl. 2. f. 2. 1965. *Panicum eruciformis* J.E. Smith in Sibth. & J. E. Smith, 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.

Tufted, erect or geniculately ascending annuals, upto 50 cm high. Leaves 2 - 5 × 0.25 cm, linear - lanceolate, acute, rounded at the base, glabrescent ; ligule a fringe of hairs. Racemes 2 - 10, each 1.5 - 3.0 cm long, secund, bearing single spikelet on a triquetrous rachis. Spikelets 2.0 - 2.5 mm long, oblong or elliptic, acutish, pubescent. Lower glume reduced to a minute, hyaline scale ; upper one 5 - nerved, hairy ; upper lemma smooth, whitish, shining, obtuse. Caryopsis c. 1.25 mm long, oblong - elliptic or obovate - oblong, flattened.

Fl. & Fr. : July - October.

Common, subgregarious in low - lying areas.

Selected specimens : Banswara : To Udaipur road, *Singh* 2997 (BSJO) ; Bundi : Hindoli, *Singh* 74498 (LWG) ; Chittorgarh : Aklera, *Wadhwa* 7615 (BSA) ; Jaipur : Daosa, *Wadhwa* 8159 (BSA) ; Jhalawar : Jalarapatan, *Singh* 83770 (LWG) ; Udaipur : *Without collector's name*, 1929 (DD).

5. *Brachiaria kurzii* (Hook. f.) A. Camus in Lecomte, Fl. Gen. de l'Indo - Chine 7 : 438. 1922 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 283. 1960 ; Raizada & Jain in Ind. For. Rec. (n.s.) Bot. 5 : 165. 1965. *Panicum kurzii* Hook. f. Fl. Brit. India 7 : 38. 1896.

Erect or decumbent annuals, often rooting at the lower nodes. Leaves 3.5 - 8.0 × 0.75 - 1.75 cm, lanceolate, acuminate, amplexicaul at the base, margins crisped ; ligule shortly bearded. Inflorescence consisting of false spikes, each spikes upto 7.5 cm long. Spikelets c. 2.5 mm long, ovate, glabrous. Lower glume clasping, 3 to 5 nerved, about half the length of the spikelet. Upper lemma 2.0 - 2.5 mm long, elliptic - oblong, rugose, apiculate.

Fl. & Fr. : August - October.

Rare, in dry habitats.

Selected specimen : Jaisalmer : Amarsagar, Wadhwa 5193 (BSA). Also reported from Alwar (Vyas, 1967) and Jodhpur (Sarup, 1951).

6. *Brachiaria lata* (Schumach.) C.E. Hubbard var. *pubescens* C.E. Hubbard in Kew Bull. 4 : 125. 1949 ; Hutchinson & Dalziel, Fl. W. Trop. Africa 3 (2) : 444. 1972 ; Pandey & Singh in J. Econ. Tax. Bot. 7 : 233. 1985.

Geniculately ascending, tufted annuals, 30 - 60 cm high, often rooting at the lower nodes. Sheath striate, softly puberulent or villous ; ligule a short ciliate rim. Leaf - blades 3 - 18 × 0.5 - 1.75 cm, lanceolate to lanceolate - linear, ciliate, acute to acuminate, with amplexicaul or subcordate base, margins cartilaginous. Panicles upto 12.0 × 3.75 cm, ovoid - oblong ; peduncles below the panicles terete and villous ; rachis wavy, softly villous. Spikelets 3.25 - 3.75 × 1.25 - 1.75 mm, solitary or in pairs, secund, ellipsoid - oblong, acute or apiculate, softly pubescent, pedicellate. Lower glume 1.75 - 2.0 mm long, acute, 5 - nerved, pubescent outside ; upper glume similar, 5 - nerved, pubescent outside. Lemma similar to the upper glume. Upper floret bisexual ; lower ones neuter. Stamens 3. Caryopsis c. 2 mm long, broadly ovate or ovate - oblong.

Fl. & Fr. : August - November.

Native of W. Tropical Africa. Commonly found in sandy to rocky habitats in the desertic zones of W. Rajasthan—the only place of occurrence in India.

Selected specimens : Bikaner : Bhikampur, Roy 2015 (BSJO) ; Jaisalmer : Pokaran - Phalsund road, Shetty 3311 (BSJO) ; Jodhpur :

Beriganga - compartment —I, *Shetty* 110 (BSJO); Kailana, *Singh* 24 (BSJO); Ketu, *Singh* 3192 (BSJO).

7. *Brachiaria ramosa* (L.) Stapf in Prain, Fl. Trop. Africa 9 : 542. 1919; Bor, Grass. Burm. Ceyl. Ind. Pak. 284. 1960; Raizada & Jain in Ind. For. Rec. (n.s.) Bot. 5 : 164. pl. 2. f. 4. 1965. *Panicum ramosum* L. Mant. Pl. 1 : 29. 1767; Hook. f. Fl. Brit. India 7 : 36. 1896, *pro parte*. 'Makra' (Hindi).

var. ramosa

Tufted, ascending annuals, often rooting at the base. Leaves 2.5 - 15.0 × 0.5 - 1.5 cm, linear - lanceolate, acuminate, base rounded, glabrescent; ligule a line of hairs. Racemes 3 or more, each upto 5 cm long. Spikelets c. 3 mm long, ovoid, apiculate. Lower glume upto half the length of spikelet. Upper lemma crustaceous, transversely rugose, subacute. Caryopsis 1.5 - 2.0 mm long, broadly elliptic, flattened.

Fl. & Fr. : July - November.

Fairly common throughout Rajasthan in mixed habitats. It is a good fodder grass and highly polymorphic.

Selected specimens : Alwar : Kanakwari forest, *Parmar* 9420 (BSJO); Banswara : Ghatol, *Kanodia* 75169 (BSI); Barmer : Puri 23299 (BSI); Jaipur : Ramgarh, *Sharma* 2064, 2196, 2275 (RUBL); Jaisalmer : Kuri, *Wadhwa* 5252 (BSA); Sirohi : Mt. Abu, *Puri* 56913 (BSI).

8. var. *pubescens* Basappa & Muniyamma in Proc. Indian Nat. Sci. Acad. Part B 49 (5) : 380. 1983; Pandey & Singh in Journ. Econ. Tax. Bot. 7 : 234. 1985.

This variety can be separated from the proper by its pubescent spikelets against glabrous ones in typical form.

Fl. & Fr. : August - October.

It was so far known to be endemic to Karnataka (type locality : Benakanahalli in Shimoga district). Recently, it has been collected from the desertic zones of W. Rajasthan. Thus, it shows extended distribution further north - west wards.

Selected specimens : Jaisalmer : Bikaner - Pokaran road, *Tiwari* 770 (BSJO); Pali : Hemawas Dam, *Shetty* 1365 (BSJO).

9. *Brachiaria reptans* (L.) Gardner & Hubbard in Hook. Icon. Pl. 34. t. 3363, p. 3. 1938 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 285. 1960 ; Raizada & Jain in Ind. For. Rec. (n.s.) Bot. 5 : 162. pl. 2. f. 1. 1965. *Panicum reptans* L. Syst. Nat. ed. 10. 870. 1759. *P. prostratum* Lam. Tab. Encycl. 1 : 171. 1791 ; Hook. f. Fl. Brit. India 7 : 33. 1896. *Urochloa reptans* (L.) Stapf in Prain, Fl. Trop. Africa 9 : 601. 1920.

Tufted, erect or creeping annuals, upto 50 cm high. Leaves upto 5.5×1.5 cm, linear - lanceolate, acuminate, subamplexicaul, glabrescent ; ligule a densely ciliate rim. Inflorescence consisting of 3 to many, spiciform racemes, each raceme upto 4 cm long. Spikelets upto 2 mm long, oblong or broadly elliptic, subacute, glabrescent. Lower glume reduced to a hyaline, minute scale ; upper one faintly 5 - nerved. Upper lemma crustaceous, shining, whitish, finely granulate or rugose. Caryopsis c. 1.25 mm long, oblong - elliptic, flattened.

Fl. & Fr. : July - October.

Common throughout the state in mixed habitats.

Selected specimens : Banswara : *Majumdar* 10288 (BSA) ; Jaipur : Durgapura, *Sharma* 1209 (RUBL) ; Jodhpur : *Ehandari*, 1061 (JAC) ; Berunda, *Singh* 4447 - A (BSJO).

10. *Brachiaria setigera* (Retz.) C.E. Hubbard in Hook. Icon. Pl. 34. t. 3363, p. 2. 1938 in adnot. ; Bor, Grass. Burm. Ceyl. Ind. Pak. 286. 1960. *Panicum setigerum* Retz. Obs. Bot. 4 : 15. 1786 ; Hook. f. Fl. Brit. India 7 : 36. 1896. *Urochloa setigera* (Retz.) Stapf in Prain, Fl. Trop. Africa 9 : 598. 1920.

Tufted, spreading grass, upto 75 cm high, with bearded nodes. Leaves 7 - 12 \times 1.0 - 2.5 cm, broadly lanceolate, acuminate, amplexicaul, margins ciliate ; ligule hairy. Inflorescence consisting of 2 - 10 racemes, each upto 5 cm long. Spikelets c. 3.5 mm long, acuminate, glabrescent. Lower glume 1/3 to the spikelet ; upper one broadly ovate, acuminate, 7 - nerved. Upper lemma coriaceous, elliptic, apiculate, granulate.

Fl. & Fr. : August - November.

Rare, found in moist and shady localities in rocky habitats. It is a good fodder grass.

Selected specimen : Kota : Darah, *Singh* 74834 (LWG).

11. *Brachiaria villosa* (Lam.) A. Camus in Lecomte, Fl. Gen. del' Indo - Chine 7 : 433. 1922 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 286. 1960.

Panicum villosum Lam. Tab. Encycl. Meth. Bot. 1 : 173. 1791, *in parte* ; Hook. f. Fl. Brit. India 7 : 34. 1896.

Tufted, erect annuals, 20 - 50 cm high. Leaves 2 - 5 × 0.5 - 1.5 cm, lanceolate, acuminate, amplexicaul, glabrescent; ligule reduced to a densely ciliate rim. Inflorescence consisting of 3 - 9, secund, spiciform racemes. Spikelets upto 2.5 mm long, acute, glabrescent. Lower glume 1/3 to 1/2 the length of the spikelets. Upper lemma coriaceous, transversely rugulose. Caryopsis 2.0 - 2.5 mm long, ellipsoid, smooth.

Fl. & Fr. : July - October.

Rare, found in moist and shady localities.

Selected specimens : Jaipur : Nim ka Thana, Stower 35-A (BSI) ; Kota : Datarah, Singh 74831 (LWG).

14. CALAMAGROSTIS Adans.

Calamagrostis pseudophragmites (Hall. f.) Koel. Descr. Gram. 106. 1802 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 396. 1960. *Arundo pseudophragmites* Hall. f. in Roem. Arch. Bot. Leipzig 1 (2) : 11. 1797. *A. littorea* Schrad. Fl. Germ. 1 : 212. 1805. *Calamagrostis littorea* (Schrad.) P. Beauv. Ess. Agrost. 15. 1812 ; Hook. f. Fl. Brit. India 7 : 261. 1896.

Tufted, erect, perennial, rhizomatous grass, upto 1.5 m tall, with 3 - 5 nodes. Leaves 20 - 35 × 0.25 - 1.0 cm, flat or convolute; ligule lacerate. Panicles upto 40 cm long, lax, tinged with purple. Spikelets 5.0 - 8.5 mm long. Glumes unequal, linear - lanceolate, keeled. Lemmas about 1/2 the length of spikelets, denticulate at the tip, awned; callus hairs double or triple the size of lemma.

Fl. & Fr. : August - November.

Occasionally found in dry rocky habitats. The plants are much liked by the cattles.

Selected specimen : Kota : Singh 90138 (LWG).

15. CENCHRUS L.

- 1a. Bristles of the involucrel retrorsely scabrid, tenaciously prickly : ... 1. *C. biflorus*
- 1b. Bristles of the involucrel antrorsely scabrid, not prickly :

- 2a. Bristles united only at the base to form a shallow disc :
- 3a. Annuals. Involucre with a wide connate base. Inner bristles stouter at the base ; outer ones upto 2 cm long :
- 4a. Inner bristles densely ciliate towards the base and scabridulous above. ... 4. *C. prleuri*
- 4b. Inner bristles not ciliate towards the base, but scabrous throughout. ... 3. *C. prleuri* var. *scabra*
- 3b. Perennials. Base of the involucre small, elliptic ; inner bristles not very stouter at the base ; outer ones not more than 1.5 cm long. ... 2. *C. ciliaris*
- 2b. Bristles connate above the base into a 1-4 mm long cup :
- 5a. Outer bristles numerous, slender. One of the inner bristle longer and stouter than the rest, otherwise very slender, widened into a cup at the base and tapering to a setiform tip, more than 1.5 cm long. ... 3. *C. pennisetiformis*
- 5b. The outer bristles few or absent. None of the inner bristles longer and stouter than the rest, all similar, rigid, flattened and subulate, acute at the tip, upto 5 mm long :
- 6a. Perennials. Rachis scabrid. ... 7. *C. setigerus*
- 6b. Annuals or biennials. Rachis glabrous. ... 6. *C. rajasthanensis*

1. *Cenchrus biflorus* Roxb. Fl. Ind. 1 : 238. 1820 ; Hook. f. Fl. Brit. India 7 : 89. 1896 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 287. 1960 ; Raizada & Jain in Ind. For. Rec. (n.s.) Bot. 5 : 215. pl. 10. f. 4. 1965. *C. catharticus* Delile, Cat. Hort. Mensp. 1838 : 4. 1839 ; Hook. f. l. c. 7 : 90. 1896 ; Blatt. & McC. Bombay Grasses 186. pl. 119. 1935. 'Bhurat' (Hindi).

Erect or geniculately ascending, annual grass, 10 - 80 cm high. Leaves 2 - 20 × 0.25 - 0.75 cm, acuminate, scabrid ; ligule a ciliate rim. Inflorescence a cylindrical, spiciform, dense panicle upto 15 cm long, tinged with purple. Spikelets mostly 2 in each involucre, each 3 - 5 mm long, sessile. Lower glume c. 2.5 mm long, lanceolate, hyaline ; upper one c. 4.5 mm long, ovate, hyaline, 1 to 5 - nerved.

Fl. & Fr. : August - December.

Commonly found in sandy plains and on low hummocky plains, particularly in desertic zones. It is a good fodder grass becoming troublesome due to its prickly husk.

Selected specimens : Ajmer : *Duthie* 6736 A (DD) ; Barmer : *Rolla* 67031 (BSI) ; Jaipur : *Singh* 150 (DD) ; Jaisalmer : *Rao* 67159 (BSI) ; Jodhpur : *Pal, Pandey* 1765 (BSJO) ; Pali : *Sarder Samand* village, *Pandey* 19490 (BSJO).

2. *Cenchrus ciliaris* L. Mant. Alt. 302. 1771 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 287. f. 33. 1960 ; Raizada & Jain in Ind. For. Rec. (n.s.) Bot. 5 : 213. 1965. *Pennisetum cenchroides* Rich. in Pers. Syn. 1 : 72. 1805 ; Hook. f. Fl. Brit. India 7 : 88. 1896. *P. ciliare* (L.) Link, Hort. Berol. 1 : 213. 1827. 'Dhaman' (Hindi).

Tufted, erect or ascending perennials, 30 - 120 cm high ; root - stock often nodose ; sheaths woody. Leaves 5 - 25 × 0.25 - 0.5 cm ; ligule reduced to a ciliate rim. Panicle upto 8 cm long, purplish, cylindrical to ovoid with angular and puberulous rachis. Spikelets 2 - 4 in each involucre, each upto 5 mm long. Upper and lower glumes lanceolate, acute, hyaline, 1 - nerved.

Fl. & Fr. : August - March.

Common throughout Rajasthan in sandy habitats ; abundant in desertic zones.

Selected specimens : Ajmer : *Raizada* 4/56 (DD) ; Banswara : *Parlaka Pul, Majumdar* 10322 (BSA) ; Bharatpur : *Pahartal forest, Parmar* 8511 (BSJO) ; Jaipur : *Dausa, Wadhwa* 8167 (BSA) ; Jaisalmer : *Phalsund, Wadhwa* 4956 (BSA) ; Pali : *Erinpura, Rao* 66816 (BSI).

3. *Cenchrus pennisetiformis* Hochst. & Steud. ex Steud. Syn. Pl. Glum. 1 : 109. 1854 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 289. 1960 ; Raizada & Jain in Ind. For. Rec. (n.s.) Bot. 5 : 214. pl. 10. f. 3. 1965. *Pennisetum cenchroides* (L.) Rich. var. *echinoides* Hook. f. Fl. Brit. India 7 : 88. 1896. 'Dhamanio - Kaitai' (Hindi).

Erect or geniculately ascending perennials, upto 60 cm tall. Leaves 2 - 15 × 0.25 - 0.5 cm, linear, acute ; ligule a ciliate rim. Panicles upto 5.5 cm long, cylindric, greenish with purple tinge. Involucre sessile, with numerous bristles. Spikelets 2 - 5 in each involucre, sessile, 3 - 6 mm long. Glumes similar in texture, 1 to 3 - nerved, membranous. Caryopsis c. 1.75 mm long, obovate, truncate.

Fl. & Fr. : August - October, rarely throughout the year.

Commonly found in sandy habitats. It is a good fodder grass.

Selected specimens : Ajmer : *Lourie* : 4941 (DD) ; Banswara : *Parlaka Pul, Majumdar* 10331 (BSA) ; Bikaner : *Bichwal, Raizada* 11/55 (DD) ; Jaipur : *Bassi, Raizada* Acc. No. 130086 (DD) ; Jaisalmer : *Stower* B - 36, B 14 (BSI) ; Sirohi : *Mt. Abu, Puri* 56910 (BSI).

4. *Cenchrus prieurii* (Kunth) Maire in Bull. Mus. Hist. Nat. Paris ser. 2. 3 : 523. 1931 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 290. 1960 ; Raizada & Jain in Ind. For. Rec. (n.s.) Bot. 5 : 212. pl. 10. f. 1. 1965. *Pennisetum prieurii* Kunth, Rev. Gram. 2 : 411. t. 119. 1831 ; Hook. f. Fl. Brit. India 7 : 89. 1896. '*Lambo Bhurat*' (Hindi).

var. prieurii

Geniculate ascending or prostrate annual grass. Leaves 5 - 20 × 0.35 - 0.75 cm, flat, linear, acute ; ligule a densely ciliate rim. Panicles 5 - 15 cm long, cylindric, purplish - green ; rachis angular, scabrid. Involucre elongate, pedunculate. Spikelets 1 - 2 in each involucre, c. 4 mm long, sessile. Lower glume shorter or absent, hyaline, 1 - nerved ; upper one c. 3.5 mm long, 3 to 5 - nerved. Caryopsis 2 - 3 mm long, elliptic-oblong, dorsally compressed.

Fl. & Fr. : August - November.

Fairly common in sandy habitats of N.W. Rajasthan. It is an excellent fodder grass.

Selected specimens : Barmer : *Sheo, Rao* 67031-A (BSI) ; Bikaner : *Raizada* 10/55 (DD) ; Jaipur : *Patil* 469 (DD) ; Jaisalmer : *Wadhwa* 5274-A (BSA) ; Jhunjhunu : CEERI Pilani, *Deshpande* Acc. No. 136395 (DD).

5. **var. scabra** Bhandari, Fl. Ind. Desert 395. 1978.

This variety can be distinguished by its inner bristles which are ciliate but scabrous throughout.

Fl. & Fr. : October - December.

Endemic to western Rajasthan desert in sandy habitats.

Selected specimens : Barmer : *Jogidhora, Tiwari* 954 (BSJO) ; Jaisalmer : *Chandan, Tiwari* 790-A (BSJO) ; Jodhpur : CAZRI & Massuria area, *Bhandari* 793 (JAC).

6. *Cenchrus rajasthanensis* Kanodia & Nanda in Geobios 5(4) : 157 - 159. f. 1. 1978.

Erect or geniculately ascending, caespitose annuals or biennials, 15 - 30 cm high, with glabrous nodes. Leaves 5 - 7 × 0.3 - 0.6 cm, linear-lanceolate, folded, acute; ligule a fringe of hairs. Inflorescence 4 - 6 cm long, cylindric; rachis angular, glabrous. Involucre 2 - 4 mm long, cupular, subsessile. Spikelets 1 - 3 in each involucre, c. 3 mm long. Lower glume ovate-lanceolate, hyaline, acute, 1-nerved; upper one ovate, acuminate, 3-nerved, hyaline. Caryopsis c. 2 mm long, ovoid-oblong, pale straw.

Fl. & Fr. : August - October.

Endemic to Rajasthan desert in sandy habitats.

Selected specimens : Jaisalmer : Nachna, *Kanodia* 2354-A (CAZRI); Chandan, *Nanda* 1604-A (K), 1604 B - D (CAZRI); Jodhpur : Waglab, *Shankarnarayan* 1088 (IGFRI), *Kanodia* 2168-A (CAZRI).

7. *Cenchrus setigerus* Vahl. Enum. Pl. 2 : 395. 1805; Bor, Grass. Burm. Ceyl. Ind. Pak. 290. 1960; Raizada & Jain in Ind. For. Rec. (n.s.) Bot. 5 : 215. pl. 10. f. 2. 1965. *C. biflorus* auct. non Roxb. 1820; Hook. f. Fl. Brit. India 7 : 89. 1896. 'Dhaman' (Hindi).

Erect or geniculately ascending perennials, 10 - 70 cm high. Leaves 5 - 22 × 0.25 - 0.75 cm, linear lanceolate, acuminate; ligule a shortly ciliate rim. Panicles upto 10 cm long, greenish with purple tinge, solitary, cylindric; rachis angular. Involucre cup shaped, subsessile. Spikelets 2 - 3 in each involucre, each 3 - 5 mm long, sessile. Lower glume c. 2.5 mm long, hyaline, 1-nerved; upper ones c. 4 mm long, 5-nerved. Caryopsis c. 2 mm long, broadly oblong, dorsally compressed, smooth.

Fl. & Fr. : August - November.

Most common grass in mixed habitats throughout Rajasthan. It is considered to be a very good fodder grass.

Selected specimens : Ajmer : *Lourie* 200/13 (DD); Alwar : Kerska forest, *Parmar* 9553 (BSJO); Jaipur : Dausa, *Wadhwa* 8179 (BSA); Jaisalmer : *Raizada* 46/55 (DD); Jodhpur : *Tandon* Acc. No. 118969 (DD); Udaipur : *Majumdar* 12445 (BSA).

16. CENTOTHECA Desv.

Centotheca lappacea (L.) Desv. in Nouv. Bull. Soc. Philom. 2 : 189. 1810; Hook. f. Fl. Brit. India 7 : 332. 1896; Blatt. & McC. Bombay

Grasses 278. pl. 189. 1935 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 457. f. 50. 1960. *Cenchrus lappaceus* L. Sp. Pl. ed. 2. 1488. 1763.

Erect grass, upto 75 cm high, with woody root - stock. Leaves 5 - 20 × 2.5 - 3.0 cm, oblong - lanceolate, acuminate or acute ; ligule a lacerate membrane. Panicles upto 20 cm long. Spikelets c. 5 mm long, oblong - lanceolate, acute. Lower glume 3 - nerved ; upper ones 3 - 4 mm long, ovate - oblong, 3 to 5 - nerved. Upper lemma equal to lower lemma, oblong, 7 - nerved, apiculate, often with 2 rows of tubercle - based, deflexed bristles at the upper part of the margins.

Fl. & Fr. : September - November.

Rare, grows in moist and shaded places. Reported from N.W. Rajasthan by Sankhala (1951).

17. CHIONACHNE R. Br.

Chionachne koenigii (Spreng.) Thw. Enum. Pl. Zeyl. 357. 1864 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 262. 1960 ; Raizada *et al.* in Ind. For. Rec. (n.s.) Bot. 4 : 177. pl. 1. f. 1. 1961. *Coix koenigii* Spreng. Syst. Veg. 1 : 239. 1825. *C. barbata* Roxb. Fl. Ind. 3 : 569. 1832. *Polytoca barbata* (Roxb.) Stapf ex Hook. f. Fl. Brit. India 7 : 102. 1896.

Tall, perennial grass, 1 - 2 (- 3) m high, with bearded nodes. Leaves 15 - 50 × 0.5 - 2.5 cm, linear, acuminate, scabrid above and the lower surface covered with brittle irritant hairs. Inflorescence a leafy panicle ; each raceme subtended by spatheoles, c. 3 cm long, male above, with a solitary female spikelet at the base. Male spikelets c. 1 cm long, solitary or paired, with brick red anthers. Female spikelets 4 - 6 mm long, oblong, glabrous, whitish.

Fl. & Fr. : August - November.

Rare, found near moist situations.

Selected specimens : Jaipur : JAV. 27526 (BSI) ; Jhalawar : Dug. Verma 6765 (BSA) ; Sarod block, Wadhwa 7695 (BSA).

18. CHLORIS Sw.

- 1a. Lemma with a row of glands or tubercles on each side of the midrib. ... 5. *C. prieurii*
- 1b. Lemma devoid of such glands or tubercles :
- 2a. Empty lemma above the fertile floret solitary :

- 3a. Erect grass. Spikes upto 25 cm long, flexuous and drooping. Spikelets upto 7.5 mm long, narrowly lanceolate, dorsally compressed. Empty lemma represented by a fine awn upto 1.25 cm long. ... 2. *C. dolichostachya*
- 3b. Prostrate grass, rooting at the nodes. Spikes not more than 8.5 cm long, straight, erect or ascending. Spikelets upto 3.5 mm long, ovate, laterally compressed. Empty lemma oblanceolate, truncate, with an arista upto 6 mm long. ... 7. *C. virgata*
- 2b. Empty lemmas above the fertile floret two to four :
- 4a. Peduncle below the inflorescence puberulous. ... 6. *C. quinquesetica*
- 4b. Peduncle below the inflorescence glabrous :
- 5a. Spikelets more than 3 mm long ; awns upto 3, each 2 - 3 mm long. ... 3. *C. gayana*
- 5b. Spikelets upto 2.5 mm long ; awns 3 - 5, each upto 8 mm long or more :
- 6a. Spikelets cuneate, with four or 5 awns. Second lemma very similar to the lowest but smaller. ... 4. *C. montana*
- 6b. Spikelets plump, with three awns. Second lemma thinner than the lowest, much smaller, truncate, obovate, eventually globose. ... 1. *C. barbata*

1. *Chloris barbata* Sw. Fl. Ind. Occ. 1 : 200. 1797 ; Hook. f. Fl. Brit. India 7 : 292. 1896 ; Blatt. & McC. Bombay Grasses 256. pl. 171. 1935 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 465. 1960.

Tufted, geniculately ascending, stoloniferous perennials, 50 - 100 cm high. Leaves 10 - 40 × 0.25 - 0.35 cm, flat or convolute, narrowly linear, acuminate ; ligule a membrane. Spikes 5 - 15, digitate, tinge with purple. Spikelets 3 - flowered, 3 - awned, c. 2.5 mm long. Lower glume upto 1.5 mm long ; upper one c. 2.5 mm long. Lowest lemma 2.0 - 2.5 mm long, ovate - elliptic, pallid, ciliate, awned ; second and third lemma reduced to glabrous, clavate scale, awned.

Fl. & Fr. : July - September.

Commonly found on sandy plains. Cattle like it very much.

Selected specimens : Banswara : *Kanodia* 75571 (BSI) ; Jodhpur : Radia, *Shetty* 242 (BSJO) ; Sirohi : Mt. Abu, *Duthie* 6774 (DD) ; Pali : Madali village, *Shetty* 1370 (BSJO) ; Tonk : *Maheshwari* 52957 (LWG).

2. *Chloris dolichostachya* Lag. Gen. Sp. Pl. 3. 1816 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 466. 1960 ; Mahesh. Illus. Fl. Delhi. f. 257. 1966. *C. incompleta* Roth, Nov. Pl. Sp. 60. 1821 ; Hook. f. Fl. Brit. India 7 : 290. 1896.

Tufted, erect or ascending perennials, 40 - 100 cm high. Leaves 10 - 25 × 0.5 - 1.25 cm, flat, linear, tapering to a fine point ; sheaths hairy down the margins ; ligule a rim of hairs. Spikes upto 6, digitate, each upto 25 cm long, widely spreading. Spikelets 2 - flowered, 2 - awned, 4 - 5 mm long, narrowly fusiform, imbricate. Rachilla between the glumes and lemma hairy, forming the bearded callus. Lower glume shorter than the upper one, linear lanceolate. Lemma terminating into a 0.75 - 1.0 cm long awn. Caryopsis 2 - 3 mm long, enclosed in persistent lemma and palea.

Fl. & Fr. : August - March.

Common in rocky to sandy habitats, in the forest thickets, wastelands and in plains. It is a good fodder grass in younger stage.

Selected specimens : Ajmer : Todgarh, *Duthie* 4945 (DD) ; Alwar : Algal, *Sharma* 3981 (RUBL) ; Banswara : Kotharia forest, *Singh* 3761 (BSJO) ; Jaipur : Ramgarh, *Sharma* 872 (RUBL) ; Kota : Shahabad, *Majumdar* 13117 (BSA) ; Sirohi : Mt. Abu, *Jain* 60145 (BSI) ; Tonk : Toda Rai Singh R.F., *Shetty* 1089 (BSJO).

3. *Chloris gayana* Kunth, Rev. Gram. 1 : 293. t. 58. 1830 ; Blatt. & McC. Bombay Grasses 258. 1935 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 466. 1960. *C. abyssinica* Hochst. ex A. Rich. Tent. Fl. Abyss. 2 : 406. 1851.

Erect or ascending, stoloniferous perennials, upto 1.25 m high, often rooting at lower nodes. Leaves 10 - 30 × 0.35 - 1.0 cm, linear, acute ; ligule membranous, very shortly hairy. Spikes 5 - 20, digitate, ascending, each 4 - 10 cm long. Spikelets 3 to 4 - flowered, 2 - awned, c. 3 mm long. Lowest lemma 2.5 - 3.5 mm long, lanceolate, pallid, ciliate on the margins, keeled, awned ; callus ciliate, rounded ; 3rd and 4th lemma clavate, reduced to awnless scales.

Fl. & Fr. : August - October.

Very rare, only once collected from Bikaner district from sandy dry habitats.

Selected specimen : Bikaner : Kolayat, Roy 2038 (BSJO).

4. *Chloris montana* Roxb. Fl. Ind. 1 : 331. 1820 ; Hook. f. Fl. Brit. India 7 : 292. 1896 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 466. 1960. *C. decora* Thw. Enum. Pl. Zeyl. 371. 1864, non Nees 1854. *C. montana* Roxb. var. *glauca* Hook. f. in Trim. Handb. Fl. Ceyl. 5 : 276. 1900.

Erect or geniculately ascending, perennial grass, upto 50 cm high, rooting at lower nodes. Leaves 7 - 20 × 0.25 - 0.5 cm, narrowly linear, acuminate ; sheath bearded at the mouth ; ligules very short. Spikes 1 - 4, erect, upto 7 cm long. Spikelets c. 2.5 mm long, cuncate, upto 5-awned. Upper lemma similar to the lowest but smaller. Barren lemmas mostly 3.

Fl. & Fr. : August - October.

Rare, found in wastelands. It is highly variable grass as regards to the size of spikes and spikelets concerned.

Selected specimens : Ajmer : Akhajitgarh, Duthie 5243-A (DD) ; Banswara : Paloda, Singh 2823 (BSJO).

5. *Chloris pleurii* Kunth. Rev. Gram. 2 : 441. t. 134. 1831 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 466. 1960 ; Bhandari, Fl. Ind. Desert 396. 1978.

Erect annuals, 25 - 60 cm high. Leaves 8 - 20 × 0.25 - 0.5 cm, linear-lanceolate, acute, pubescent ; sheaths softly hairy, keeled ; ligule a hairy ridge. Spikes 3 - 5, digitate, upto 7 cm long. Spikelets c. 3 mm long, 4-awned ; upper glumes c. 3 mm long, membranous, long awned, villous at apex, keeled, the keel with a row of glands on each side.

Fl. & Fr. : August - October.

Fairly common in sandy plains and in open wastelands, particularly in desertic zones.

Selected specimens : Barmer : Gypsum halt, Tiwari 964 (BSJO) ; Bikaner : Kolayat, Roy 2038 (BSJO) ; Jaipur : Raizada 2/55 (DD) ; Jodhpur : Bhandari 1947 (JAC) ; Pali : Raizada 4/55 (DD).

6. *Chloris quinquesetica* Bhide in Journ. Proc. Asiat. Soc. Bengal (n.s.) 8 : 311. 1912 ; Blatt. & McC. Bombay Grasses 257. 1935 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 466. 1960 ; Bhandari, Fl. Ind. Desert 397. 1978.

Tufted, stoloniferous perennials, with glabrous nodes. Leaves 2 - 15 × 0.25 - 0.5 cm, lanceolate, acuminate, truncate at the base; ligule membranous. Spikes 2 - 15, crowded, each 2.5 - 5.0 cm long. Spikelets c. 8 mm long, mostly 5 flowered and 5 awned. Lowest lemma 2 - 3 mm long, obovate elliptic, pallid, densely bearded, awned; callus rounded, ciliate; 3rd, 4th and 5th lemma glabrous, reduced to minute scales.

Fl. & Fr. : August - November.

Occasional, found in sandy to saline habitats in W. Rajasthan desert.

Selected specimens : Jodhpur : *Bhandari* 1697, 1942 (JAC) ; Pali : *Erinapura, Rao* 66745 (BSI). Also reported from Jaisalmer (*Sarup*, 1958).

7. *Chloris virgata* Sw. Fl. Ind. Occ. 1 : 203. 1797 ; Hook f. Fl. Brit. India 7 : 291. 1896 ; Blatt. & McC. Bombay Grasses 255. pl. 170. 1935 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 468. 1960.

Tufted, erect annuals, c. 60 cm high, sometimes rooting at lower nodes. Leaves 5 - 25 × 0.25 - 0.5 cm, flat, linear, acute, glabrous; sheaths bearded; ligule a narrow, membranous, ridge. Spikes 5 - 12, erect, crowded, digitate, each 2.5 - 7.5 cm long. Spikelets 3 - flowered, 2 - awned, c. 2.5 mm long. Lowest lemma 2 - 4 mm long, obliquely obovate, ciliate along the margins, keel hairy, awned; callus rounded, ciliate; 3rd lemma an awnless, clavate scale.

Fl. & Fr. : July - November.

Common throughout Rajasthan in mixed habitats.

Selected specimens : Ajmer : *Lourie* 4943, 4943-A (DD) ; Alwar : Kankwari forest, *Parmar* 9416 (BSJO) ; Banswara : *Majumdar* 10232, 10262 (BSA) ; Jaipur : *Wadhwa* 4823 (BSA) ; Jaisalmer : *Vinjorai, Wadhwa* 5313 (BSA) ; Kota : *Verma* 453 (BSA) ; Sirohi : *Devali tank, Rao* 66634 (BSA).

19. CHRYSOFOGON Trin. *nom. cons.*

1a. Pedicels of pedicellate spikelets half the length of sessile spikelets or longer :

2a. Culms creeping at the base. Sessile spikelets upto 4.5 mm long, with a very long, pungent callus decurrent on the peduncle.

...

1. *C. aciculatus*

- 2b. Culms erect, not creeping at the base. Sessile spikelet more than 5 mm long and without a decurrent callus. ... 4. *C. gryllus*
- 1b. Pedicels of pedicellate spikelets shorter than half the length of the sessile spikelets :
- 3a. Leaves glabrous :
- 4a. Pedicellate spikelet much shorter than the sessile ones ; hairs chocolate brown or rufous - brown. Lower glume of pedicellate spikelet not awned. ... 5. *C. hackelii*
- 4b. Pedicellate spikelet a little shorter, equal to or longer than the sessile one ; hairs golden brown or if rufous - brown then lower glume of pedicellate spikelet awned :
- 5a. Sessile and pedicellate spikelets equal in size. Upper glume of the sessile spikelet shortly ciliate in the upper quarter. ... 6. *C. serrulatus*
- 5b. Sessile spikelet longer than pedicellate. Upper glume of the sessile spikelet keeled, pectinate - ciliate in the lower two - third or three quarters with long golden - brown rigid hairs. ... 3. *C. fulvus*
- 3b. Leaves puberulous. ... 2. *C. aucheri*

1. *Chrysopogon aciculatus* (Retz.) Trin. Fund. Agrost. 188. 1820 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 115. 1960 ; Raizada *et al.* in Ind. For. Rec. (n.s.) Bot. 4 : 218. 1961. *Andropogon aciculatus* Retz. Obs. Bot. 5 : 22. 1789 ; Hook. f. Fl. Brit. India 7 : 188. 1896.

Erect or ascending perennial grass, with woody and creeping root - stock. Leaves 2 - 12 × 0.25 - 0.5 cm, flat, linear - lanceolate, acute, margins distantly spinulose ; ligule membranous. Panicles 2 - 7 cm long, green with purplish tinge. Spikelets in threes. Sessile spikelets c. 3.5 mm long ; callus very long, pungent, decurrent on the peduncle. Glumes equal, aristulate. Pedicellate spikelets upto 5 mm long, acuminate ; pedicels with a tuft of few hairs at the base only. Caryopsis linear.

Fl. & Fr. : August - October.

Rare, in open dry wastelands.

Selected specimen : Bundi : Kota dam, Singh 74482 (LWG). Also reported from Bikaner (Joshi, 1956). It is often used as fodder.

2. *Chrysopogon aucheri* (Boiss.) Stapf in Kew Bull. 1907 : 21. 1907 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 116. 1960. *Andropogon aucheri* Boiss. Diagn. ser. 1. 5 : 77. 1844 ; Hook. f. Fl. Brit. India 7 : 195. 1896.

Tufted, erect or ascending perennials, 30 - 60 cm high, with silky villous basal sheaths. Leaves 5 - 20 × 0.25 - 0.5 cm, linear - lanceolate, acute to acuminate, margins ciliate. Panicles upto 10 cm long. Sessile spikelets 5 - 8 mm long, narrowly elliptic - oblong. Lower glume laterally compressed, ciliate ; upper one with a long awn. Upper lemma bidentate, with a shortly pubescent awn. Pedicelled spikelets 7 - 10 mm long ; lower glume awned ; pedicels fulvously villous.

Fl. & Fr. : March - September.

Rare, found in the crevices of rocks.

Selected specimen : Bharatpur : On hills near Sikandara, Parmar 8740 (BSJO).

3. *Chrysopogon fulvus* (Spreng.) Chiov. Fl. Somalia 1 : 327. 1929 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 116. 1960. *Pollinia fulva* Spreng. Pugill. 2 : 10. 1815. *Chrysopogon montanus* Trin. ex Spreng. Neue Entdeck. 2 : 93. 1821 ; Blatt. & McC. Bombay Grasses 70. pl. 42. 1935. *Andropogon monticola* Roem. & Schult. Syst. Veg. Mant. 2 : 665. 1827 ; Hook. f. Fl. Brit. India 7 : 192. 1896.

Erect or geniculately ascending perennials, 50 - 150 cm high. Leaves upto 40 × 1 cm, linear, acuminate, scabrid on margins ; ligule a minute membranous rim. Panicles upto 15 cm long, yellowish - purple. Sessile spikelets 5 - 8 mm long ; callus short with oblique, oval scar and stiff golden brownish hairs. Glumes with white or rufous hairs, awned. Pedicellate spikelets as long as the sessile ones ; lower glume dorsally pubescent.

Fl. & Fr. : August - November.

Commonly found in sandy and rocky habitats. It is used as a fodder grass.

Selected specimens : Barmer : Nimla, Agrawal 629 (DD) ; Bharatpur : Lahasar, Parmar 8599 (BSJO) ; Bhilwara : Bhiloki Jopari, Singh 6209

(BSJO); Kota : Garari Mahadev, *Singh* 74646 (LWG) ; Pali : Chang Chittar R.F., *Shetty* 1801 (BSJO); Tonk : Bilaspur forests, *Shetty* 1310 (BSJO); Udaipur : *Kanodia* 82294 (BSI).

4. *Chrysopogon gryllus* (L.) Trin. Fund. Agrost. 188. 1820 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 117. 1960 ; Blatt. & McC. Bombay Grasses 67. pl. 41. 1935 ; Raizada *et al.* in Ind. For. Rec. (n.s.) Bot. 4 : 217. 1961. *Andropogon gryllus* L. Cent. Pl. 2 : 33. 1756 ; Hook. f. Fl. Brit. India 7 : 187. 1896.

Densely tufted, erect grass, 25 - 125 cm high, with glabrous nodes. Leaves 10 - 30 × 0.35 - 0.75 cm, linear, acute, margins serrulate, glabrescent. Panicles 10 - 18 cm long. Sessile spikelets 4.5 - 7.75 mm long ; callus acute, straight. Glumes awned, chartaceous. Pedicellate spikelets 7-9 mm long, lanceolate, acuminate.

Fl. & Fr. : July - September.

Rare, reported from Jhunjhunu (*Joshi & Sharma*, 1964 & 1966) from dry sandy habitats.

5. *Chrysopogon hackellii* (Hook. f.) Fischer in Gamble, Fl. Madras pt. 10 : 1739. 1934 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 117. 1960. *Andropogon hackelii* Hook. f. Fl. Brit. India 7 : 194. 1896.

Tall annuals, upto 1.25 m or more high ; nodes with a ring of hairs. Leaves linear, glabrous ; ligule a rim of short hairs ; sheaths keeled on back. Panicles upto 15 cm long, with spreading branches. Pedicellate spikelets and their pedicels shorter than the sessile spikelets. Lower glumes of the sessile spikelets subcymbiform, 2 - lobed at the top, awned. Lower glumes of the pedicellate spikelets not awned.

Fl. & Fr. : October - January.

Common along water courses and streams in dry deciduous forests.

Selected specimen : Banswara : Hura Bowji forest, *Singh* 3684 (BSJO).

6. *Chrysopogon serrulatus* Trin. in Mem. Acad. Sci. Petersb. ser. 6 ; 2 : 318. 1832 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 118. 1960. *Andropogon trinitii* Steud. Syn. Pl. Glum. 1 : 395. 1854. *A. monticola* Schult. var. *trinitii* (Steud.) Hook. f. Fl. Brit. India 7 : 193. 1896. *Chrysopogon fulvus* (Spreng.) Chiov. var. *serrulatus* (Trin.) R.R. Stewart in Brittonia 5 : 466. 1945.

Tall, erect perennials, upto 1 m high. Leaves upto 25.0×0.5 cm, linear, acuminate, glabrescent. Panicles upto 10 cm long, with capillary branches which are fulvously bearded at the tip. Sessile spikelets 4 - 8 mm long; glumes awned. Pedicellate spikelets 4 - 8 mm long; pedicels fulvously villous, one-fourth to one-third the length of the sessile spikelets.

Fl. & Fr. : August - October.

Rare, found in rocky habitats. Included on the authority of Gupta & Sharma (1971) from Pali district.

20. COIX L.

- 1a. Annuals. Lower glume of the male spikelets hardly or narrowly winged. ... 3. *C. lacryma - jobi*
- 1b. Perennials. Lower glume of the male spikelets distinctly and broadly winged at the apex :
- 2a. Terrestrial, erect grass. Upper surface of the leaves without conspicuous glands. Involucre not abruptly constricted at the neck into a beak. ... 2. *C. gigantea*
- 2b. Aquatic, floating and creeping grass with succulent stem and floating roots at the nodes. Upper surface of the leaves densely covered with conspicuous glands which bear bristle - like hairs. Ripe involucre abruptly constricted at the neck into a beak. ... 1. *C. aquatica*

1. *Coix aquatica* Roxb. Fl. Ind. 3 : 571. 1832 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 264. 1960 ; Hook. f. Fl. Brit. India 7 : 100. 1896.

Floating and creeping perennials. Leaves linear, acute, upper surface densely covered with conspicuous glands which bears bristle - like hairs, margins hispid. Male spikes drooping, many - flowered. Lower glume of the male spikelets broadly winged. Ripe involucre abruptly constricted at the neck into a beak. Seeds turbinate.

Fl. & Fr. : February - March.

Occasional, found in stagnant water in ponds, pools, ditches etc., particularly along the roads and railway lines in south - east Rajasthan.

Selected specimens : Chittorgarh : Pratapgarh, *Majumdar* 10150-A (BSA) ; Jhalawar : Shyamgarh, *Majumdar* 10084 (BSA) ; Kota : Baran, *Majumdar* 10844, 13264 (BSA).

2. *Coix gigantea* Koenig ex Roxb. Fl. Ind. 3 : 570. 1832 ; Bor. Grass. Burm. Ceyl. Ind. Pak. 264. 1960 ; Raizada *et al.* in Ind. For. Rec. (n.s.) Bot. 4 : 176. 1961. *C. lingulata* Hack. in Ost. Bot. Z. 41 : 5. 1891. *C. lacryma - jobi* L. var. *gigantea* (Koen. ex Roxb.) Stapf in Hook. f. Fl. Brit. India 7 : 100. 1896.

Erect, tall, perennial grass, 1.0 - 2.5 m high. Leaves upto 100 × 2.6 cm, broadly ovate lanceolate, subcordate at the base, scabrid at the margins, upper leaves narrower. Inflorescence consisting of false, drooping racemes ; peduncle 5 - 12 cm long. Male spikelets : Lower glume c. 1.25 cm long, broadly winged at the top, many - nerved ; upper one lanceolate. Stamens 3. Involucre of female spikelets with distinct ligule.

Fl. & Fr. : August - November.

Rare, found in moist sandy soils, particularly in low lying cultivated and fallow fields.

Selected specimen : Jhalawar : Raizada 4/55 (DD).

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 ; Raizada *et al.* in Ind. For. Rec. (n.s.) Bot. 4 : 176. pl. 1, f. 2. 1961. *C. lacryma* L. Syst. Nat. ed. 10. 1261. 1759. 'Jorgadi' (Hindi).

Robust, spongy, glabrous annuals, upto 2.5 m tall, often rooting at lower nodes. Leaves 7.5 - 40.5 × 2 - 5 cm, linear lanceolate, cordate at the base, acuminate at the apex ; ligule a glabrous membrane. Inflorescence a false raceme, consisting of solitary, basal female spikelet enclosed in bract and several male spikelets borne upwards on the same peduncle. Cupule broadly ovoid, bony, shining white.

Fl. & Fr. : August - December.

Common in wet and semi - aquatic habitats. It is used as a fodder grass.

Selected specimens : Banswara : Jholana, Kanodia 51161 (BSI) ; Bhilwara : Bijolia, Singh 6075, 7157 (BSJO) ; Kota : Jain 28735 (BSI) ; Jaisalmer : Anand sagar, JAV 219119 (BSI) ; Sirohi : Mt. Abu, Duthie 6742 (DD). Also reported from Udaipur (Ramdeo, 1969).

21. *CRYPISIS* Ait. *nom. cons.*

Crypsis schoenoides (L.) Lam. Tab. Encycl. Meth. Bot. 1 : 166. t. 42. 1791 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 622. 1960. *Phleum schoenoides* L. Sp. Pl. 60. 1753. *Heleochoa schoenoides* (L.) Host. Icon. Gram. Austr. 1 : 23. t. 30. 1801 ; Hook. f. Fl. Brit. India 7 : 235. 1896.

Prostrate or ascending, profusely branched annuals, upto 20 cm high. Leaves 0.75-5.0 × 0.25-0.5 cm, broadly linear lanceolate, acuminate, glabrous or sparsely hairy. Inflorescence c. 2.5 cm long, spiciform panicle, ellipsoid or ovoid, base with 2, inflated leaves. Spikelets 2.0-3.5 mm long, lanceolate. Glumes c. 3 mm long, lanceolate, 1-nerved, stiffly ciliate on the keel. Stamens 3. Caryopsis c. 1.5 mm long, obovate - elliptic, brown.

Fl. & Fr. : August - November.

Commonly found near moist places, particularly on dried banks of ponds and ditches.

Selected specimens : Barmer : Pachpadara, *Tiwari* 1140 (BSJO) ; Bikaner : Kolayat tank side, *Roy* 2403 (BSJO) ; Jaipur : Dausa, *Wadhwa* 8193 (BSA) ; Jaisalmer : Pokaran, *Tiwari* 758 (BSJO) ; Jhalawar : Kali sind river, *Verma* 3393 (BSA) ; Tonk : Near Bentheli, *Shetty* 472 (BSJO).

22. *CYMBOPOGON* Spreng.

1a. Sessile spikelets awned :

2a. Leaves cordate and amplexicaul at base. Panicle usually very large, decomposed or compound. Lower glume of sessile spikelet with a deep median groove from middle downwards. ...

5. *C. martinii*

2b. Leaves narrow or attenuate at the base. Panicle narrow, of short, dense fascicles or racemes. Lower glume of sessile spikelets flat or concave on the back :

3a. Basal sheath woolly. Joints and pedicels glabrous or scarcely pubescent on the back. Lower glume of the sessile spikelet pubescent in the groove. Pedicel of the lowest pedicellate spikelet in the subsessile raceme swollen, hard. Pedicellate spikelets hairy on the nerves. ...

2. *C. commutatus*

- 3b. Basal sheath not woolly. Joints and pedicels pilose on the back. Lower glume of the sessile spikelet smooth and glabrous. Pedicel of the lowest pedicellate spikelet not swollen. Pedicellate spikelets glabrous :
- 4a. Culms upto 1.5 m high. Basal sheath more or less coiled in a characteristic spiral. Ligule less than 1 mm long. Leaves flat. ... 3. *C. jwarancusa* subsp. *jwarancusa*
- 4b. Culms less than 1/2 m high. Basal sheath never curled in spirals. Ligule more than 2 mm long. Leaves more or less filiform or flexuous. ... 4. *C. jwarancusa* subsp. *olivieri*
- 1b. Sessile spikelet not awned. ... 1. *C. citratus*

1. *Cymbopogon citratus* (DC.) Stapf in Kew Bull. 1906 : 357. 1906 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 126. 1960. *Andropogon citratus* DC. Cat. Hort. Monsp. 78. 1813 ; Hook. f. Fl. Brit. India 7 : 210. 1896.

Densely tufted, erect perennials, 1 - 2 m high. Leaves 20 - 80 × 1.25 - 1.75 cm, linear, acuminate, attenuated at the base, glabrous ; ligule very short, scarious. Panicles 25 - 50 cm long, spatheate. Racemes binate, upto 2.5 cm long, purplish red, villous. Fertile spikelets c. 5 mm long, linear - lanceolate, acuminate, glabrous ; callus bearded. Glumes subequal, subchartaceous, keeled. Pedicellate spikelet male or neuter, glabrous.

Fl. & Fr. : September - February.

Rare, forms tufts in grasslands. Sometimes cultivated for essential oil extracted from leaves. Included on the authority of Sarup (1951) and Puri *et al.* (1964) from desertic zones.

2. *Cymbopogon commutatus* (Steud.) Stapf in Kew Bull. 1907 : 211. 1907. *Andropogon commutatus* Steud. Syn. Pl. Glum. 1 : 387. 1864. *Cymbopogon parkeri* Stapf in Kew Bull. 1929 : 10. 1929 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 131. 1960 ; Raizada *et al.* in Ind. For. Rec. (n.s.) Bot. 4 : 241. pl. 11. f. 3. 1961.

Densely tufted, erect or geniculately ascending perennials. Leaves 10 - 45 × 0.25 - 0.35 cm, very narrow, almost filiform, flexuous, narrowed at the base ; basal sheaths pubescent ; ligule scarious, c. 1.5 mm long, truncate. Inflorescence a spatheate panicle, upto 30 cm long. Racemes

2-nate, divaricate, upto 2.5 cm long. Lowest pair of spikelets of the sessile racemes homogamous, of the other heterogamous. Sessile spikelets hermaphrodite, awned. Palea absent. Pedicellate spikelets male.

Fl. & Fr. : March - May.

Commonly found in dry sandy habitats.

Selected specimens : Ajmer : *Lourie* 4922 (DD), *Duthie* 6760 (DD) ; Barmer : *Sheo*, *Tiwari* 920 (BSJO) ; Bikaner : *Kolayat*, *Roy* 2375 (BSJO) ; Jaisalmer : *Sam*, *Shetty* 3342 (BSJO) ; Jodhpur : *Beriganga*, *Shetty* 125 (BSJO) ; Tonk : *Gar R.F.*, *Shetty* 1240 (BSJO). Also reported from Jhunjhunu (*Joshi & Sharma*, 1966).

3. *Cymbopogon jwarancusa* (Jones) Schult. *Syst. Veg. Mant.* 2 : 458. 1824 ; *Bor*, *Grass. Burm. Ceyl. Ind. Pak.* 128. 1960 ; *Raizada et al.* in *Ind. For. Rec. (n.s.) Bot.* 4 : 243. pl. 11. f. 2. 1961. *Andropogon jwarancusa* Jones in *Asiat. Res.* 4 : 109. 1795 ; *Hook. f. Fl. Brit. India* 7 : 203. 1896.

subsp. *jwarancusa*

Erect or geniculately ascending perennials, upto 1.5 m high ; roots aromatic. Leaves 10 - 25 × 0.25 - 0.5 cm, flat, linear, base narrowed, tip filiform ; basal sheath coiled ; ligule 1.0 - 2.5 mm long. Inflorescence a panicle, 10 - 45 cm long, spatheate. Each raceme upto 2.5 cm long ; internodes and pedicels densely ciliate. Sessile spikelets c. 5 mm long, linear - lanceolate, hermaphrodite, awned. Pedicellate spikelets c. 5.5 mm long, male, oblong - elliptic, acuminate.

Fl. & Fr. : August - December.

Commonly found in sandy habitats in the desertic zones.

Selected specimens : Bikaner : *Bichwal*, *Roy* 1673 (BSJO) ; Churu : *Sardar Shahr*, *Roy* 2595 (BSJO) ; Ganganagar : *Garsana*, *Roy* 4862 (BSJO) ; Jaisalmer : *Chandan*, *Tiwari* 793 (BSJO) ; Jodhpur : *Chaba*, *Singh* 3140 (BSJO). Also reported from Alwar (*Vyas*, 1967).

4. subsp. *olivieri* (Boiss.) Soenarko in *Reinwardtia* 9 : 307. 1977. *Andropogon olivieri* Boiss. *Diagn. ser. 1.* 1(5) : 76. 1844. *A. jwarancusa* Jones subsp. *laniger sensu* *Hook. f. Fl. Brit. India* 7 : 203. 1896, non *A. laniger* Desf. 1799. *Cymbopogon schoenanthus* non (L.) Spreng. 1815 ; *sensu* *Bor*, *Grass. Burm. Ceyl. Ind. Pak.* 131. 1960. *C. olivieri* (Boiss.) *Bor*, in *Notes Roy. Bot. Gard. Edinb.* 25 : 62. 1963. *C. ladakhensis* *Gupta* in *Proc. Ind. Acad. Sci. Sect. B.* 71 (1) : 11. 1970.

This subspecies can be identified by having culms seldom exceeding 1/2 m tall ; basal sheaths hardly coiled and ligules 2 - 4 mm long.

Fl. & Fr. : August - December.

Commonly found in sandy habitats like subsp. *jwarancusa*.

Selected specimens : Barmer : *Bhandari* 1551 (JAC) ; Churu : Sardar Shahr, *Singh* Acc. No 39189 (LWG) ; Ganganagar : Sunderpura, *Roy* 6433 (BSJO) ; Sirohi : Mt. Abu, *Mehra* 572 (JAC). Also reported from Jaisalmer (*Majumdar et al.*, 1969).

5. *Cymbopogon martinii* (Roxb.) Watson in Atkins. Gaz. N.W. Prov. India 10 : 392. 1882 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 129. 1960 ; Raizada *et al.* in Ind. For. Rec. (n.s.) Bot. 4 : 244. pl. 11. f. 1. 1961. *Andropogon martinii* Roxb. Fl. Ind. 1 : 280. 1820. *A. schoenanthus* L. var. *martinii* (Roxb.) Hook. f. Fl. Brit. India 7 : 204. 1896.

Tufted, erect, sweet - scented, perennial grass, 1.5 - 2.5 m high, with woody root - stock. Leaves 20 - 45 × 1.0 - 2.75 cm, lanceolate, cordate or amplexicaul at base, filiform at the tip, margins scabrid, pigmented pink ; ligule 1 - 2 mm long, oblong. Inflorescence 10 - 30 cm long, spatheate, orange - red at maturity. Each raceme upto 2.25 cm long ; pedicels and internodes densely ciliate. Sessile spikelets of the lowest pair male or neuter, others hermaphrodite, awned. Pedicellate spikelets male. Stamens 3.

Fl. & Fr. : August - March.

Commonly found near moist situations.

Selected specimens ; Ajmer : Taragarh, *Duthie* 4921 (DD) ; Alwar : Pandupole, *Parmar* 9480 (BSJO) ; Banswara : *Kanodia* 75703 (BSI) ; Barmer : Kundal R.F., *Pandey* 8015 (BSJO) ; Jaipur : Univ. R.F., *Sharma* 1355 (RUBL) ; Kota : *Jain* 28742 (BSI) ; Sirohi : Mt. Abu, *Blatter* 2544 (BLAT) ; Tonk : *Maheshwari* 53222 (LWG).

23. CYNODON L.C. Rich. *nom. cons.*

1a. Lemmas longer than the upper glumes.

2a. Rhizomatous grass. Ligule a ring of white hairs. Spikes 2 - 6, each upto 6 cm long. Hairs on lemma always simple not clavate. Anthers more than 1 mm long.

... 3. *C. dactylon*

- 2b. Plant not rhizomatous. Ligule membranous. Spikes numerous, each upto 10 cm long. Hairs on lemma mostly clavellate. Anthers c. 0.5 mm long. ... 1. *C. arcuatus*
- 1b. Lemmas equal, shorter or slightly longer than the upper glume. ... 2. *C. barberi*

1. *Cynodon arcuatus* J.S. Presl ex C.B. Presl, Rel. Haenk. 1 : 290. 1830 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 469. 1960. *C. intermedius* Rang. & Tad. in Journ. Bombay Nat. Hist. Soc. 26 : 304. 1918. *C. dactylon* (L.) Pers. var. *intermedius* (Rang. & Tad.) Fischer in Gamble, Fl. Madras 1835. 1934.

Creeping, stoloniferous, slender perennials. Leaves upto 15.0 × 0.5 cm, linear-lanceolate to ovate, glaucous ; ligule membranous, ciliolate. Spikes many, upto 10 cm long, flexuous, slightly drooping, in a single whorl. Spikelets 1.75 - 2.25 mm long. Glumes 1-nerved, lanceolate. Lemma with pointed clavellate hairs. Caryopsis more or less trigonous and laterally compressed.

Fl. & Fr. : August - November.

Rare, found along irrigational channels and in cultivated fields etc. Perhaps recently introduced from Punjab through canal.

Selected specimen : Ganganagar : 20 P.D.D., Roy 3848 (BSJO).

2. *Cynodon barberi* Rang. & Tad. in Journ. Bombay Nat. Hist. Soc. 24 : 846. 1916 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 469. 1960.

Rhizomes absent. Leaves shorter and not finely pointed. Upper glume always equal or longer than the lemma. Clavellate hairs present on the keels and margins of the lemma and on the keels of the palea.

Fl. & Fr. : August - October.

Rare, weed in open wastelands and neglected corners of the gardens. It is very closely allied to *C. dactylon* (L.) Pers.

Selected specimens : Bikaner : Vallabh-garden, Roy 2435 (BSJO) ; Kota : Verma 435 (BSA) ; Sirohi : Mandhura, Khisti 59909 (BSI).

3. *Cynodon dactylon* (L.) Pers. Syn. Pl. 1 : 85. 1805 ; Hook. f. Fl. Brit. India 7 : 288. 1896 ; Blatt. & McC. Bombay Grasses 250. pl. 166. 1935 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 469. f. 52. 1960. *Panicum dactylon* L. Sp. Pl. 58. 1753.

Creeping, stoloniferous, often rhizomatous perennials forming matted tufts, 10 - 40 cm high. Leaves 2.5 - 10.5 × 0.25 - 0.5 cm, linear-lanceolate, acute, glaucous, auricles and orifices bearded; ligule 0.1 - 0.35 mm long, a rim of short, white hairs. Spikes 2 - 6, upto 6.5 cm long. Spikelets 2.0 - 2.5 mm long, crowded, secund. Glumes lanceolate, 1 - nerved. Lemmas c. 2 mm long, silky pubescent on the keel with simple hairs, obliquely oblong. Stamens 3. Caryopsis c. 1 mm long, mostly turgid.

Fl. & Fr. : January - December.

Fairly common in fallow fields and wastelands. Also grown in the lawns.

Selected specimens : Ajmer : Beawar, *Duthie* 4947(DD); Alwar : Naldeshwar forest, *Parmar* 9505 (BSJO); Banswara : *Majumdar* 10227 (BSA); Bikaner : Bichwal, *Roy* 1674 (BSJO); Jaipur : Dausa, *Wadhwa* 8143 (BSA); Kota : *Majumdar* 10347 (BSA); Sirohi : Mt. Abu, *Vasvada* 22656 (BSA).

24. DACTYLOCTENIUM Willd.

- 1a. Stoloniferous perennials. Anthers more than 1 mm long. ... 3. *D. scindicum*
- 1b. Annuals. Anthers less than 0.75 mm long :
- 2a. Inflorescence open ; the spikes 2.5 - 6.0 cm long, ascending or radiating from the culm tip ; tip of the rachis shortly produced, upto 2 mm long. Lemmas acute, cuspidate or mucronate. Caryopsis coarsely transversely rugose ... 1. *D. aegyptium*
- 2b. Inflorescence compact ; the spikes upto 2 cm long ; tip of the rachis upto 4 mm long. Lemmas conspicuously acuminate - mucronate. Caryopsis finely granular. ... 2. *D. aristatum*

1. *Dactyloctenium aegyptium* (L.) Willd. Enum. Hort. Berol. 1029. 1809; Blatt. & McC. Bombay Grasses 262. pl. 176. 1935; Bor, Grass. Burm. Ceyl. Ind. Pak. 489. f. 54. 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.

Erect or geniculately ascending, hispid annuals, 15 - 70 cm high, often rooting at lower nodes. Leaves 5.5 - 20.0 × 0.25 - 0.7 cm, linear, acute, margins and nerves covered with bulbous - based hairs ; ligule a

ring of white hairs. Spikes 2 - 6, each upto 6 cm long, digitate ; rachis trigonous, rigid, excurrent into a pungent mucro, c. 2 mm long. Spikelets 3 to 5 - flowered, 3.5 - 4.25 mm long. Glumes subequal, upto 2.5 mm long, with scabrid keel. Caryopsis c. 1 mm across, compressed, subglobose, reddish.

Fl. & Fr. : July - November.

Commonly found in moist habitats in the cultivated and fallow fields, wastelands and along the irrigation channels.

Selected specimens : Ajmer : *Lourie* 4949 (DD) ; Alwar : *Naryanji, Parmar* 9783 (BSJO) ; Banswara : Paloda village, *Singh* 2807 (BSJO) ; Bikaner : *Bhikmpur, Roy* 2019 (BSJO) ; Jaipur : *Raizada* Acc. No 130091 (DD) ; Kota : *Kishanganj, Verma* 746 (BSA) ; Sirohi : *Mt. Abu, Mehta* 1359 (JAC).

2. *Dactyloctenium aristatum* Link, Hort. Berol. 1 : 59. 1827 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 489. 1960. *D. aegyptium* (L.) Willd. var. *aristatum* (Link) A. Chev. in *Revue Bot. Appl. Agric. Trop.* 14 : 130. 1934.

Diffuse - prostrate, tufted annuals, often rooting at the lower nodes. Leaves upto 12.5 × 0.75 cm, linear, acuminate, papillose - hispid. Spikes usually 4 or more, each upto 1.75 cm long, in a dense subglobose heads ; rachis ending into a pungent, curved mucro. Spikelets 3 to 5 - flowered, c. 4 mm long. Glumes subequal, lower glume with keel narrowly winged, upper one shortly awned. Caryopsis c. 1 mm long, elliptic - obovate.

Fl. & Fr. : July - October.

Commonly found in moist sandy and rocky habitats.

Selected specimens : Banswara : *Kanodia* 75588 (BSI) ; Barmer : *Rao* 67009 (BSI) ; Chittorgarh : *Bharar, Singh & Pandey* 6989 (BSJO) ; Jaipur : *Sharma* 1355 (RUBL) ; Jaisalmer : *Rao* 67357 (BSI). Also reported from Jalore and Jodhpur (*Gupta & Sharma*, 1971).

3. *Dactyloctenium scindicum* Boiss. *Diagn. Pl. Orient. ser. 2.* 4 : 131. 1859 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 489. 1960. *Eleusine aristata* Ehrenb. ex Boiss. *Fl. Orient.* 5 : 557. 1884 ; Hook. f. *Fl. Brit. India* 7 : 296. 1896. *E. scindica* (Boiss.) Duthie, *Illus. Indig. Fodd. Grass.* pl. 36. 1886 et *Fodd. Grass. N. India* 58. 1888.

Profusely branched, creeping, stoloniferous perennials, upto 40 cm high, with thickened and pubescent nodes. Leaves 1.5 - 11.5 × 0.15 - 0.5 cm

glaucous, loosely folded, sparsely hairy, margins ciliate with bulbous-based hairs; ligule membranous with a minute fringe of hairs. Spikes 3 - 4, each 0.5 - 2.0 cm long, falcate, often forming compact heads; tip of the rachis shortly produced into a 2 - 3 mm long, pungent mucro. Spikelets 3 to 9 - flowered, c. 3.25 mm long. Glumes unequal, lower glume 1.75 - 2.5 mm long, with keel narrowly winged; upper one with prominent scabrid keel extended into an awn. Lemmas mucronate. Caryopsis 0.75 - 1.0 mm long, ovoid, transversely rugose, brownish.

Fl. & Fr. : Almost throughout the year.

Commonly found in sandy and gravelly soils forming thick tufts or mats on the ground.

Selected specimens : Ajmer : *Lourie* 200/191 (DD) ; Alwar : Naldeshwar, *Parmar* 9531 (BSJO) ; Barmer : Rani ka bara, *Shetty* 2328 (BSJO) ; Jaipur : *Raizada* 16/55 (DD) ; Jodhpur : Pal, *Pandey* 1763 (BSJO).

25. DENDROCALAMUS Nees

Dendrocalamus strictus (Roxb.) Nees in *Linnaea* 9 : 476. 1834 ; Gamble in *Ann. Roy. Bot. Gard. Calc.* 7 : 78. t. 68, 69, 1896 *et in Hook. f. Fl. Brit. India* 7 : 404. 1896. *Bambusa stricta* Roxb. *Pl. Cor.* 1 : 58. t. 80. 1798. '*Bans*' (Hindi).

Densely tufted, arborescent bamboos, upto 10 m tall, with swollen nodes. Lower stem - sheaths covered on the back with golden - brown stiff hairs. Internodes upto 50 cm long. Leaves upto 12 × 2 cm, shortly petiolate, acuminate at the apex; ligules narrow, serrate. Inflorescence a panicle of dense, globular heads 2.5 - 5.5 cm across. Spikelets spiny, hairy; perfect florets 2 or 3, intermixed with many, small sterile ones. Bracts and glumes similar. Lemma ovate, densely hairy to the top, ending in a sharp spine. Palea fringed on the keel and hairy near the tip. Caryopsis subglobose, brown.

Fl. & Fr. : At the intervals of many years.

Fairly common in dry deciduous forests on the top of hills forming distant patches. This species is under great biotic pressure being the main source of bamboo in the area.

Selected specimens : Banswara : Kushalgarh, *Kanodia* 75691 (BSI) ; Chittorgarh : *Majumdar* 12347 (BSA) ; Dungarpur : *Verma* 199 (BSA) ;

Kota : *Wadhwa* 9435 (BSA) ; Sirohi : Chipperbari - Abu hills, *McCann* 1929 (BLAT).

26. DESMOSTACHYA Stapf

Desmostachya bipinnata (L.) Stapf in Dyer, Fl. Cap. 7 : 632. 1900 ; Blatt. & McC. Bombay Grasses 244. pl. 162. 1935 ; Bor, Grass. Burn. Ceyl. Ind. Pak. 491. 1960. *Briza bipinnata* L. Syst. Nat. ed. 10. 2 : 875. 1759. *Poa cynosuroides* Retz. Obs. Bot. 4 : 20. 1786. *Eragrostis cynosuroides* (Retz.) P Beauv. Ess. Agrost. 162. 1812 ; Hook. f. Fl. Brit. India 7 : 324. 1896.

Tufted, stout, erect, rhizomatous perennials, upto 1.25 m tall, with creeping root - stock. Leaves 20 - 50 × 0.35 - 0.75 cm, acuminate ; sheaths glabrous, densely flabellate. Inflorescence 25 - 50 cm long. Spikes 1.5 - 3.5 cm long, clustered, each cluster bearing 20 - 30 spikelets. Spikelets 2.5 - 3.5 mm long, linear - oblong. Glumes unequal. Lemmas c. 2.5 mm long, straw - coloured.

Fl. & Fr. : July - November.

Commonly found near moist places, particularly in sandy and clayey soils.

Selected specimens : Ajmer : *Wadhwa* 4882 (BSA) ; Banswara : Chiriya vasa village, *Singh* 2998 (BSJO) ; Bikaner : Kolayat, *Roy* 2383 (BSJO) ; Jaipur : Durgapura, *Sharma* 2225 (RUBL) ; Jaisalmer : Ramgarh, *Tiwari* 820 (BSJO) ; Jhalawar : Aklera, *Wadhwa* 9582 (BSA) ; Sirohi : Mt. Abu, *Mehta* 319 (JAC) ; Tonk : Sohela R.F., *Shetty* 1253 (BSJO).

27. DICHANTHIUM Willemet

- 1a. Inflorescence a solitary raceme, spatheate. ... 5. *D. foveolatum*
- 1b. Inflorescence either panicle or digitate or subdigitate raceme, never spatheate :
- 2a. Joints and pedicels solid, not grooved. Inflorescence digitate or subdigitate raceme :
- 3a. Nodes of the culms glabrous. Lower glume of the sessile spikelet obovate, with simple, scattered hairs on the dorsal surface. Pedicel of pedicellate spikelet less than half the length of the sessile spikelets. ... 3. *D. caricosum*

- 3b. Nodes of the culms densely bearded. Lower glume of the sessile spikelet oblong, with bulbous - based hairs on the keels and near the apex. Pedicel of the pedicellate spikelet equal or more than half the length of the sessile spikelets. ... 1. *D. annulatum*
- 2b. Joints and pedicels with translucent groove, if not grooved then racemes in panicles :
- 4a. Branches of panicles stout, bearing a number of spikelets from a little above the base to the apex. Lower glume of sessile spikelet mostly pitted :
- 5a. Lower glume of the sessile spikelet hairy below the middle, elliptic - oblong or truncate, more than 5 - nerved. ... 9. *D. pertusum*
- 5b. Lower glume of the sessile spikelet glabrous, lanceolate, acuminate, upto 5 - nerved. ... 7. *D. kuntzeana*
- 4b. Branches of panicles capillary, bearing few spikelets near the apex only. Lower glume of the sessile spikelet not pitted :
- 6a. Sessile spikelet shorter than the pedicellate spikelet :
- 7a. Culms weak, decumbent and trailing, much geniculate-ly branched. Callus densely bearded. Sessile spikelet oblong - lanceolate, obtuse. ... 4. *D. filiculme*
- 7b. Culms erect, robust, simple or branched. Callus shortly bearded. Sessile spikelet oblong or linear - oblong, truncate. ... 2. *D. assimile*
- 6b. Sessile spikelet as long as the pedicellate spikelet :
- 8a. Nodes glabrescent. Leaves rounded at the base. Lower glume of the sessile spikelet dorsally channelled. ... 8. *D. parviflorum*

- 8b. Nodes bearded. Leaves conspicuously narrowed at the base. Lower glume of the sessile spikelet flat on the back, not channelled. ... 6. *D. huegellii*

1. *Dichanthium annulatum* (Forsk.) Stapf in Prain, Fl. Trop. Africa 9 : 178. 1817 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 133. 1960 ; Deshpande, Fl. India Fasc. 15 : 5. f. 1 2. 1984. *Andropogon annulatus* Forsk. Fl. Aegypt. - Arab. 173. 1775 ; Hook. f. Fl. Brit. India 7 : 196. 1896.

Tufted, erect or ascending perennials, 50 - 150 cm high. Leaves 5 - 25 × 0.25 - 0.75 cm, linear lanceolate, acuminate ; ligule c. 1 mm long. Inflorescence of 2 - 10, digitate or subdigitate racemes, each raceme upto 7.5 cm long. Sessile spikelets 2.5 - 5.5 mm long, narrowly elliptic. Glumes equal ; lower glume hairy below the middle, 5 to 9 - nerved ; upper one keeled and awned. Pedicellate spikelets 2.5 - 5.5 mm long, awned.

Fl. & Fr. : August - November.

Very common throughout Rajasthan in mixed habitats.

Selected specimens : Ajmer : Todgarh, *Duthie* 4924 (DD) ; Alwar : Pandupole, *Sharma* 3853 (RUBL) ; Jaisalmer : Devikot, *Wadhwa* 5291A (BSA) ; Jhalawar : Piplosa, *Wadhwa* 6941 (BSA) ; Sawaimadhopur : *Verma* 1932 (BSA) ; Sirohi : Mt. Abu, *Raizada* Acc. No. 138021 (DD).

2. *Dichanthium assimile* (Steud.) Deshpande, Fl. India Fasc. 15 : 6. 1984. *Andropogon assimilis* Steud. in Zoll. Syst. Verz. 58. 1854 ; Hook. f. Fl. Brit. India 7 : 179. 1896. *Capillipedium assimile* (Steud.) A. Camus in Lecomte, Fl. Gen. del' Indo - Chine 7 : 314. 1922 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 110. 1960 ; *Raizada et al.* in Ind. For. Rec. (n.s.) Bot. 4 : 226. 1961.

Erect or decumbent, suffrutescent perennials, 1 - 3 m tall. Leaves 5 - 15 × 0.25 - 0.5 cm, flat, lanceolate - linear, with spinous - toothed margins, narrowed at the base. Inflorescence a decompound panicle, 5 - 10 cm long, with capillary branches bearded in the axils. Sessile spikelets c. 2.5 mm long, pubescent, aristate. Pedicellate spikelets c. 3.5 mm long, linear lanceolate, acute, rusty.

Fl. & Fr. : September - February.

Rare, found in wastelands, particularly near moist situations. It is a good fodder grass.

Selected specimens : Chittorgarh : Bansi, Verma 1725 (BSA) ; Sirohi : Mt. Abu, Duthie 6763 (DD), Jain 46595, 62115 (BSI), Blatter 2596, 2608 (BLAT).

3. *Dichanthium caricosum* (L.) A. Camus in Bull. Mus. Hist. Nat. Paris 27 : 549. 1921 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 134. 1960 ; Deshpande, Fl. India Fasc. 15 : 7. f. 7-17. 1984. *Andropogon caricosus* L. Sp. Pl. ed. 2. 1480. 1763 ; Hook. f. Fl. Brit. India 7 : 196. 1896, incl. var. *mollicomus* (Kunth) Hack. *A. aristatus* Poir. in Lam. Encycl. Meth. Bot. Suppl. 1 : 585. 1810. *Dichanthium aristatum* (Poir.) C.E. Hubb. in Kew Bull. 1939 : 654. 1939 ; Bor, l. c. 134. 1960.

Tufted, erect or creeping perennials, c. 1 m high. Leaves 3-25 × 0.25 - 0.75 cm, linear-lanceolate, acuminate, glabrescent ; ligule a short, ciliate membrane. Racemes 1-6, digitate, each upto 8.5 cm long. Sessile spikelets c. 4.5 mm long ; lower glume 5 to 7-nerved, hairy outside ; keel winged at the top, with a 2 cm long awn. Pedicellate spikelets equal to sessile ones.

Fl. & Fr. : October - February.

Rare, found in rocky habitats.

Selected specimens : Banswara : Bagayacha forest, Singh 4281 (BSJO) ; Chittorgarh : Verma 1610 (BSA) ; Jhalawar : Aklera, Wadhwa 1706 (BSA), Verma 3451 (BSA).

4. *Dichanthium filiculme* (Hook. f.) Jain & Deshpande in Bull. Bot. Surv. India 20 : 134. 1979 ; Deshpande, Fl. India Fasc. 15 : 12. f. 35-36. 1984. *Andropogon filiculmis* Hook. f. Fl. Brit. India 7 : 181. 1896. *Capillipedium filiculme* (Hook. f.) Stapf in Hook. Ic. Pl. subtab. 3085. 1922 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 111. 1960.

Geniculately ascending, weak, glabrous annuals. Leaves c. 7.5 × 0.35 cm, linear-lanceolate, tip filiform, narrowed at the base, glabrous ; ligule membranous, ciliate. Panicles upto 5 cm long, with filiform branches. Spikelets distant on rachis ; upper ones pedicellate, awnless ; lower sessile, with densely villous callus. Upper lemma absent.

Fl. & Fr. : August - October.

Rare, in wastelands. So far known to be apparently endemic to W. Peninsula.

Selected specimen : Chittorgarh : Kalakhet, Verma 1740 (BSA). Also reported from Sirohi (Kanodia & Rao, 1966) and Udaipur (Majumdar, 1969).

5. *Dichanthium foveolatum* (Del.) Roberty in Boissiera 9 : 170. 1960. *Andropogon foveolatus* Del. Fl. Egypt 16. t. 8. f. 2. 1812 ; Hook. f. Fl. Brit. India 7 : 168. 1896. *A. strictus* Roxb. Fl. Ind. 1 : 260. 1832. *Eremopogon foveolatus* (Del.) Stapf in Prain, Fl. Trop. Africa 9 : 183. 1917 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 148. 1960. *E. strictus* (Roxb.) A. Camus in Ann. Soc. Linn. Lyon. (n.s.) 68 : 208. 1921.

Tufted, ascending perennials, 20-80 cm high, with hairy basal-sheath. Leaves upto 15.0 × 0.25 cm, linear, flat or rolled ; ligule truncate, ciliate. Racemes upto 4 cm long. Sessile spikelets c. 3.5 mm long, narrowly elliptic. Lower glume glabrous, with a pit in the upper half. Upper lemma acute or bidentate, awned. Pedicellate spikelets with or without a pit.

Fl. & Fr. : August - December.

Fairly common along the dried up river-beds and in moist, sandy and rocky habitats.

Selected specimens : Ajmer : Kaul 8538 (LWG) ; Banswara : Raizada 1/55 (DD) ; Bharatpur : Lohasar, Parmar 8602 (BSJO) ; Jaipur : Bassi, Raizada Acc. No 130406 (DD) ; Jodhpur : Neemli, Patil 554 (DD) ; Kota : Borbans, Nanda 431 (DD) ; Udaipur : Thooar, Nautiyal & Raizada 25443 (DD).

6. *Dichanthium huegellii* (Hack.) Jain & Deshpande in Bull. Bot. Surv. India 20 : 135. 1979 ; Deshpande, Fl. India Fasc. 15 : 15. f. 29-30. 1984. *Andropogon huegellii* Hack. in DC. Monogr. Phan. 6 : 492. 1889 ; Hook. f. Fl. Brit. India 7 : 180. 1896. *Capillipedium huegellii* (Hack.) Stapf in Hook. Ic. Pl. subtab. 3085. 1922 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 111. 1960.

Suffrutescent, branched perennials, c. 1 m high. Leaves flat, 8-18 × 0.75-1.75 cm, linear-lanceolate, acuminate ; ligule membranous, ciliate. Panicles 5-12 cm long ; joints and pedicels bearded. Sessile spikelets 3-4 mm long, green with purplish tinge, awned ; callus densely villous. Pedicellate spikelets 3-4 mm long.

Fl. & Fr. : August - November.

Commonly found near the water courses in shaded localities. The plant often emit sweet smell.

Selected specimens : Ajmer : Lourie 812 (DD) ; Banswara : Anand Sagar, Kanodia 75301 (BS1) ; Chittorgarh : Pratapgarh, Majumdar 12352

(BSA) ; Jhalawar : Miroli block, *Wadhwa* 7640 (BSA) ; Sirohi : Mt. Abu, *Rao* 66534 (BSI) ; Udaipur : Kodra tank, *Rao* 66534 (BSA).

7. *Dichanthium kuntzeana* (Hack.) Jain & Deshpande in Bull. Bot. Surv. India 20 : 134. 1979 ; Deshpande, Fl. India Fasc. 15 : 17. 1984. *Andropogon kuntzeanus* Hack. in DC. Monogr. Phan. 6 : 478. 1889 ; Hook. f. Fl. Brit. India 7 : 175. 1896. *Bothriochloa kuntzeana* (Hack.) Henr. in Blumea 3 : 456. 1940 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 108. 1960 ; Raizada *et al.* in Ind. For. Rec. (n.s.) Bot. 4 : 231. pl. 9. f. 2. 1961.

Tufted, erect perennials, upto 1.5 m high, with bearded nodes. Leaves 10 - 30 cm long, linear, acute, with scaberulous margins. Inflorescence of 3 to many fasciculate racemes. Joints and pedicels densely ciliate. Sessile spikelets linear - lanceolate. Lower glume 4.0 - 4.5 mm long ; upper one lanceolate, acuminate, with a awn upto 1.5 cm long. Pedicellate spikelets narrower than sessile ones.

Fl. & Fr. : August - November.

Rare, growing in sandy soils.

Selected specimen : Kota : Campus of Soil Conservation Research and Training Centre, *Singh* 74671 (LWG).

8. *Dichanthium parviflorum* (R. Br.) de Wet & Harlan in Amer. Journ. Bot. 53 : 97. 1966 ; Deshpande, Fl. India Fasc. 15 : 21. f. 38 - 40. 1934. *Holcus parviflorus* R. Br. Prodr. 199. 1810. *Andropogon micranthus* Kunth, Rev. Gram. 1 : 165. 1829 ; Hook. f. Fl. Brit. India 7 : 178. 1896, incl. var. *villosulus* Hack. *Capillipedium parviflorum* (R. Br.) Stapf in Prain, Fl. Trop. Africa 9 : 169. 1917 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 112. 1960.

Tufted, erect perennials, 0.5 - 1.5 m high. Leaves 7 - 25 × 0.25 - 1.0 cm, linear - lanceolate, acuminate. Panicles upto 20 cm long. Racemes generally reduced to one sessile and 2 pedicellate spikelets, rarely more. Sessile spikelets 3.0 - 4.5 mm long, narrowly oblong, awned. Pedicellate spikelets 2.75 - 4.5 mm long, narrower than the sessile ones.

Fl. & Fr. : August - November.

Rare, found near moist places. This species is highly polymorphic and on the basis of chemical nature of essential oils, many varieties have been distinguished. Reported from Sirohi (Kanodia & Rao, 1966).

9. *Dichanthium pertusum* (L.) Clayton in Kew Bull. 32 : 4. 1977 ; Deshpande, Fl. India Fasc. 15 : 22. f. 42-44. 1984. *Holcus pertusus* L. Mant. Alt. 301. 1771. *Andropogon pertusus* (L.) Willd. Sp. Pl. 4. (2) : 922. 1806 ; Hook. f. Fl. Brit. India 7 : 173. 1896. *Bothriochloa pertusa* (L.) A. Camus in Ann. Soc. Linn. Lyon (n.s.) 76 : 164. 1931. ; Bor, Grass. Burm. Ceyl. Ind. Pak. 109. 1960 ; Raizada *et al.* in Ind. For. Rec. (n.s.) Bot. 4 : 230. pl. 9. f. 3. 1961.

Tufted, erect or geniculately ascending, rhizomatous perennials, 30-50 cm high, nodes densely bearded. Leaves upto 30.0 × 0.5 cm, lanceolate, acuminate or acute, crowded at the base of culms. Inflorescence of 3-15, subdigitate, paniculate racemes, each raceme upto 5 cm long, silky hairy. Sessile spikelets 3.5-4.0 mm long. Lower glume cartilaginous, pitted, 5 to 9 nerved, blunt ; upper glume acute with an awn upto 2 cm long. Pedicellate spikelets glabrous, pitted or not.

Fl. & Fr. : August- November.

Very common grass in open grassy plains, in moist and shady localities and on the Aravalli hills.

Selected specimens : Ajmer : *Lourie* 750 (DD) ; Alwar : *Algal*, *Sharma* 3985 (RUBL) ; Banswara : *Shergarh* forest, *Singh* 3087 (BSJO) ; Bikaner : *Raizada* Acc. No 130113 (DD) ; Jaipur : *Amer*, *Sharma* 864 (RUBL) ; Jhalawar : *Shyamgarh*, *Majumdar* 10094 A (BSA) ; Pali : *Jawai* dam, hills, *Shetty* 1940 (BSJO) ; Sirohi : *Mt. Abu*, *Mehta* 612 (JAC).

28. *DIECTOMIS* Kunth

Diectomis fastigiata (Sw.) Kunth in Humb. & Bonpl. Nov. Gen. & Sp. 1 : 193 t. 64. 1816 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 135. 1960. *Andropogon fastigiatus* Sw. Prod. Veg. Ind. Occ. 26. 1788 ; Hook. f. Fl. Brit. India 7 : 167. 1896.

Erect or ascending perennials, fastigiately branched upwards. Leaves 5-15 × 0.25-0.5 cm, linear, acuminate, scabrid ; ligule elongated, acute. Spikes 2-5 cm long, spatheate, solitary, fragile ; joints shorter than the spikelets, villous. Sessile spikelets 2-3 mm long ; callus shorter, glume awned. Pedicellate spikelets neuter.

Fl. & Fr. : August October.

Rare, found near moist places.

Selected specimen : Kota : Borabans, Patil 435 (DD).

29. DIGITARIA Haller *nom. cons.*

- 1a. Racemes very long, many, straight, stiff, with distant pairs of spikelets, naked at the base :
- 2a. Rachis pinnately hairy at the base. ... 6. *D. pennata*
- 2b. Rachis glabrous throughout. ... 7. *D. pennata* var. *shettyanu*
- 1b. Racemes with spikelets upto the base, variously placed along a common axis or umbellate :
- 3a. Hairs on the spikelets verrucose *i.e.* covered with minute warty growths. ... 5. *D. longiflora*
- 3b. Hairs on the spikelets, if any, not verrucose :
- 4a. Hairs on the spikelets clavate :
- 5a. Tip of pedicel with a corona of hairs upto 1 mm long. ... 11. *D. stricta*
- 5b. Tip of pedicel glabrous without corona. ... 1. *D. abludens*
- 4b. Hairs on the spikelets, if any, without a globular thickening *i.e.* not clavate :
- 6a. Margins of rachis smooth. ... 8. *D. radicata*
- 6b. Margins of rachis scabrid :
- 7a. Spikelets elliptic - acute to narrowly lanceolate. Lower glume absent. Upper glume a nerved or nerveless triangular scale, 0.35 - 0.75 mm long. ... 10. *D. setigera*
- 7b. Spikelets ovate with an apiculate fruit protruding. Lower glume present, mostly conspicuous. Upper glume well developed :

- 8a. Racemes mostly 2,
divaricate, stiff. Spikelets
of each pair heteromor-
phous ; sessile spikelets
nearly glabrous in front,
the pedicellate ones
coated with long hairs
often spreading at
maturity. ... 2. *D. bicornis*
- 8b. Racemes more than 3,
nodding, flexible.
Spikelets of each pair
not heteromorphous,
both spikelets of each
pair with the same type
of indumentum :
- 9a. Nerves of the lower
lemma smooth,
without minute
triangular spines
on nerves :
- 10a. Spikelets broad
and turgid.
Upper glume
very broad and
rounded at the
top. Caryopsis dis-
tinctly apiculate and
protruding above
the lower
lemma. ... 4. *D. cruciata*
- 10b. Spikelets lan-
ceolate, elliptic
or narrow, not
turgid. Upper
glume narrow,
triangular,
acute. Caryop-
sis acute. ... 3. *D. ciliaris*
- 9b. Nerves of the lower
lemma with minute,
many triangular
siliceous spines on
the upper part of
the nerves. ... 9. *D. sanguinalis*

1. *Digitaria abludens* (Roem. & Schult.) Veldk. in *Blumea* 21 : 53.
1973. *Panicum abludens* Roem. & Schult. *Syst. Veg.* 2 : 457. 1817.

Paspalum granulare Trin. ex Spreng. Neue Entdeck. 2 : 47. 1821. *P. pedicellare* Trin. ex Hook. f. Fl. Brit. India 7 : 19. 1896. *Digitaria pedicellaris* (Trin. ex Hook. f.) Prain, Bengal Pl. 1181. 1903 ; Blatt. & McC. Bombay Grasses 126. pl. 80. 1935. *D. granularis* (Trin. ex Spreng.) Henr. Monogr. Digitaria 302. 1950 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 301. 1960.

Tufted, erect or geniculately ascending annuals, 20-70 cm high. Leaves 5-15 × 0.25-0.5 cm, linear lanceolate, acuminate, rounded at the base ; ligule c. 5 mm long, membranous. Inflorescence of 3-5, 7-10 cm long racemes arranged along a short common axis ; rachis triquetrous, scabrid, flexuous. Pedicels smooth, with discoid or cup shaped tip. Spikelets 1.25-1.75 mm long, oblong-elliptic. Lower glume absent ; upper glume narrower 1/2 - 3/4 as long as the spikelet. Upper lemma bisexual, chartaceous. Stamens 3. Caryopsis ellipsoid, apiculate.

Fl. & Fr. : August-October.

Frequently found in open wastelands, fallow fields etc.

Selected specimens : Alwar : Algal, Sharma Acc. No. 6710 (RUBL) ; Banswara : Verma 776 (BSA) ; Jaipur : Digotha, Sharma 3751 (RUBL) ; Jhalawar : Wadhwa 7453 (BSA) ; Sirohi : Mt. Abu, Sharma 3526 (RUBL).

2. *Digitaria bicornis* (Lam.) Roem. & Schult. ex Loud. Hort. Brit. 24 : n. 1578. 1830 ; Bor in Webbia 11 : 323. 1955 & Grass. Burm. Ceyl. Ind. Pak. 299. 1960 ; Raizada & Jain in Ind. For. Rec. (n.s.) Bot. 5 : 185. pl. 5. f. 7. 1965. *Paspalum bicorne* Lam. Tab. Encycl. Meth. Bot. 1 : 176. 1791. *P. heteranthum* Hook. f. Fl. Brit. India 7 : 16. 1896, non Link 1820, non Nees & Meyen 1843.

Tufted, erect or decumbent annuals, 10-20 cm high, often rooting at the lower nodes. Leaves 2-10 × 0.25-0.75 cm, very variable, scabrid on the margins ; ligule 1-2 mm long, truncate or lacerate on the top. Racemes digitate, terminal, 5-10 cm long. Spikelets in pairs, heteromorphous, elliptic lanceolate ; the sessile ones glabrous or sparsely hairy and pedicellate ones with spreading hairs. Lower lemma of the sessile spikelets prominently 5-nerved, with slit-like inter-nerve spaces. Lower lemma of pedicellate spikelets hairy, 7-nerved. Stamens 3. Caryopsis c. 2.25 mm long, obtusely elliptic, hilum a circular dot.

Fl. & Fr. : August-October.

Found in wet and humid situations along the streams, by the sides of dams etc.

Selected specimens : Ajmer : Bassi, Raizada Acc. No. 130160 (DD) ; Banswara : Bagaycha forest, Singh s. n. (BSJO) ; Jaisalmer : Phalsund, Wadhwa 4729 (BSA) ; Jhalawar : Pirawa, Verma 7674 (BSA).

3. *Digitaria ciliaris* (Retz.) Koel. Descr. Gram. 27. 1802. *Panicum ciliare* Retz. Obs. Bot. 4 : 16. 1786. *P. adscendens* H.B. & K. Nov. Gen. Sp. Pl. 1 : 97. 1816. *Digitaria fimbriata* Link, Hort. Berol. 1 : 226. 1827. *D. marginata* Link var. *fimbriata* (Link) Stapf in Prain, Fl. Trop. Africa 9 : 440. 1919. *D. adscendens* (H.B. & K.) Henr. in Blumea 1 : 92. 1934 & Monogr. Digitaria 9. 1950, incl. vars. & subsp. *chrysolephara*, *marginata* & *criniformis* ; Bor in Webbia 11 : 350. 1955 & Grass. Burm. Ceyl. Ind. Pak. 298. 1960. *D. biformis* Willd. subsp. *willdenowii* Henr. l.c. 978. 1950. *D. adscendens* (H.B. & K.) Henr. var. *fimbriata* (Link) Cuf. in Bull. Jard. Bot. Etat. Brux. 39 : suppl. 1327. 1969.

Erect or geniculately ascending annuals, often rooting at the lower nodes. Leaves 5 - 22 × 0.25 - 1.0 cm, linear-lanceolate, acuminate, rounded at the base ; ligule 1.5 - 3.0 mm long, membranous, more or less lacerate. Racemes 3 - 9, subsessile, subdigitate, 5 - 20 cm long. Spikelets 2-nate, 2.5 - 3.5 mm long, elliptic - lanceolate or oblong-lanceolate, acute. Upper glume half as long as the spikelet, 3-nerved ; lower one 2.0 - 3.5 mm long, triangular. Lower lemma as long as the spikelet, 7-nerved, appressed puberulous, silky pubescent, 5 to 7-nerved, empty. Stamens 3. Caryopsis c. 2.75 mm long, ellipsoid.

Fl. & Fr. : August - October.

Fairly common throughout the state as forest undergrowth, in wastelands and neglected places.

Selected specimens : Ajmer : Lourie 1718, 4980-A, 4980-B (DD) ; Barmer : Bhu-ka-par, Pandey 7921 (BSJO) ; Bharatpur : Sikandra, Parmar 8744 (BSJO) ; Ganganagar : 20 P.D.D., Roy 3843 (BSJO) ; Jaipur : Ramgarh, Sharma 2058 (RUBL) ; Kota : Verma 440 (BSA) ; Sirohi : Mt. Abu, Narayan 22648 (BSA).

4. *Digitaria cruciata* (Nees. ex Steud.) A. Camus in Lecomte, Fl. Gen. del' Indo - Chine 7 : 399. 1922 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 300. 1960. *Panicum cruciatum* Nees ex Steud. Syn. Pl. Glum. 1 : 39. 1854. *Paspalum sanguinale* Lam. var. *cruciatum* (Nees ex Steud.) Hook. f. Fl. Brit. India 7 : 14. 1896.

Decumbent or ascending annuals, 20 - 50 cm high. Racemes 3 - 10 cm long ; common axis winged. Spikelets ovate-elliptic,

c. 2.5 mm long, not heteromorphic. Upper lemma 3 to 5 - nerved, glabrous, acute ; lower lemma smooth. Caryopsis ellipsoid.

Fl. & Fr. : November - March.

Occasionally found in moist and shady localities in dry deciduous forests.

Selected specimen : Kota : Kelwara, Singh 90700 (LWG).

5. *Digitaria longiflora* (Retz.) Pers. Syn. Pl. 1 : 85. 1805 ; Blatt. & McC. Bombay Grasses 127. pl. 81. 1935 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 302. 1960 ; Raizada & Jain in Ind. For. Rec. (n. s.) Bot. 5 : 194. pl. 5. f. 4. 1965. *Paspalum longiflorum* Retz. Obs. Bot. 4 : 15. 1786 ; Hook. f. Fl. Brit. India 7 : 17. 1896.

Prostrate or creeping annuals, rooting at the lower nodes. Leaves 2.5 - 8.5 × 0.1 - 0.35 cm, linear - lanceolate, glabrous or densely hairy ; ligule short, membranous. Racemes digitate, upto 10 cm long ; rachis flat, winged, glabrous ; pedicels with cupuliform tips. Spikelets 1.25 - 1.5 mm long, elliptic - oblong. Lower glume almost absent ; upper one equal to the size of spikelet, 5 - nerved, with short appressed verrucose hairs between the nerves. Lower lemma similar to upper glume excepting being 7-nerved. Stamens 3. Caryopsis ellipsoid, light brown.

Fl. & Fr. : August - November.

Rare, found in open wastelands and in rocky habitats.

Selected specimens : Jaipur : Athunia ka kund, Sharma Acc. No. 4476 (RUBL) ; Jhalawar : Bijliya - Bhadok, Wadhwa 7401 (BSA) ; Sirohi : Mt. Abu, Mehta 1294 (JAC). Also reported from Jhunjhunu (Nair, 1956), and Jodhpur (Sarup, 1951).

6. *Digitaria pennata* (Hochst.) T. Cooke, Fl. Bombay 2 : 941. 1908 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 303. 1960 ; Raizada & Jain in Ind. For. Rec. (n. s.) Bot. 5 : 191. pl. 5. f. 1. 1965. *Panicum pennatum* Hochst. in Flora 38 : 197. 1855. *Paspalum pennatum* (Hochst.) Hook. f. Fl. Brit. India 7 : 16. 1896.

Tufted, perennial, rhizomatous grass, 1/4 - 1 m high ; basal sheath silky pubescent. Leaves 5 - 12 × 0.25 - 0.5 cm, narrowly lanceolate, acuminate, scaberulous on both surfaces ; ligule membranous, truncate. Racemes upto 14, radiating in whorls, each 5 - 25 cm long ; rachis

straight, triquetrous; pedicels triquetrous. Spikelets c. 3 mm long, linear-lanceolate, acute. Lower glume reduced to a hyaline, minute scale; upper one as long as the size of spikelet, 3-nerved, densely appressedly hairy between the nerves. Lower lemma coarsely ribbed, 7-nerved, pubescent between the nerves. Upper lemma hermaphrodite. Stamens 3. Caryopsis ellipsoid, brown.

Fl. & Fr. : August - November.

Commonly found as a forest undergrowth and in wastelands among the bushes.

Selected specimens : Ajmer : Puskar, *Sharma* Acc. No. 122384 (DD); Barmer : Naga R.F., *Shetty* 2225 (BSJO); Bhilwara : Badnor, *Singh* 6278 (BSJO); Jaipur : Amer, *Sharma* 867 (RUBL); Jodhpur : Kailana, *Moorthy* 78 (BSJO); Pali : *Pandey* 10066 (BSJO); Udaipur : Kamlighat, *Sharma* 3442 (RUBL).

7. var. *shettyana* *Pandey, Parmar & Vyas* in *Journ. Econ. Tax. Bot.* 5 (2) : 475-476. f. 1-7. 1984.

Allied to the proper variety *pennata*, but differs in having the rachis glabrous throughout. In var. *pennata* the rachis is pinnately hairy.

Fl. & Fr. : August - November.

Endemic to Rajasthan; found in rocky habitats.

Selected specimens : Jalore : Sareh Mandir, *Shetty* 6659-A (CAL, Holotype), *Shetty* 6659 B - D (BSJO; Isotype).

8. *Digitaria radicata* (Presl) *Miq.* *Fl. Ind. Bat.* 3 : 437. 1857 *Panicum radicosum* *Presl, Rel. Haenk.* 1 : 297. 1830. *P. timorense* *Kunth, Enum. Pl.* 1 : 83. 1833. *Digitaria timorensis* (*Kunth*) *Bal. in Journ. Bot. Morot* 4 : 138. 1890; *Bor, Grass. Burm. Ceyl. Ind. Pak.* 306. 1960; *Raizada & Jain in Ind. For. Rec. (n. s.) Bot.* 5 : 193. 1965. *Paspalum sanguinale* (L.) *Lam. var. debile* *Hook. f. Fl. Brit. India* 7 : 16. 1896.

Creeping annuals, 10-40 cm high, rooting at lower nodes. Leaves 2 - 7 × 0.25 - 0.75 cm, linear-lanceolate, acute, pubescent; ligule minute, membranous, truncate. Racemes 2 - 4, digitate, upto 10.5 cm long; rachis triquetrous; pedicels scabrid. Spikelets c. 2.75 mm long, narrowly lanceolate. Lower glume a minute scale; upper one 1/4 to 1/2 the length of spikelets, 3-nerved, hairy. Lower lemma 5-nerved, hairy

on the margins. Upper lemma longitudinally striated. Stamens 3. Caryopsis narrowly lanceolate, yellowish brown.

Fl. & Fr. : August - October.

Very rare, in wastelands and open forests among bushes.

Selected specimen : Udaipur : *Majumdar* 11642 (BSA).

9. *Digitaria sanguinalis* (L.) Scop. Fl. Carn. ed. 2. 1 : 52. 1772 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 304. 1960 ; Raizada & Jain in Ind. For. Rec. (n. s.) Bot. 5 : 193. 1965. *Panicum sanguinale* L. Sp. Pl. 57. 1753. *Paspalum sanguinale* (L.) Lam. Tab. Encycl. Meth. Bot. 1 : 176. 1791 ; Hook. f. Fl. Brit. India 7 : 13. 1896.

Erect or decumbent annuals, 25 - 70 cm high, often rooting at lower nodes. Leaves 5 - 20 × 0.25 - 1.0 cm, linear - lanceolate, acute, rounded at the base, softly hairy on the both surfaces ; ligule c. 2 mm long, membranous. Racemes upto 15, digitate or subdigitate, 5 - 15 cm long ; rachis winged, scabrid. Spikelets binate, pedicellate, c. 3 mm long, elliptic - lanceolate, acute. Lower glume a minute, ovate scale ; upper one c. 1.75 mm long, 3 - nerved, glabrescent. Lower lemma membranous, 7 nerved, scaberulous on the nerves with minute siliceous spines, appressedly pubescent. Stamens 3. Caryopsis narrowly lanceolate, brownish.

Fl. & Fr. : August - November.

Occasional, weed in fallow and cultivated fields and open waste places.

Selected specimen : Sirohi ; Delwara, *Sharma* 3575 (RUBL). Also reported from Alwar (Vyas, 1967), Churu (Sharma, 1965), Jhunjhunu (Nair & Kanodia, 1959), Jodhpur (Sarup, 1951) and Udaipur (Ramdeo, 1969).

10. *Digitaria setigera* Roth ex Roem. & Schult. Syst. Veg. 2 : 474. 1817 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 305. 1960 ; Raizada & Jain in Ind. For. Rec. (n. s.) Bot. 5 : 189. pl. 5. f. 5. 1965. *Paspalum sanguinale* (L.) Lam. var. *extensum* Hook. f. Fl. Brit. India 7 : 15. 1896.

Erect or geniculately ascending annuals, 25 - 100 cm high. Leaves 5 - 25 × 0.25 - 1.0 cm, broadly linear - lanceolate, acuminate ; ligule

membranous. Racemes many, 5-15 cm long. Spikelets binate, c. 2.5 mm long; rachis winged, scabrid. Lower glume wanting; upper one upto 0.75 mm long, 3-nerved, pubescent. Lower lemma equal to the size of spikelets, 5 to 7-nerved, silky pubescent. Stamens 3. Caryopsis lanceolate, yellowish-pale brown.

Fl. & Fr. : August - October.

Occasional, found in rocky habitats.

Selected specimens : Chittorgarh : Near fort, Patil 493 (DD), Bansi, Majumdar 12275 (BSA); Jhalawar; Wadhwa Acc. No. 22398 (BSA); Sirohi : Mt. Abu, Blatter 5541 (BLAT); Udaipur : Majumdar 10348 (BSA).

11. *Digitaria stricta* Roth ex Roem. & Schult. Syst. Veg. 2 : 474. 1817; Bor, Grass. Burm. Ceyl. Ind. Pak. 305. 1960; Raizada & Jain in Ind. For. Rec. (n. s.) Bot. 5 : 188. pl. 5. f. 3. 1965. *D. denudata* Link, Hort. Berol. 1 : 222. 1827. *Paspalum royleanum* Nees ex Thw. Enum. Pl. Zeyl. 358. 1864; Hook. f. Fl. Brit. India 7 : 18. 1896. *Digitaria stricta* Roth ex Roem. & Schult. var. *denudata* (Link) Henr. Monogr. Digitaria 175. 1950.

Tufted, erect or decumbent annuals, 15-40 cm high. Leaves 5-20 × 0.25-0.5 cm, linear, acuminate, rounded at the base, scabrid; ligule membranous, lacerate on the upper margins. Racemes 3-15, subdigitate, upto 18 cm long; rachis triquetrous, narrowly winged; pedicels narrowly winged, slightly dilated at the tip. Spikelets c. 1.25 mm long, elliptic-obovate or oblong. Lower glume, wanting; upper one 1/3 the spikelet, 3-nerved, covered all over with short, clavate hairs. Lower lemma hairy, 5-nerved, empty. Stamens 3. Caryopsis ellipsoid, apiculate, brownish.

Fl. & Fr. : July - October.

Occasional, found in open wastelands particularly in rocky-gravelly habitats in the east of Aravalli.

Selected specimens : Banswara : Majumdar 10223 (BSA); Chittorgarh : Bansi, Majumdar 12262 (BSA); Kota : Kelwara, Jain 29128 (BSI); Sirohi : Mt. Abu, Rao 66617 (BSI).

30. *DIGNATHIA* Stapf

Dignathia hirtella Stapf in Hook. Icon. Plant. sub. tab. 2950. 1911 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 700. 1960 ; Raizada & Jain in Ind. For. 87 : 426. f. 1 - 8. 1961 ; Bhandari, Fl. Ind. Desert 405. 1978.

Erect, caespitose annuals, upto 2 - 5 cm high. Leaves 2 - 3 × 0.15 - 0.35 cm, linear, apiculate, scabridulous on both sides ; ligule a ciliate line. Racemes c. 4.5 cm long, compound, spatheate ; rachis angular, scabrid. Spikelets bearing branchlets with 2 fertile and one apical, sterile spikelet, erect or adpressed to the primary rachis. Fertile spikelet c. 7.5 mm long. Lower glume curved, c. 5.5 mm long, linear - lanceolate, acuminate ; upper one caudate - acuminate, ciliolate on the back. Lemma c. 3.25 mm long, ciliolate on the back, awned. Caryopsis c. 2 mm long, obliquely ovoid - oblong.

Fl. & Fr. : August - September.

Rare, in wastelands and neglected corners of fields and gardens.

Selected specimen : Jodhpur : Sardar - samand, *Bhandari* 1222 (JAC).

31. *DIMERIA* R. Br.

Spikelets more than 3.5 mm long. Upper glume winged all along. ... 1. *D. connivens*

Spikelets less than 2.5 mm long. Upper glume not winged. ... 2. *D. ornithopoda*

1. *Dimeria connivens* Hack. in DC. Monogr. Phan. 6 : 689. 1889 ; Hook. f. Fl. Brit. India 7 : 104. 1896 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 140. 1960 ; Raizada *et al.* in Ind. For. Rec. (n. s.) Bot. 4 : 180. 1961.

Annual grass, upto 25 cm high. Racemes 2, 4 - 6 cm long, erect, slender. Spikelets 3.5 - 4.5 mm long, oblong, awned. Caryopsis slightly compressed, linear.

Fl. & Fr. : August - November.

Occasional, found in open grasslands and in dry deciduous forests.

Selected specimen : Kota : Atru, *Singh* 83741 (LWG).

2. *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 ; Raizada *et al.* in Ind. For. Rec. (n.s.) Bot. 4 : 179. 1961.

Tall, erect annuals, often bearded at the nodes. Leaves mostly towards the base, upper ones reduced to sheaths, flat, linear, pilose ; sheaths keeled, shorter than internodes. Racemes 2 to 3-nate, simple, upto 4 cm long. Spikelets c. 2 mm long, linear ; callus bearded. Upper glume linear, c. 5 mm wide, awnless. Caryopsis c. 2 mm long, linear, free and included in the lemma.

Fl. & Fr. : October - December.

Rare, found in moist habitats, particularly in the forests.

Selected specimen : Banswara : Ghatol, *Kanodia* 75494 (BSI). Also reported by Sankhala (1951) from N.W. Rajasthan.

32. DINEBRA Jacq.

Dinebra retroflexa (Vahl) Panzer in Denkschr. Acad. Wiss. Munchen 1813 : 270. t. 12. 1814 ; Blatt. & McC. Bombay Grasses 264. pl. 177. 1935 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 491. 1960. *Cynosurus retroflexus* Vahl, Symb. Bot. 2 : 20. 1791. *Dinebra arabica* Jacq. Fragm. 77. t. 121. f. 1. 1807 ; Hook. f. Fl. Brit. India 7 : 297. 1896.

Tufted, erect or geniculately ascending annuals, often rooting at lower nodes. Leaves upto 25.0 × 0.75 cm, linear-lanceolate, acute, glandular. Spikes c. 5 cm long, stiff, deflexed, arranged racemosely along axis, deciduous at maturity. Spikelets 5-9 mm long, sessile, narrowly wedge-shaped, 1 to 3-flowered, greenish. Glumes coriaceous, asymmetric, with caudate curving tips, glandular along the keel. Lemmas c. 2.5 mm long, pilose, narrowly ovate.

Fl. & Fr. : July - September.

Common weed in cultivation, particularly in the east of Aravalli.

Selected specimens : Banswara : Bhingarh, *Kanodia* 75387 (BSI) ; Bhilwara : Parvatipur, *Singh* 6577 (BSJ) ; Jaipur : Chaksu, *Sharma* 1732 (RUBL) ; Jhalawar : *Sharma* 266 (RUBL) ; Kota : Chambal river, *Majumdar* 10118 (BSA).

33. DIPLACHNE P. Beauv.

Diplachne fusca (L.) P. Beauv. ex Roem. & Schult. Syst. Veg. 2 : 615. 1817 ; Hook. f. Fl. Brit. India 7 : 329. 1896 ; Blatt. & McC. Bombay

Grasses 246. pl. 163. 1935 ; Bor. Grass. Burm. Ceyl. Ind. Pak. 492. 1960. *Festuca fusca* L. Syst. Nat. ed. 10. 2 : 876. 1759 & Sp. Pl. ed. 2. 1 : 109. 1762.

Tufted, erect or geniculately ascending, hygrophilous, rhizomatous perennials, upto 1.25 m high. Leaves 15 - 50 × 0.15 - 0.5 cm, flat or convolute, filiform, acuminate ; ligule membranous, lacerate. Panicles 10 - 30 cm long, erect, with smooth rachis. Spikelets 7.5 - 12.5 mm long, 6 to 11-flowered, erect, linear-oblong. Glumes scabrid on keels. Lemmas upto 6 mm long, minutely mucronate, pilose. Caryopsis slightly flattened.

Fl. & Fr. : March - November.

Occasionally found in water-logged habitats, but gregarious wherever grows.

Selected specimens : Bhilwara : Koshithal village, Singh 6531 (BSJO) ; Ganganagar : Sherpura, Roy 4874 (BSJO) ; Jaipur : Phulera, Wadhwa 8269 (BSA) ; Pali : Kharda village, Moorthy 331 (BSJO).

34. ECHINOCHLOA P. Beauv. *nom. cons.*

- | | |
|---|---------------------------|
| 1a. Ligule a fringe of stiff hairs, at-least in the basal leaves. ... | 5. <i>E. stagnina</i> |
| 1b. Ligule entirely absent : | |
| 2a. Spikelets upto 3 mm long. Racemes distinctly compound with short secondary branchlets. ... | 3. <i>E. crus-pavonis</i> |
| 2b. Spikelets upto 4.5 mm long. Racemes not or indistinctly compound : | |
| 3a. Spikelets acuminate to awned, hispid. Racemes 2 to several-rowed, the longest more than 5 cm long and usually with secondary branchlets at the base. ... | 2. <i>E. crus-galli</i> |
| 3b. Spikelets acute to cuspidate, pubescent. Racemes less than 3 cm long, simple : | |
| 4a. Spikelets upto 3 mm long. Racemes distinctly 4-rowed, openly placed, commonly half of their length apart and half appressed to the axis, sometimes subverticillate and spreading. ... | 1. <i>E. colona</i> |
| 4b. Spikelets upto 3.5 mm long. Racemes crowded, with plump, pallid spikelets closely placed to form a dense, lanceolate head. ... | 4. <i>E. frumentacea</i> |

1. *Echinochloa colona* (L.) Link, Hort. Berol. 2 : 209. 1833 ; Blatt. & McC. Bombay Grasses 148. pl. 94. 1935 ; Bor, Grass. Burm. Ceyl. Ind.

Pak. 308. f. 34. 1960 ; Raizada & Jain in Ind. For. Rec. (n.s.) Bot. 5 : 170. 1965. *Panicum colonum* L. Syst. Nat. ed. 10. 2 : 870. 1759 ; Hook. f. Fl. Brit. India 7 : 32. 1896.

Erect or geniculately ascending annuals, 20 - 80 cm high, often rooting at the lower nodes. Leaves 2.5 - 20.0 × 0.25 - 0.75 cm, linear, acute, flaccid, scabrid or glabrescent, marked by a purplish-brown band at the junction of the blade and sheath. Panicle of racemes 5.5 - 15.0 cm long, branches upto 3 cm long, appressed or ascending to the axis ; pedicels 2-nate. Spikelets 2 - 3 mm long, crowded, ovate to obovate-elliptic, pubescent. Glumes and lemmas neither awned, nor cuspidate, acute. Caryopsis 1.5 - 2.0 mm long, planoconvex, broadly elliptic.

Fl. & Fr. : March - August.

Common throughout Rajasthan in moist and marshy habitats. This grass is commonly used as a fodder grass and the grains are eaten by poor people at times of scarcity.

Selected specimens : Ajmer : Beawar, *Lourie* 4981-B, 1137 (DD) ; Alwar : Sariska, *Sharma* Acc. No. 5354 (RUBL) ; Banswara : Paloda, *Singh* 2805 (BSJO) ; Barmer : Sela forest, *Pandey* 8041 (BSJO) ; Ganganagar : Shesapura, *Roy* 4377 (BSJO) ; Jhalawar : *Wadhwa* 7499 (BSA) ; Sirohi : Mt. Abu, *Rao* 66532 (BSI).

2. *Echinochloa crus-galli* (L.) P. Beauv. Ess. Agrost. 53 : 161. 1812 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 310. 1960 ; Raizada & Jain in Ind. For. Rec. (n.s.) Bot. 5 : 171. pl. 3. f. 2. 1965. *Panicum crus-galli* L. Sp. Pl. 56. 1753 ; Hook. f. Fl. Brit. India 7 : 30. 1896, *pro parte*. *P. crus-galli* L. var. *brevisetum* Doell, Fl. Bad. 1 : 232. 1857. *Echinochloa crus-galli* (L.) P. Beauv. var. *breviseta* (Doell) Neill, Fl. Nied. Ost. 31. 1859 ; Bor. l.c. 310. 1960. *E. glabrescens* Murno ex Hook. f. l.c. 7 : 31. 1896 ; Bor. l.c. 311. 1960.

Erect or ascending, stout annuals, 50 - 200 cm high, rooting at the lower nodes. Leaves 5.5 - 30.0 × 0.5 - 2.0 cm, linear, acute, margins finely cartilaginous, scaberulous ; sheath glabrous, striated, marked with purplish-brown at the junction of blade. Racemes either solitary or 2 to 3-together, erect, upto 20 cm long ; pedicels fascicled or 2-nate, with prominent bulbous-based white setae. Spikelets 3.5 - 4.0 mm long, ovate-elliptic, hispid. Glumes cuspidate or acuminate and lower lemma acuminate or with a moderately long awn. Caryopsis 1.5 - 1.75 mm long, elliptic.

Fl. & Fr. : March - August.

Common throughout Rajasthan in moist-marshy habitats. It is also a good fodder grass.

Selected specimens : Ajmer : Duthie 4978 (DD) ; Alwar : Siliserh, Hira Lal 3456 (LWG) ; Jaisalmer : Amarsagar Tiwari 857 (BSJO) ; Jaipur : Durgapura, Sharma 2213 (RUBL) ; Kota : Singh 90276 (LWG) ; Sirohi : Delwara, Raizada 21125 (DD), Jain 46577-A, 46577 (BSI).

3. *Echinochloa crus-pavonis* (H.B. & K.) Schult. Syst. Veg. Mant. 2 : 269. 1824 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 310. 1960. *Oplismenus crus-pavonis* H.B. & K. Nov. Gen & Sp. 1 : 108. 1816. *Panicum crus-galli* Hook. f. Fl. Brit. India 7 : 30. 1896, *pro parte*, non L. 1753.

Erect or decumbent, stout, robust perennials, upto 2 m high, often rooting at lower nodes. Leaves upto 50 × 2 cm, linear, acute ; sheath smooth. Inflorescence upto 25 cm long, large, loose, ovate ; racemes 3 - 15 cm long. Spikelets 2 - 3 mm long, elliptic, more or less hispid, often with a short curved awn.

Fl. & Fr. : March - August.

Rare, found in moist places.

Selected specimen : Udaipur : Banki block, Verma 12 (BSA).

4. *Echinochloa frumentacea* Link, Hort, Berol. 1 : 204. 1827 ; Bor, Grass. Burm. Ceyl. Ind Pak. 311. 1960. *Panicum frumentaceum* Roxb. Fl. Ind. 1 : 307. 1820, non Salisb. 1796. *P. crus-galli* L. var. *frumentaceum* (Link) Trimen, Syst. Cat. Ceyl. Pl. 104. 1885 ; Hook. f. Fl. Brit. India 7 : 31. 1896. *Echinochloa crus-galli* (L.) P. Beauv. var. *frumentacea* (Link) W.F. Wight, Suppl. Cent. Dict. 810. 1909. *E. colona* (L.) Link var. *frumentacea* (Link) Ridl. Fl. Malay Penin. 5 : 223. 1925.

Erect, robust annuals, 20 - 120 cm high. Leaves upto 25 × 2 cm, linear, acute ; sheaths glabrous. Inflorescence upto 20 cm long. Spikelets 2.0 - 3.5 mm long, broadly elliptic to globose, yellowish or pallid, pubescent ; lower lemma barren.

Fl. & Fr. : March - August.

Rare, in moist to marshy habitats. Usually cultivated for edible grains.

Selected specimens : Banswara : Kushalgarh, Singh 3029 (BSJO), Kanodia 75230 (BSI) ; Udaipur : Kanodia 75589 (BSI).

5. *Echinochloa stagnina* (Retz.) P. Beauv. Ess. Agrost. 53, 161, 171. 1812 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 311. 1960 ; Raizada & Jain in Ind. For Rec. (n.s.) Bot. 5 : 172. 1965. *Panicum stagninum* Retz. Obs. Bot. 5 : 17. 1789. *P. crusgalli* Hook. f. Fl. Brit. India 7 : 30. 1896, *pro parte*, non L. 1753.

Tall, geniculately ascending perennials or annuals, upto 1.5 m high, often rooting at lower nodes, with creeping base. Leaves 10 - 40 × 0.5 - 2.5 cm, linear, acute, margins spinulose ; sheath ciliate at the mouth. Inflorescence 5 - 25 cm long, nodding and secund panicle ; pedicels usually 2-nate, discoid. Spikelets 3.5 - 6.0 mm long, ovate to lanceolate-ovate, pubescent or hispid. Upper glume caudate-acuminate or awned. Upper lemma crustaceous, polished. Caryopsis 2.5 - 3.0 mm long, obovate-oblong, whitish.

Fl. & Fr. : August - November.

Occasionally found in water-logged or moist areas.

Selected specimens : Jaipur : Ramgarh, Sharma 163, 2059, 2184 (RUBL) ; Jhalawar : Shivpuri road, Majumdar 10462 (BSA).

35. ELEUSINE Gaertn.

Spikes less than 0.75 cm wide, slender, straight, nearly glabrous at the base. Spikelets elliptic, disarticulating between the florets. Caryopsis elliptic to oblong, obtusely trigonous, not exposed when ripe. ...

2. *E. indica*

Spikes more than 1 cm wide, stout, incurved, hairy at the base. Spikelets ovate, non shattering, very closely overlapping. Caryopsis globose, exposed when ripe. ...

1. *E. coracana*

1. *Eleusine coracana* (L.) Gaertn. Fruct. 1 : 8. t. 1. f. 11. 1789 ; Hook. f. Fl. Brit. India 7 : 294. 1896 ; Blatt. & McC. Bombay Grasses 260. pl. 173. 1935 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 492. 1960. *Cynosurus coracanus* L. Syst. Nat. ed. 10. 2 : 875. 1759.

Tall erect, stout annuals, upto 1.5 m high. Leaves distichous, 2 - 20 × 0.5 - 0.75 cm, acute, sparsely hairy ; ligule of hairs. Spikes upto 7, suberect ; rachis often 3-gonous. Spikelets awnless, 3 to 6-rid, 3 - 4 mm long, 3 to 6-flowered. Glumes unequal, apiculate, membranous. Lemma broadly ovate, obtuse. Caryopsis smooth or rugose, with depressed black hilum and slightly flattened on one side, dark brown.

Fl. & Fr. : August - November.

Mostly cultivated in the eastern Rajasthan for its edible grains ; often escape from cultivation.

Selected specimens : Banswara : Banpharlo, Singh 3651 (BSJO), Kanodia 75540 (BSI) ; Jodhpur : Puri 22948 (BSI) ; Sirohi : Mt. Abu, Narayan 22654 (BSI).

2. *Eleusine indica* (L.) Gaertn. Fruct. 1 : 8. 1789 ; Hook. f. Fl. Brit. India 7 : 293. 1806 ; Blatt. & McC. Bombay Grasses 259. pl. 172. 1935 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 493. 1960. *Cynosurus indicus* L. Sp. Pl. 72. 1753.

Erect or geniculately ascending annuals, 10 - 70 cm high. Leaves upto 30.0×0.75 cm, distichous, flat, linear, acute ; ligule a hairy membrane. Spikes 2 - 7, digitate ; rachis flattened. Spikelets c. 3.75 mm long, 3 to 6-flowered, glabrous. Glumes unequal, membranous, 1-nerved ; apiculate. Lemmas c. 3 mm long, gibbously ovate-oblong, obtuse. Caryopsis obliquely striated, reddish-brown.

Fl. & Fr. : July - September.

Commonly found along road-sides in open wastelands and as a weed in cultivated fields. It is a good fodder grass.

Selected specimens : Ajmer : *Lourie* 200/194 (DD) ; Alwar : Minak forest, *Parmar* 9618 (BSJO) ; Banswara : *Kanodia* 75300 (BSI) ; Barmer : *Sheo, Rao* 66991 (BSI) ; Jaisalmer : *Stower A* 99 (BSI) ; Jhalawar : Kokan dam, *Wadhwa* 5453 (BSA) ; Sirohi : Mt. Abu. *Blatter* 2500 (BLAT) ; Udaipur : Banki block, *Verma* 11 (BSA).

36. ELYONURUS Humb. & Bonpl. ex Willd.

Elyonurus royleanus Nees ex A. Rich. Tent. Fl. Abyss. 2 : 471. 1851 ; Hook. f. Fl. Brit. India 7 : 161. 1896 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 145. 1960 ; Raizada & Jain in Ind. For. Rec. (n.s.) Bot. 4 : 206. pl. 6. f. 2. 1961.

Slender, geniculately ascending annuals with pubescent nodes. Leaves 3 - 10 \times 0.75 - 1.25 cm, linear-lanceolate, acute to acuminate, glabrescent ; ligule a short membrane. Racemes upto 5 cm long, erect, yellowish-green with purplish tinge, enclosed in sheath ; joints densely bearded with whitish, silky hairs. Sessile spikelets 10 - 12 mm long, with 2-fid long beak, ciliate. Glume margins with a row of tubercles. Lower lemma nerveless, glabrous. Pedicellate spikelets upto 1 cm long, awned.

Fl. & Fr. : August - November.

Occasionally found in open rocky habitats.

Selected specimens : Alwar : Pandupole, *Parmar* 10202 (BSJO) ; Barmer : *Bhandari* 1850 (JAC) ; Chittorgarh : Ratangarh, *Majumdar* 12231 (BSA) ; Jaisalmer : Chandan, *Tiwari* 830 (BSJO) ; Jodhpur : Osian, *Singh* 3254 (BSJO) ; Udaipur : Bordi plantation, *Patil* 504 (DD).

37. ELYTROPHORUS P. Beauv.

Elytrophorus spicatus (Willd.) A. Camus in Lecomte, Fl. Gen. de l'Indo-China 7 : 547. 1923 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 493. 1960. *Dactylis spicata* Willd. in Ges. Naturf. Freunde Berlin, Neue Schrift 3 : 416. 1801. *Elytrophorus articulatus* P. Beauv. Ess. Agrost. 67. t. 14. f. 2. 1812 ; Hook. f. Fl. Brit. India 7 : 306. 1896.

Tufted, erect annuals, upto 40 cm high, with fibrous roots. Leaves linear, acute, sometimes longer than the culms, smooth ; ligule membranous, lacerate. Panicles 10 - 25 cm long, spiciform. Spikelets c. 5 mm long, awned, compressed, subtended by many empty glumes. Lemmas c. 5 mm long, ovate-lanceolate, 3-nerved. Palea with winged keels, 3-lobed. Caryopsis free, obliquely oblong.

Fl. & Fr. : October - January.

Frequent on the banks of temporary ponds, pools, ditches etc.

Selected specimens : Ajmer : Lourie 4955 (DD) ; Kota : Atru, Singh 83772 (LWG).

38. ENNEAPOGON Desv. ex P. Beauv.

- | | |
|--|---------------------------|
| 1a. Four of the awns much shorter than the other five. Lemma plus longer awns more than 8 mm long : | |
| 2a. Annuals Palea about twice as long as the lemma, ciliate on the keel but glabrous on the flaps. Lemma hairy inside at the base of the awns. Panicles upto 12 cm long, dense, flexuous, greyish. ... | 2. <i>E. cenchroides</i> |
| 2b. Perennials. Palea equal to the lemma, ciliate on the keel and hairy on the flaps. Panicles less than 10 cm long, erect, with pinkish tinge. ... | 3. <i>E. persicus</i> |
| 1b. All awns more or less of same length. Lemma plus awns less than 6 mm long : | |
| 3a. Basal leaves setaceous, thread-like. Panicles steel-grey, short, compact. Awns shortly ciliate, not bristly, straight. Palea longer than broad, shortly ciliate on the keels. ... | 1. <i>E. desvauxii</i> |
| 3b. Basal leaves flat, not filiform. Panicles often with a purplish-grey tinge. Awns markedly ciliate, bristly, curved at maturity. Palea long-ciliate on the keels. ... | 4. <i>E. schimperanus</i> |

1. *Enneapogon desvauxii* P. Beauv. Ess. Agrost. 82. t. 16/11. 1812. *Pappophorum brachystachyum* Jaub. & Spach in Ann. Sci. Nat. Bot. ser. 3.

14 : 365. 1850 & in *Illus. Pl. Or.* 4 : 34. t. 324. 1851 ; Hook. f. *Fl. Brit. India* 7 : 302. 1896. *Enneapogon brachystachyus* (Jaub. & Spach) Stapf in *Thiself.* - Dyer, *Fl. Cap.* 7 : 654. 1900 ; Bor, *Grass. Burm. Ceyl. Ind. Pak.* 608. f. 70/2. 1960.

Tufted, erect or geniculate perennials, 10 - 40 cm high, with villous nodes. Leaves 2.5 - 10.5 × 0.25 - 0.45 cm. filiform, convolute, linear, acute ; sheaths pubescent ; ligule a short rim of hairs. Inflorescence a spike-like panicle, upto 5 cm long. Spikelets 3.5 - 5.0 mm long, 2 to 3-flowered, pedicellate, awned. Lower glume 2 - 5 mm long, ciliate on margins and keel, 3 to 5 (- 7)-nerved ; upper one 2.75 - 5.0 mm long, 3 to 5-nerved, softly pubescent outside. Lemmas densely villous from near the base, awned. Caryopsis 1.0 - 1.5 mm long, ovoid, shining.

Fl. & Fr. : August - December.

Occasionally found in open rocky-gravelly habitats, particularly in W. Rajasthan.

Selected specimens : Jaisalmer : *Shetty* 3417 (BSJO) ; Pokaran, *Wadhwa* 4941 (BSA) ; Jodhpur : *Bhandari* 1103 (JAC). Also reported from Barmer (Gupta & Sharma, 1971).

2. *Enneapogon cenchroides* (Lichst. ex Roem. & Schult.) C.E. Hubbard in *Kew Bull.* 1934 : 199. 1934 ; Bor, *Grass. Burm. Ceyl. Ind. Pak.* 608. 1960. *Pappophorum cenchroides* Lichst. ex Roem. & Schult. *Syst. Veg.* 2 : 616. 1817. *P. robustum* Hook. f. *Fl. Brit. India* 7 : 302. 1896.

Geniculately ascending or erect, robust annuals, 30 - 100 cm high, with pubescent nodes. Leaves 10 - 22 × 0.25 - 0.75 cm, flat or involute, tapering to a fine point ; sheaths densely glandular-pubescent ; ligule a hairy ridge. Inflorescence a contracted or spike-like panicle, silvery-grey. Spikelets 2.75 - 7.0 mm long, 3-flowered, awned. Lower glume 2.5 - 4.25 mm long, 5 to 7-nerved, softly glandular-pubescent ; upper one upto 3.75 mm long, 3-nerved, softly hairy. Lemmas upto 7 mm long, with awns softly antrorsely hairy near the base and the tips naked. Caryopsis c. 1 mm long, ovoid, pale-brown.

Fl. & Fr. : October - November.

Rare, found in rocky places.

Selected specimens : Jodhpur : *Bhandari* 1654 (JAC), *Blatter* 4010 (BLAT).

3. *Enneapogon persicus* Boiss. *Diagn.* 1(5) : 71. 1844 ; Bor, *Grass. Burm. Ceyl. Ind. Pak.* 610. 1960 ; *Pappophorum aucheri* Jaub. & Spach, *Ill. Pl. Or.* 4 : 32. t. 323. 1851 ; Hook. f. *Fl. Brit. India* 7 : 301. 1896.

Erect, caespitose perennials, 20–50 cm high with tomentose nodes. Leaves 2.5–15.5 × 0.25–0.45 cm, convolute, linear, pointed at tip; ligule a line of hairs. Panicles upto 10 cm long. Spikelets 2 to 4-flowered, sessile, awned. Lower glume upto 10 mm long, ovate-lanceolate, 5 to 8-nerved; the upper ones upto 11.5 mm long, upto 8-nerved, sparsely hairy. Lemmas 1.0–1.25 cm long including the awns; awns hirsute with long soft hairs near to the middle. Caryopsis c. 1.5 mm long, more or less compressed, oblong, pale-brown.

Fr. & Fr. : August - November.

Tiny grass, growing in rocky-gravelly habitats in W. Rajasthan.

Selected specimens : Jodhpur : *Bhandari* 1938 (JAC); Jaisalmer : *Blatter* 4117, 4130 (BLAT).

4. *Enneapogon schimperanus* (Hochst. ex A. Rich.) Renvoize in *Kew Bull.* 22 : 400. 1968. *Pappophorum schimperanus* Hochst. ex A. Rich. *Tent. Fl. Abyss.* 2 : 403. 1854. *P. elegans* Nees ex Steud. *Syn. Pl. Glum.* 1 : 199. 1854; Hook. f. *Fl. Brit. India* 7 : 301. 1896. *Enneapogon elegans* (Nees ex Steud.) Stapf in *Kew Bull.* 1907 : 224. 1907; Bor, *Grass Burm. Ceyl. Ind. Pak.* 610. 1960; *Bhandari*, *Fl. Ind. Desert* 410. f. 132. 1978.

Tufted, erect perennials, with tomentose nodes. Leaves 1.5–10.0 × 0.15–0.5 cm, involute, pungent at apex, softly pubescent; sheaths with spreading hairs; ligule a ring of hairs. Panicles 2.5–10.0 cm long, spike-like, with purplish-grey tinge. Spikelets 4–6 mm long, 3 to 4-flowered. Lower glume upto 5 mm long, 7 to 9-nerved, softly pubescent; upper one 9-nerved, acute. Lemma orbicular, cleft into 9, subulate awns, the latter plumose in the lower half. Caryopsis c. 1.5 mm long, ovate, pale-brownish.

Fl. & Fr. : October - January.

Gregarious in rocky habitats, particularly in W. Rajasthan.

Selected specimens : Barmer : *Mava nagar*, *Shetty* 2260 (BSJO); Bikaner : *Bhikmpur*, *Roy* 2023 (BSJO); Jaipur : *Amer*, *Sharma* Acc. No. 6647 (RUBL); Jaisalmer : *Budli nala*, *Wadhwa* 4977 (BSA); Nagaur : *Stower* A 69 (BSI).

39. ERAGROSTIELLA BOR

- 1a. Leaves from the basal sheaths very long, narrow, rolled or folded, reaching to the base of the inflorescence. ... 3. *E. nardoides*
- 1b. Leaves from the basal sheaths very much shorter, never reaching the base of inflorescence :

- 2a. Keel of palea broadly winged. Leaves very narrow, almost filiform when rolled or folded. ... 1. *E. bifaria*
- 2b. Keel of the palea not broadly winged. Leaves linear, often complicate and falcate. ... 2. *E. brachyphylla*

1. *Eragrostiella bifaria* (Vahl) Boro in Ind. For. 66 : 270. 1940 & Grass. Burm. Ceyl. Ind. Pak. 494. 1960 ; Mahesh. Illus. Fl. Delhi f. 248. 1966. *Poa bifaria* Vahl, Sym. Bot. 2 : 19. 1791. *Eragrostis bifaria* (Vahl) Wight ex Steud. Nom. Bot. ed. 2. 1 : 562. 1840; Stapf in Hook. f. Fl. Brit. India 7 : 325. 1896.

Densely tufted perennials, upto 50 cm high. Leaves 3 - 12 × 0.5 - 2.0 cm, filiform, convolute, linear, acute ; ligule c. 3.75 mm long Inflorescence 5 - 20 cm long, olive-grey. Spikelets 7 to 40-flowered, elliptic-oblong, 0.5 - 2.0 cm long ; rachilla fracturing at maturity towards the base. Lower glume 1.5 - 5.5 mm long, lanceolate-ovate, with scabrid keel, acute ; upper one narrowly ovate, upto 3.75 mm long, rounded, subacute. Lemmas 1.75 - 2.5 mm long, ovate, acute. Palea broadly winged on the keel, ciliolate along the margins. Caryopsis c. 0.5 mm long, broadly ovate.

Fl. & Fr. : August - November.

Rare, found in rocky habitats.

Selected specimens : Ajmer : Duthie 4960 (DD) ; Bharatpur : Sikandra, Parmar 6193 (BSJO) ; Jaipur : Ramgarh, Sharma 2116 (RUBL) ; Kota : Majumdar 10464 (BSA) ; Pali : Gorm Ghat R.F., Shetty 1841 (BSJO). Also reported from Jodhpur (Rao & Kanodia, 1963).

2. *Eragrostiella brachyphylla* (Stapf) Bor in Ind. For. 66 : 270. 1940 & Grass. Burm. Ceyl. Ind. Pak. 494. 1960. *Eragrostis brachyphylla* Stapf apud. Stapf in Hook. f. Fl. Brit. India 7 : 327. 1896.

Tufted, slender perennial grass, 20 - 70 cm high. Leaves convolute, filiform, linear, acute, falcate, shorter than the culms. Panicles upto 25 cm long, straw-coloured. Spikelets 3.5 - 12.5 mm long, linear to oblong, 2-seriate. Glumes closely imbricate. Keel of palea not broadly winged. Caryopsis ellipsoid, 3-gonous.

Fl. & Fr. : August - November.

Common in dry rocky and sandy habitats.

Selected specimens : Ajmer : Lourie 126 (DD) ; Bundi : Nenwa, Singh 83632 (LWG) ; Kota : Darah, Singh 74813 (LWG).

3. *Eragrostiella nardoides* (Trin.) Bor in Ind. For. 66 : 270. 1940 & Grass. Burm. Ceyl. Ind. Pak. 495. 1960. *Eragrostis nardoides* Trin. in Mem. Acad. Sci. Petersb. ser. 6. 1 : 415. 1830 ; Stapf in Hook. f. Fl. Brit. India 7 : 326. 1896.

Densely tufted perennials. Leaves convolute, filiform, with long white hairs. Spikes very long and slender. Spikelets erecto-patent, close-set, laterally compressed. Lemmas about 2 mm long. Keel of palea narrowly winged ; wings ciliate.

Fl. & Fr. : August - November.

Rare, found in moist rocky places.

Selected specimen : Sawai Madhopur : Bayana fort, Uma Shankar & Ghosh 46049 (LWG).

40. ERAGROSTIS N.M. Wolf

- 1a. Spikelets not breaking up at maturity. 17. *E. tef*
- 1b. Spikelets breaking up at maturity :
- 2a. Spikelets breaking up from apex downwards at maturity. Rachis fragile :
- 3a. Lemma ciliate on the margins. 6. *E. coarctata*
- 3b. Lemma eciliate on the margins :
- 4a. Keels of the palea more or less ciliate :
- 5a. Panicles compact and dense :
- 6a. Annuals. Lemmas ciliate on the keels. Palea-hairs longer than the width of floret and glands at the base of hairs conspicuous. Stamens 2. 4. *E. ciliaris* var. *ciliaris*
- 6b. Perennials. Lemmas eciliate on the keels. Palea-hairs shorter than the width of floret and glands at the base of hairs inconspicuous. Stamens 3. 16. *E. riparia*
- 5b. Panicles effuse :
- 7a. Lemmas ciliate on the keels. 5. *E. ciliaris* var. *clarkel*

7b. Lemmas eciliate on the keel :

8a. Culms and leaves more or less viscous. Inflorescence sticky due to glands on the branchlets and glumes to which grains of sand adhere.

23. *E. viscosa*

8b. Culms and leaves not viscous. Inflorescence not sticky and without glands on branchlets and glumes :

9a. Panicles loose, with spreading branches ; axis more or less bearded at the nodes.

18. *E. tenella*
var. *tenella*

9b. Panicles contracted, with ascending branches ; axis glabrous.

19. *E. tenella*
var. *insularis*

4b. Keels of palea scabrid or smooth, eciliate :

10a. Panicles thyriform or very broadly oblong with numerous capillary branches bearing long or short pedicelled spikelets. Lemmas upto 1.5 mm long, markedly truncate.

1. *E. aspera*

10b. Panicles oblong or linear ; branches not capillary. Lemmas less than 1 mm long.

9. *E. japonica*

2b. Spikelets breaking up from below upwards. Rachis tough :

11a. Plants glandular :

12a. Lowest branches of the panicle fascicled or sub-whorled, with pitted glands just above and below the lowest node and also with glandular band below culm-nodes. Palea deciduous.

15. *E. pilosa*

12b. Lowest branches of panicle not whorled ; glandular bands below the culm-nodes absent. Palea persistent :

13a. Fresh plant with disagreeable odour. Pedicels without crateriform glands. Spikelets 2 - 4 mm wide. Caryopsis upto 0.5 mm long, subglobose.

3. *E. cilianensis*

- 13b. Fresh plant without any specific odour. Pedicels of spikelets with crateriform glands. Spikelets 1.5 - 2.0 mm wide. Caryopsis more than 0.7 mm long, broadly oblong. 10. *E. minor*
- 11b. Plants eglandular :
- 14a. Spikelets broadly ovate to ovate-oblong. 22. *E. unioloides*
- 14b. Spikelets narrowly oblong or linear :
- 15a. Lemmas upto 1.5 mm long :
- 16a. Stamens 2 :
- 17a. Dwarf plants, not more than 12 cm high. Spikelets 4 to 8-flowered. Lemmas very acute. 11. *E. multicaulis*
- 17b. Tall plants, more than 20 cm high. Spikelets more than 10-flowered. Lemmas acute to subacute with overlapping margins. 8. *E. gangetica*
- 16b. Stamens 3 :
- 18a. Spikelets slatey-grey to black. Caryopsis c. 0.75 mm long, truncate at both ends, dorsally slightly grooved. 12. *E. nigra*
- 18b. Spikelets grey or purple. Caryopsis c. 0.5 mm long, cylindrical, smooth. 2. *E. atrovirens*
- 15b. Lemmas more than 1.5 mm long :
- 19a. Annuals. Pedicels over 5 mm long. Lemmas broadly ovate. Stamens 2. 21. *E. tremula*
- 19b. Perennials. Pedicels less than 2.5 mm long. Lemma narrow, elliptic. Stamens 3 :
- 20a. Lemmas 2 mm long :
- 21a. Basal leaf-sheath silky pubescent below and strongly ridged. Pedicels of the spikelets devoid of a glandular band. 7. *E. curvula*
- 21b. Basal leaf-sheath glabrous below and not ridged. Pedicels of the spikelets with a glandular band. 20. *E. tenuifolia*

20b. Lemmas less than 1.75 mm long :

22a. Panicles contracted. Spikelets less than 1 mm wide, crowded, packed, straight. Lemmas oblong, acute, lateral nerves straight ; tip of lemma overlapping the base of next lemma above. Caryopsis ellipsoid-globose, circular in section.

13. *E. nutans*

22b. Panicles widely spreading. Spikelets more than 1.25 mm wide, loose, slightly curved. Lemmas almost orbicular in shape ; lateral nerves curved ; tip of lemma just touching the base of next lemma above or overlapping slightly. Caryopsis cuneate-truncate, triangular in cross section.

14. *E. papposa*

1. *Eragrostis aspera* (Jacq.) Nees, Fl. Afr. Austr. 408. 1841 ; Hook. f. Fl. Brit. India 7 : 314. 1896 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 501. 1960 ; Roy in Bull. Bot. Surv. India 18 : 105. 1979. *Poa aspera* Jacq. Hort. Vindob. 3 : 32. t. 56. 1776.

Erect annuals. Leaves 10 - 25 × 0.25 - 0.65 cm, flat, linear-lanceolate, acute ; sheaths bearded ; ligule hairy. Panicles upto 30 cm long, loose, bearded at the nodes. Spikelets 4 10 × 1.0 1.5 mm, 5 to 22-flowered, linear-oblong. Glumes subequal. Keel of the palea scabrid. Stamens 3, pink. Caryopsis c. 0.5 mm long, subglobose.

Fl. & Fr. : August - October.

Rare, found in moist and shaded localities, particularly in sandy-loam soils in the desertic zones.

Selected specimens : Bikaner : Gajner, Roy 2074 (BSJO) ; Churu : Adsar, Roy 2695 (BSJO). Also reported from Jodhpur (Sarup, 1951).

2. *Eragrostis atrovirens* (Desf.) Trin. ex Steud. Nom. Bot. ed. 2. 1 : 562. 1840 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 503. 1960 ; Roy in Bull. Bot. Surv. India 18 : 107. 1979. *Poa atrovirens* Desf. Fl. Atlant. 1 : 73. t. 14. 1798.

Tufted perennials, upto 1 m high. Leaves 5 - 25 × 0.25 0.5 cm, flat or convolute, linear, acute. Ligule membranous. Panicles upto 20 cm long, ovate or oblong. Spikelets c. 1.5 mm long, 5 to 15-flowered, linear.

Glumes subequal, ovate-lanceolate, 1-nerved. Lemmas 1.25 - 2.0 mm long, broadly ovate, 3-nerved, acute or subacute when flattened. Palea scabrid on the keel. Stamens 3. Caryopsis c. 0.75 mm long, ellipsoid, reddish-brown.

Fl. & Fr. : January - December.

Mostly found near swampy habitats. This species is highly polymorphic as regard to the habit and size of inflorescence.

Selected specimens : Banswara ; *Majumdar* 10299 (BSA) ; Chittorgarh : Maslana, *Majumdar* 10165, 10172 (BSA) ; Kota : Shahabad, *Majumdar* 13282 (BSA), *Verma* 445 (BSA).

3. *Eragrostis cilianensis* (All.) Vig. - Lut. ex F. T. Hubbard in Philipp. J. Sci. C. Bot. 8 : 159. 1913 ; Blatt. & McC. Bombay Grasses 237. pl. 157. 1935 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 503. 1960. Roy in Bull. Bot. Surv. India 18 : 106. 1979. *Poa cilianensis* All. Fl. Pedem. 2 : 246. t. 91. f. 2. 1785. *Eragrostis major* Host. Gram. Austr. 4 : 14. t. 24. 1809 ; Stapf in Hook. f. Fl. Brit. India 7 : 320. 1896.

Tufted, erect or geniculately ascending annual grass, 10 - 60 cm high. Leaves 2 - 10 × 0.15 - 0.75 cm, flat or convolute, linear, acute, glabrous, margins with a row of warty glands ; ligule a ring of hairs. Panicles upto 18 cm long, erect. Spikelets upto 50-flowered, 0.3 - 2.0 × 0.25 - 0.4 cm, narrowly oblong, yellowish-green, often pigmented with purple ; the rachilla often breaking off above the glumes before all the lemmas have fallen. Glumes subequal, 1.5 - 2.5 mm long, boat-shaped, acute, with scabrid keel. Lemmas glandular on the keel, with distinct nerves, obtuse. Caryopsis c. 0.5 mm across, rugulose, reddish-brown.

Fl. & Fr. : August - December.

Fairly common in open wastelands and fallow and cultivated fields. It is used as a fodder grass.

Selected specimens : Ajmer : *Lourie* 200, 230 (DD) ; Banswara : Parla ka Pul, *Majumdar* 10324 (BSA) ; Barmer : *Bhandari* 500 (JAC) ; Jaisalmer : *Raizada* 3/55 (DD) ; Sirohi : Mt. Abu, *Sharma* 3365 (RUBL) ; Udaipur : *Majumdar* 12498 (BSA) ; Pali : Babra, *Pandey* 10318 (BSJO).

4. *Eragrostis ciliaris* (L.) R. Br. in Tuckey, Narr. Exp. Congo, App. 478. 1818 ; Stapf in Hook. f. Fl. Brit. India 7 : 314. 1896 ; Blatt. & McC. Bombay Grasses 231. pl. 154. 1935 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 506. 1960 ; Roy in Bull. Bot. Surv. India 18 : 103. 1979. *Poa ciliaris* L. Syst. Nat. ed. 10. 2 : 875. 1759. *Eragrostis ciliaris* (L.) R. Br. var. *brachystachya* Boiss. Fl. Orient. 5 : 582. 1884 ; Stapf in Hook. f. l.c. 7 : 315. 1896 ; Bor, l.c. 506. 1966.

var. *ciliaris*

Tufted, erect or procumbent annuals, 10 - 35 (- 60) cm high. Leaves 2 - 10 × 0.15 - 0.5 cm, flat, linear-lanceolate, acute; ligule ciliate. Panicles 1.5 - 7.0 (- 10.0) × 0.25 - 0.75 cm, spiciform, lobed or dense, cylindrical, woolly. Spikelets 5 to 12-flowered, 2.0 - 5.25 mm long, densely clustered, green with pinkish tinge, breaking up from the apex; rachilla fragile. Glumes subequal, 0.5 - 1.25 mm long, acute. Lemmas c. 1.5 mm long; keel hairy or smooth, obtuse. Palea equal to lemmas; keel with tuberculate cilia; cilia upto 0.75 cm long. Caryopsis 0.35 - 0.6 mm across, ellipsoid or ovoid.

Fl. & Fr. : August - November.

Common in moist sandy soils, particularly along irrigation channels, dam sides, fallow fields, dried up river-beds etc.

Selected specimens : Ajmer : *Lourie* 4969 (DD); Alwar : *Balafort, Hira Lal* 34458 (LWG); Banswara : *Lasara village, Singh* 3605 (BSJO); Ganganagar : *Bhadra, Roy* 6452 (BSJO); Jaipur : *Wadhwa* 4852 (BSA); Jaisalmer : *Along Miajlar road, Shetty* 3390 (BSJO); Kota : *Shahabad, Majumdar* 13151 (BSA); Udaipur : *Wingati* 54 (DD).

5. var. *clarkei* Stapf in Hook. f. *Fl. Brit. India* 7 : 315. 1896; Bor, *Grass. Burm. Ceyl. Ind. Pak.* 506. 1960; Mahesh. *Fl. Delhi* 385. 1966.

This taxon can be identified by having effuse and open panicles resembling *Eragrostis tenella* (L.) P. Beauv. ex Roem. & Schult. Lemmas are ciliate on the keel.

Fl. & Fr. : As proper variety.

Rare, in moist clayey soils along dam-sides. So far known endemic to Delhi (*Clarke s.n.*). Its present records from Rajasthan indicates extended distribution pattern towards west.

Selected specimen : Pali : *Jawai dam, Rao* 66752 (BSA).

6. *Eragrostis coarctata* Stapf apud. Hook. f. *Fl. Brit. India* 7 : 313. 1896; Bor, *Grass. Burm. Ceyl. Ind. Pak.* 507. 1960.

Tufted, annual grass, 20 - 40 cm high. Leaves linear-lanceolate, acute. Panicle upto 10 cm long, contracted, spiciform; rachis bearded at the nodes, fragile. Keels of palea ciliate. Caryopsis ovoid-oblong, polished, brown.

Fl. & Fr. : July - March.

Rare, found in open wastelands.

Selected specimen : Kota : Singh 90137 (LWG). Also reported from Alwar (Vyas, 1964, 67) and Udaipur (Vyas, 1965 ; Ramdeo, 1969).

7. *Eragrostis curvula* (Schrad.) Nees, Fl. Afr. Austr. 397. 1841 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 507. 1960. *Poa curvula* Schrad. in Gotting. Anz. Ges. Wiss. 3 : 2073. 1821.

Tufted, erect perennials. Basal sheaths striated and appressedly silky hairy. Leaves 5 - 20 × 0.1 - 0.30 cm, filiform, often folded, linear, acute. Panicles upto 25 cm long, variable, bearded in the axils. Spikelets 5 to 10 (- 15)-flowered, 5 - 10 mm long, narrowly linear, grey-green. Glumes unequal. Lemmas upto 2.5 mm long, ovate-elliptic, appressed to rachilla. Palea persistent. Caryopsis c. 0.65 mm long, ellipsoid.

Fl. & Fr. : August - November.

Native of S. Africa ; occasionally found in dry habitats.

Selected specimen : Jhalawar : Singh 74466 (LWG).

8. *Eragrostis gangetica* (Roxb.) Steud. Syn. Pl. Glum. 1 : 266. 1854 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 508. 1960 ; Roy in Bull. Bot. Surv. India 18 : 107. 1979. *Poa gangetica* Roxb. Fl. Ind. 1 : 341. 1820. *Eragrostis stenophylla* Hochst. ex Miq. in Verh. Konink. - Nederl. Inst. 3 : 4, 39. 1851, *pro parte* ; Stapf in Hook. f. Fl. Brit. India 7 : 318. 1896, *pro parte*.

Glaucous, perennial grass. Leaves 5 - 15 × 0.25 - 0.5 cm, flat or in-rolled, linear, ligule a rim of short hairs. Inflorescence a panicle. Spikelets upto 1.25 cm long, linear. Glumes subequal, 0.75 - 0.9 mm long, lanceolate, acute, 1-nerved, nerve scabrid on the back. Lemma 1.0 - 1.5 mm long, boat-shaped, 3-nerved. Palea scabrid. Caryopsis c. 0.5 mm long, subglobose, dark brown.

Fl. & Fr. : August - November.

Common on sandy-loam soils in open wastelands and in cultivated fields.

Selected specimens : Banswara : Majumdar 10171-A (BSA) ; Chittorgarh : Bansi, Verma 1716 (BSA) ; Kota : Majumdar 10479 (BSA) ; Sirohi : Mt. Abu, Rao 67243 (BSA) ; Duthie 6789 (DD) ; Tonk : Rampura, Shetty 1037 (BSJO).

9. *Eragrostis japonica* (Thunb.) Trin. in Mem. Acad. Sci. Petersb. ser. 6. 1 : 405. 1830 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 509. 1960 ; Roy in Bull. Bot. Surv. India 18 : 105. 1979. *Poa japonica* Thunb. Fl. Jap. 51. 1784. *P. diarrhena* Schult. Syst. Veg. Mant. 2 : 616. 1827. *Eragrostis diarrhena* (Schult.) Steud. Syn. Pl. Glum. 1 : 266. 1854 ; Bor, l.c. 507.

1960. *Eragrostis interrupta* auct. plur. non (R. Br.) P. Beauv. 1812; Stapf. in Hook. f. Fl. Brit. India 7 : 316. 1896, incl. vars. *diarrhena* (Schult.) Stapf and *koenigii* Stapf *Diandrochloa japonica* (Thunb.) Henry in Bull. Bot. Surv. India 9 : 290. 1968. *D. diarrhena* (Schult.) Henry, l.c. 9 : 290. 1968.

Tufted, geniculately ascending annuals or perennials, upto 70 cm or more high. Leaves 5 - 25 × 0.25 - 1.25 cm, flat, linear, acute, glabrous. Ligule a fimbriate membrane. Panicle 5 - 45 cm long, either contracted with appressed branches or interrupted with short spreading and sub-whorled branches. Spikelets upto 6.5 mm long, many-flowered. Glumes subequal, hyaline, obtuse, 1-nerved. Lemmas c. 1 mm long, obtuse. Stamens 2. Caryopsis c. 0.5 mm long, obovoid polished, reddish-brown.

Fl. & Fr. : October - February.

Common in moist and marshy habitats along dam-sides, river-beds, dried up tanks and as a weed in fallow and cultivated fields.

Selected specimens : Banswara : Bagaycha forest, Singh 4279 (BSJO) ; Barmer : Mavagar R.F., Shetty 2262 (BSJO) ; Bundi : Mangli plantation, Raizada 2/55 (DD) ; Jaipur : Narana, Sharma 1509 (RUBL) ; Sirohi : Mt. Abu, Duthie 6790 (DD).

10. *Eragrostis minor* Host, Icon. Descr. Gram. Austr. 4 : 15. 1809 ; Stapf in Hook. f. Fl. Brit. India 7 : 321. 1896 ; Blatt. & McC. Bombay Grasses 238. pl. 158. 1935. *Poa eragrostis* L. Sp. Pl. 68. 1753. *Eragrostis poaeoides* P. Beauv. Ess. Agrost. 162. 1812 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 512. 1960 ; Roy in Bull. Bot. Surv. India 18 : 106. 1979.

Tufted, erect or ascending annuals, 15 - 60 cm high. Leaves 3 - 10 × 0.25 - 0.5 cm, linear, acute, usually with a row of warty glands along the margins ; sheath glandular and bearded at the mouth. Ligule a pubescent ridge. Panicles 10 - 15 cm long, dense to open, stiff with short pedicels. Pedicels and branchlets usually with crateriform glands. Spikelets 5 to many-flowered, 3.5 - 10.5 × 1.5 - 2.25 mm, green-pigmented with purple, breaking up from the base. Glumes subequal, upto 1.5 mm long, 1-nerved, acute. Lemmas c. 1.75 mm long, chartaceous, obtuse, glandular on the keels. Palea persistent, scabrid on the keel. Stamens 3. Caryopsis c. 0.75 mm long, dorsally flattened, brownish.

Fl. & Fr. : September - march.

Common in moist places in cultivated and fallow fields.

Selected specimens : Ajmer : Lourie 4958 (DD) ; Barmer : Randva village, Shetty 2285 (BSJO) ; Ganganagar : 18 PDD. Roy 4910 (BSJO) ; Jaipur : Pokaran, Shetty 3309 (BSJO) ; Jhalawar : Verma 3504 (BSA) ; Udaipur : Banki block, Verma 15 (BSA).

11. *Eragrostis multicaulis* Steud. Syn. Pl. Glum. 1 : 426. 1855 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 510. 1960 ; Roy in Bull. Bot. Surv. India 18 : 107. 1979.

Erect annuals. Leaves 3 - 15 × 0.15 - 0.35 cm, narrowly linear, acute ; ligule a short ring of hairs. Axils of panicle glabrous. Spikelets 2.5 - 3.75 mm long. Lemma and palea upto 1.5 mm long, with scabrid keels. Stamens dark. Caryopsis c. 0.75 mm long, dark brown.

Fl. & Fr. : September - December.

Rare, in black cotton soils in the southern parts of the state.

Selected specimen : Banswara : *Majumdar* 10229 (BSA).

12. *Eragrostis nigra* Nees ex Steud. Syn. Pl. Glum. 1 : 267. 1854 ; Stapf in Hook. f. Fl. Brit. India 7 : 324. 1896 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 511. 1960 ; Roy in Bull. Bot. Surv. India 18 : 107. 1979.

Tufted perennials. Leaves 10 - 25 × 0.25 - 0.45 cm, flat or convolute, acute ; ligule a ring of hairs. Panicles open, spreading. Spikelets slaty-greyish to black, with tough rachilla. Glumes subequal, ovate-elliptic. Lemmas 1.5 - 1.75 mm long, ovate, acute. Palea scabrid. Stamens yellow. Caryopsis c. 0.75 mm long, black, slightly grooved on the dorsal side.

Fl. & Fr. : August - November.

Commonly found in rocky to gravelly habitats and near moist situations.

Selected specimens : Jaipur : *Singh* Acc. No. 9321 (RUBL) ; Sirohi : Mt. Abu, *Puri* 56684 (BSI).

13. *Eragrostis nutans* (Retz.) Nees ex Steud. Nom. Bot. ed. 2. 563. 1840 ; Bor, Grass, Burm. Ceyl. Ind. Pak. 511. 1960. *Poa nutans* Retz. Obs. Bot. 4 : 19. 1786. *E. stenophylla* auct. non Hochst. ex Miq. 1851 ; Stapf in Hook. f. Fl. Brit. India 7 : 318. 1896.

Densely tufted, erect or geniculately ascending perennials, 20 - 50 cm high. Leaves 5.5 - 12.5 × 0.1 - 0.35 cm, convolute, linear, acute ; ligule a linear membrane. Panicles suberect, ovate or oblong. Spikelets 15 to 30-flowered, 3.5 - 5.5 mm long, linear-oblong. Glumes unequal, 1-nerved. Lemmas c. 1.5 mm long, subacute. Palea linear-oblong, with scabrid keel. Caryopsis c. 2.5 mm long, smooth, reddish-brown.

Fl. & Fr. : August - November.

Rare, weed in irrigated fields.

Selected specimen : Tonk : *Deoli, Patil* 409 (DD).

14. *Eragrostis papposa* (Duf.) Steud. Nom. Bot. ed. 2 : 1. 564. 1840 & Sym. Pl. Glum. 1 : 263. 1854; Stapf in Hook. f. Fl. Brit. India 7 : 322. 1896; Bor. Grass. Burm. Ceyl. Ind. Pak. 511. 1960. *Poa papposa* Duf. in Roem. & Schult. Syst. Veg. 2 : 585. 1817.

Tufted, erect or ascending perennials, upto 1/2 m high. Leaves upto 12.5 × 0.25 cm, flat or convolute, linear-lanceolate, acute; mouth of the sheath bearded with long silky hairs. Panicles 5 - 20 cm long open, ovoid. Spikelets 5 to 20-flowered, 5.5 - 10.5 mm long, linear, green with purplish tinge. Glumes subequal, hyaline. Lemmas 1.0 - 1.75 mm long, hyaline. Palea minutely scabrid at the keel. Caryopsis 0.5 - 1.0 mm long, dorsally grooved.

Fl. & Fr. : March - September.

Rare, weed in cultivated fields.

Selected specimen : Bundi : Nenwa, Singh 83633 (LWG).

15. *Eragrostis pilosa* (L.) P. Beauv. Ess. Agrost. 71, 162, 175. 1812; Stapf in Hook f. Fl. Brit. India 7 : 323, 1896; Blatt. & McC. Bombay Grasses 241. Pl. 160. 1935; Bor. Grass. Burm. Ceyl. Ind. Pak. 512. 1960; Roy in Bull. Bot. Surv. India 18 : 105. 1979. *Poa pilosa* L. Sp. Pl. 68. 1753.

Tufted, erect or geniculately ascending, glandular annuals, 15 - 80 cm high. Leaves 5 - 20 × 0.1 - 0.5 cm, flat or convolute, acuminate; sheath close, glabrous, bearded at the mouth; ligule a short hairy ridge. Panicles upto 20.5 cm long, open, lowest branches pilose in the axils, often with glands above and below the nodes. Spikelets 5 - 10 or more-flowered, 2 - 8 × 0.5 - 1.5 mm, purplish-green, linear; florets breaking up from the base with persistent rachilla. Glumes unequal, hyaline, often 1-nerved. Lemmas upto 1.5 mm long, ovate, subacute. Palea 2-nerved, keel smooth or scaberulous. Stamens 3. Caryopsis upto 0.75 mm long, ellipsoid, laterally compressed and apiculate at the base, brownish.

Fl. & Fr. : August - February.

Common in moist-marshy places and as a weed in open wastelands, cultivated fields etc.

Selected specimens : Ajmer : Lourie 125 (DD); Banswara : Shergarh Singh 30 9 (BSJO); Bikaner : Shivbari, Roy 2128 (BSJO); Ganganagar : Sherpura, Roy 4887 (BSJO); Jaipur : Ram Niwas Garden, Sharma 204 (RUBL); Kota : Majumdar 10469 (BSA); Tonk : Banas river-bed, Shetty 481 (BSJO).

16. *Eragrostis riparia* (Willd.) Nees, Agrost. Bras. 512. 1829; Bor. Grass. Burm. Ceyl. Ind. Pak. 513. 1960; Roy in Bull. Bot. Surv. India

18. 104. 1979. *Poa riparia* Willd. in Ges. Natur. Freunde Berlin, Neue Schrift 4 : 185. 1803. *Eragrostis tenella* (L.) P. Beauv. var. *riparia* (Willd.) Stapf in Hook. f. Fl. Brit. India 7 : 315. 1896.

Tufted perennial grass. Leaves 5 - 15 × 0.15 - 0.45 cm, narrowly linear, acute ; ligule ciliate. Panicles delicate, contracted, very narrow, subcylindric. Spikelets 1.0 - 1.25 mm long, crowded. Palea ciliate. Stamens pale pink. Caryopsis c. 0.45 mm long, ovoid, brown.

Fl. & Fr. : August - November.

Rare, found in sandy-loam, moist soil.

Selected specimen : Banswara : *Majumdar* 10223-B (BSA). Also reported from Jhunjhunu (Joshi & Sharma, 1964, 1966).

17. *Eragrostis tef* (Zucc.) Trotter in Bull. Soc. Bot. Ital. 62. 1918, in obs. ; Bor, Grass. Burm. Ceyl. Ind. Pak. 513. 1960 ; Roy in Bull. Bot. Surv. India 18 : 103. 1979. *Poa tef* Zucc. Diss. Ist. Pianta Panizz. Abiss. 1774.

Erect, spreading annuals, upto 1 m high. Leaves 5 - 25 × 0.15 - 0.33 cm, narrowly linear, acute ; ligule membranous. Panicles large and open. Spikelets 5 to 9-flowered, 7.5 - 8.5 mm long. Palea scabrid. Stamens 2, yellowish. Caryopsis c. 1 mm long, spindle-shaped, reddish-brown.

Fl. & Fr. : August - November.

Found near moist places viz. along irrigation channels, dam-sides, river-beds etc., particularly in south-eastern parts of the state.

Selected specimens : Jhalawar : Manoharthana, *Wadhwa* 3465 (BSA) ; Kota : *Majumdar* 3200 (BSA).

18. *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 ; Roy in Bull. Bot. Surv. India 18 : 104. 1979. *Poa tenella* L. Sp. Pl. 69. 1753. *P. plumosa* Retz. Obs. Bot. 4 : 20. 1786. *Eragrostis tenella* (L.) P. Beauv. ex Roem. & Schult. var. *plumosa* (Retz.) Stapf l.c. 7 : 315. 1896 ; Blatt. & McC. Bombay Grass 232. pl. 155. 1935.

var. **tenella**

Erect or geniculately ascending, weak annuals, 15 - 45 cm high. Leaf-blades 5 - 15 × 0.35 - 0.75 cm, flat, linear-lanceolate, acuminate ; mouth of the sheath hairy ; ligule a narrow rim of hairs. Panicles 5 - 15 cm long. Spikelets 4 to 9-flowered, 1.0 - 2.5 mm long, breaking up from the apex ; rachilla capillary, scabrous, fragile. Glumes subequal, ovate,

acute. Lemmas c. 0.75 long, broadly ovate-oblong, 3-nerved. Palea-keels ciliate, with spreading setose hairs, the hairs shorter than the width of the florets and clasping the floret above. Stamens 3. Caryopsis c. 0.5 mm long, ovoid-ellipsoid, polished, brown.

Fl. & Fr. : August - November.

Fairly common along dam sides, streams, open wastelands and in moist crevices of rocks.

Selected specimens : Ajmer : *Lourie* 200/230 (DD) ; Alwar : Kankwari forest, *Parmar* 8787 (BSJO) ; Banswara : Bagaycha forest, *Singh* 3773 (BSJO) ; Barmer : Naga R.F., *Shetty* 2231 (BSJO) ; Ganganagar : Bhaduwalla, *Roy* 4948 (BSJO) ; Jaipur : *Wadhwa* 4829 (BSA) ; Jhalawar : *Verma* 3365 (BSA) ; Sirohi : Mt. Abu, *Jain* 60109 (BSI).

19. var. *insularis* C.E. Hubbard in Kew Bull. 1939 ; 654. 1939 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 514. 1960.

This can be distinguished from proper var. by having panicles contracted with ascending branches and axis glabrous.

Fl. & Fr. : August - November.

Rare, found near moist places.

Selected specimens : Barmer : Kapurdi vilage, *Shetty* 2353 (BSJO) ; Tonk : Rampura, *Shetty* 1036 (BSJO).

20. *Eragrostis tenuifolia* Hochst. ex Steud. Syn. Pl. Glum. 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. 1851.

Erect, slender perennials. Leaves narrowly linear, acute ; mouth of sheath naked. Panicles upto 15 cm long, open, oblong to ovate. Spikelets 5 to 15 - flowered, upto 6 mm long, linear. Glumes unequal. Lemmas c. 2 mm long, ovate, subacute. Palea persistent, with scabrid keel. Caryopsis c. 2 mm long, obovoid-oblong, dorsally grooved.

Fl. & Fr. : August - October.

Found as a weed in sandy-loam soils.

Selected specimens : Jaipur : University R.F., *Sharma* 5552 (RUBL) ; Sanganer, *Sharma* 5553 (RUBL) ; Bani park, *Sharma* 8684 (RUBL).

21. *Eragrostis tremula* (Lam.) Hochst. ex Steud. Syn. Pl. Glum. 1 : 269. 1854 ; Stapf in Hook. f. Fl. Brit. India 7 : 320. 1896 ; Blatt. & McC. Bombay Grasses 239. pl. 159. 1935 ; Bor, Grass. Burm. Ceyl. Ind. Pak.

514. 1960 ; Roy in Bull. Bot. Surv. India 18 : 108. 1979. *Poa tremula* Lam. Tab. Encycl. Meth. Bot. 1 : 185. 1791.

Tufted, erect or geniculately ascending annuals, 15 - 50 (- 125) cm high. Leaves 5 - 20 × 0.25 - 0.65 cm, flat, linear-lanceolate, acute, sparsely hairy ; sheath bearded at the mouth ; ligule a minute line of hairs. Panicles 7 - 20 cm long. Spikelets 10 to many-flowered, 0.7 - 2.75 cm long, linear, breaking up from the base ; rachilla persistent. Glumes subequal, c. 1.25 mm long, 1-nerved, obtuse. Lemmas upto 2 mm long, closely imbricate, obtuse, with strong nerves. Palea persistent, with scabrid keel. Caryopsis c. 0.5 mm across, nearly globose, yellowish-brown.

Fl. & Fr. : August - December.

Common weed throughout the state in mixed habitats. It is a common fodder grass.

Selected specimens : Ajmer : *Lourie* 200/230 (DD) ; Banswara : *Kanodia* 75595 (BSI) ; Barmer : Bal village, *Shetty* 2202 (BSJO) ; Jaipur : Jagatpura, *Sharma* 231 (RUBL) ; Jhalawar : Mohanagar, *Kaul* 18659 (LWG) ; Tonk : Bani plantation, *Raizada* 14/55 (DD).

22. *Eragrostis unioloides* (Retz.) Nees ex Steud. Syn. Pl. Glum. 1 : 264. 1854 ; Blatt. & McC. Bombay Grasses 235. Pl. 156. 1935 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 515. 1960 ; Roy in Bull. Bot. Surv. India 18 : 106. 1979. *Poa unioloides* Retz. Obs. Bot. 5 : 19. 1789.

Tufted, erect or geniculately ascending annuals or perennials, 15 - 70 cm high. Leaves 5 - 18 × 0.25 - 0.5 cm, lanceolate, acute, subamplexicaul at base ; ligule membranous. Panicles upto 18 cm long, open or contracted. Spikelets 10 to many-flowered, 3.5 - 15.0 mm long, with purple tinge. Glumes unequal, 1-nerved. Lemmas upto 2.25 mm long, suborbicular, paniculate. Palea with scabrid keel. Stamens 3. Caryopsis 0.5 - 0.75 mm long, obovoid to ellipsoid, laterally compressed, orange-brown.

Fl. & Fr. : August - November.

Common in moist and shady localities. The size of lemmas is highly variable.

Selected specimens : Banswara : Punapathar, *Singh* 3657 (BSJO), *Kanodia* 75236, 75450 (BSI) ; Jhalawar : Bijliya-Bhadok, *Wadhwa* 5323 (BSA) ; Jodhpur : *Bhandari* 531 (JAC) ; Sirohi : Mt. Abu, *Jain* 60112 (BSI) ; Udaipur : Kotra Dam, *Rao* 66594 (BSA).

23. *Eragrostis viscosa* (Retz.) Trin. in Mem. Acad. Sci. Petersb. ser. 6. 1 : 397. 1830 ; Blatt. & McC. Bombay Grasses 233. 1935 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 515. 1960 ; Roy in Bull. Bot. Surv. India 18 : 104. 1979. *Poa viscosa* Retz. Obs. Bot. 4 : 20. 1786. *Eragrostis tenella* (L.)

P. Beauv. ex Roem. & Schult. var. viscosa (Retz.) Stapf in Hook. f. Fl. Brit. India 7 : 315. 1896.

Small, tufted annuals. Leaves 2 - 8. × 0.25 - 0.5 cm, convolute, acute, sticky, margins glandular-ciliate; sheaths sticky, ciliate; ligule ciliate. Panicles 5 - 15 cm long, usually bearded in the axils, branches spreading and with oblong, yellowish glands. Spikelets 5 to 20-flowered, upto 3.5 mm long, ovate-oblong, purplish-green, breaking up from the base; rachilla fragile. Glumes almost equal, c. 1 mm long, acute, keel with a yellow gland. Lemmas 0.75 - 1.5 mm long, broadly elliptic. Keels of palea ciliate. Stamens 2. Caryopsis c. 0.5 mm long, ellipsoid, polished, brownish.

Fl. & Fr. : August - November.

Found in moist and shaded damp places along dam sides, river-beds and road-sides. Sand particles and debris adhere to the plant.

Selected specimens : Banswara : Parla ka pul, *Majumdar* 10312 (BSA); Chittorgarh : Maslana, *Majumdar* 10203 (BSA); Bansi, *Verma* 1722 (BSA); Jhalawar : Manobarthana, *Verma* 3475 (BSA); Kota; Ramgarh, *Wadhwa* 8417 (BSA); Sirohi : Mt. Abu, *Jain* 60185 (BSI).

41. *ERIOCHLOA* H.B.K.

Spikelets more than 4 mm long, distinctly awned : axis and pedicels commonly setose.

1. *E. fatmensis*

Spikelets less than 3.5 mm long, acute to acuminate, not awned; axis and pedicels commonly glabrous.

2. *E. procera*

1. *Eriochloa fatmensis* (Hochst. & Steud.) W.D. Clayton in Kew Bull. 30 : 108. 1975. *Panicum fatmense* Hochst. & Steud in Sched. Schimp. It. Un. 806. 1837. *Helopus nubicus* Steud. Syn. Pl. Glum. 1 : 100. 1854. *Eriochloa nubica* (Steud.) Hack. & Stapf ex Thell. in Vjschr. Naturf. Ges. Zurich. 52 : 435. 1907; Bor, Grass. Burm. Ceyl. Ind. Pak. 312. 1960.

Tufted, erect or geniculately ascending annuals, 20 - 100 cm high. Leaves 5 - 20 × 0.25 - 1.0 cm, convolute, acute. Inflorescence upto 18 cm long; rachis narrowly winged, triquetrous, puberulous, bearing paired spikelets. Spikelet 4.0 - 4.5 mm long, thinly pubescent. Lower glume wanting; upper one with a long awn. Upper lemma with a distinct mucro.

Fl. & Fr. : September - November.

Occasionally found near moist places viz. water-logged pools, ponds, ditches etc.

Selected specimens : Bhilwara : Ganthila, *Singh* 6560 (BSJO); Chittorgarh : Pratapgarh, *Majumdar* 12265 (BSA); Jaipur : Chaksu, *Sharma* 1771 (RUBL); Jodhpur : Kharanalä, *Singh* 4459 (BSJO); Kota : Shahabad, *Majumdar* 13253 (BSA).

2. *Eriochloa procera* (Retz.) C.E. Hubbard in Kew Bull. 1930 : 256. 1930; Bor, Grass. Burma. Ceyl. Ind. Pak. 312. 1960; Raizada & Jain in Ind. For. Rec. (n.s.) Bot. 5 : 196 pl. 6. f. 2. 1965, *Agrostis procera* Retz. Obs. Bot. 4 : 19. 1786. *Milium ramosum* Retz. Obs. Bot. 6 : 22. 1791; Blatt & McC. Bombay Grasses 131 pl. 84. 1935. *Eriochloa polystachya sensu* Hook. f. Fl. Brit. India 7 : 20. 1896, non H.B K. 1816.

Tufted, erect annuals, 30 - 100 cm high, with swollen and pubescent nodes. Leaves 5 - 25 × 0.25 - 1.0 cm, convolute when dry, glabrous; ligule a rim of very short hairs. Inflorescence 5 - 20 cm long; rachis angular, puberulous, bearing paired spikelets. Spikelets thinly pubescent. Lower glume and palea absent; upper one acute to acuminate. Upper lemma mucronate. Caryopsis free within the hardened lemma, lenticular, compressed, smooth.

Fl. & Fr. : August - November.

Common in water-logged places.

Selected specimens : Ajmer : Beawar, *Duthie* 6521 (DD); Banswara : Lodhia tank, *Kanodia* 75334 (BSI); Jaipur : Chaksoo, *Sharma* 1719 (RUBL); Kota : Kishanganj, *Verma* 744 (CAL); Tonk : Deoli, *Agrawal* 415 (DD); Tordi Sagar, *Shetty* 1327 (BSJO).

42. EULALIA Kunth

Annual grass. Racemes less than 6. Rachis slender.

1. *E. fimbriata*

Perennial grass. Racemes more than 6. Rachis flexuous.

2. *E. trispicata*

1. *Eulalia fimbriata* (Hack.) O. Ktze. Rev. Gen. Pl. 2 : 775. 1891; Bor, Grass. Burma. Ceyl. Ind. Pak. 155. 1960. *Pollinia fimbriata* Hack. in DC. Monogr. Phan. 6 : 164. 1889; Hook. f. Fl. Brit. India 7 : 112. 1896.

Tufted, erect annuals, 20 - 50 cm high, with glabrous nodes. Leaves 10 - 25 × 0.1 - 0.5 cm, linear, acute, pubescent; ligule a ciliolate ridge. Racemes upto 6, villous, each 2 - 7 cm long; rachis silky hairy, slender. Sessile spikelets c. 3 mm long, awned. Upper glume of sessile spikelets

without an arista. Upper lemma c. 2.5 mm long, hyaline, 2-fid, awned ; palea absent or indistinct.

Fl. & Fr. : September - November.

Rare, found in open grasslands.

Selected specimens : Sirohi : Mt. Abu, *Jain* 56675, 46615, 60154 (BSI), *Rao* 66615 (BSI).

2. *Eulalia trispicata* (Schult.) Henr. in *Blumea* 3 : 453. 1940 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 157. 1960 ; Raizada *et al.* in *Ind. For. Rec. (n.s.) Bot.* 4 : 193. pl. 3. f. 2. 1961. *Andropogon trispicatus* Schult. *Syst. Veg. Mant.* 2 : 452. 1824. *Eulalia argentea* Brongn. in Duperry, *Voy. Coq. Bot.* 2 : 92. 1830. *Pollinia argentea* (Brongn.) Trin. in *Bull. Acad. Sci. Petersb.* 1 : 71. 1836 ; Hook. f. *Fl. Brit. India* 7 : 111. 1896.

Densely tufted, erect or ascending perennials, 50 - 150 cm high. Leaves 7.5 - 40.0 × 0.25 - 0.6 cm, linear, acuminate ; ligule bearded. Racemes upto 12, subdigitate, each 5 - 15 cm long ; rachis filiform, compressed ; joints and pedicels with white hairs. Sessile spikelets 2.5 - 3.5 mm long, narrowly oblong ; callus upto 5.5 mm long, obtuse. Lower glume upto 3 mm long, membranous, depressed on the back, pilose with white hairs ; upper one similar to lower but shortly ciliate. Lower lemma well-developed ; upper one long awned. Pedicellate spikelets similar to sessile but narrower.

Fl. & Fr. : August - November.

Occasional, found in open grassy plains and in fallow wastelands.

Selected specimens : Jhalawar : Pirawa, *Verma* 6847 (BSA) ; Udaipur : Devalia tank, *Rao* 66615 (BSA) ; Sirohi : Mt. Abu, *Duthie* 6748-A, 6748 (DD), *Jain* 46675, 60154 (BSI).

43. EULALIOPSIS Honda

Eulaliopsis binata (Retz.) C.E. Hubbard in Hook. *Icon. Pl.* 33, t. 3262. 1935 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 158. 1960 ; Raizada *et al.* in *Ind. For. Rec. (n.s.) Bot.* 4 : 191. 1961. *Andropogon binatus* Retz. *Obs. Bot.* 5 : 21. 1789. *Spodiopogon angustifolius* Trin. in *Mem. Acad. Sci. Petersb. ser. 6.* 2 : 300. 1832. *Ischaemum angustifolium* (Trin.) Hack. in *DC. Monogr. Phan.* 6 : 241. 1889 ; Hook. f. *Fl. Brit. India* 7 : 129. 1896. *Pollinidium binatum* (Retz.) C.E. Hubbard in *Kew Bull.* 1932 : 72. 1932.

Tufted, erect, tall perennials, with woody root-stock. Leaves 10 - 60 × 0.25 - 0.35 cm, folded or convolute ; basal sheaths woolly, mouth ciliate ; ligule a ridge of short hairs. Racemes 2 - 4, sessile, unequal, upto

4 cm long, rufously hairy; joints and pedicels angular, linear-filiform. Spikelets c. 3.75 mm long, elliptic-oblong; callus very short, obtuse, with rusty hairs. Lower glume hairy on the margins and with tufts of hairs in the middle across the back, c. 3.5 mm long, 2 to 3-toothed; upper one with a single tuft of hairs in the middle on the back, otherwise similar. Upper lemma hermaphrodite, with an awn upto 1 cm long. Caryopsis linear-oblong, free.

Fl. & Fr. : November - February.

Rare, found in dry localities in open rocky habitats.

Selected specimen : Bundi : Singh 74051 (LWG). Also reported from Sirohi (Kanodia & Rao, 1966).

44. HACKELOCHLOA O. Ktze.

Hackelochloa granularis (L.) O. Ktze. Rev. Gen. Pl. 2 : 776. 1891; Bor, Grass. Burm. Ceyl. Ind. Pak. 159. 1960; Raizada *et al.* in Ind. For. Rec. (n.s.) Bot. 4 : 205. pl. 6. f. 1. 1961. *Cenchrus granularis* L. Mant. 2 : 575. 1771. *Manisuris granularis* (L.) L. f. Nov. Gram. Gen. 37. 1779; Hook. f. Fl. Brit. India 7 : 159. 1896.

Tufted, erect or geniculately ascending annuals, 30 - 100 cm high. Leaves 3.5 - 12.5 × 0.5 - 1.25 cm, linear-lanceolate, acute, cordate or amplexicaul, coarsely-hispid; ligule membranous, ciliate. Racemes 0.5 - 2.5 cm long, spatheate. Sessile spikelets 1.0 - 1.5 mm long, globular, glabrous, with obconical callus. Glumes subequal. Lower glume pitted and tubercled with faint longitudinal ribs; upper one hyaline, 3-nerved. Caryopsis c. 1 mm long. Pedicellate spikelets 1.5 - 2.25 mm long.

Fl. & Fr. : August - October.

Common in moist, open grasslands, wastelands and lawns.

Selected specimens : Banswara : Pipalkhunt, Kanodia 75351 (BSI); Jaipur : Ramgarh, Sharma 1310 (RUBL); Jodhpur : Osian, Singh 4421 (BSJO); Kota : Shahabad, Majumdar 13147 (BSA); Pali : Malgarh R.F., Shetty 1914 (BSJO).

45. HALOPYRUM Stapf

Halopyrum mucronatum (L.) Stapf in Hook. Icon. Pl. 25 : t. 2448. 1896; Hook. f. Fl. Brit. India 7 : 328. 1896; Blatt. & McC. Bombay Grasses 242. pl. 161. 1935; Bor, Grass. Burm. Ceyl. Ind. Pak. 516. 1960. *Uniola mucronata* L. Sp. Pl. ed. 2. 1 : 104. 1762.

Tall, tough, stoloniferous perennial grass, with thick, woody and tomentose roots. Leaves 15 - 40 × 0.25 - 0.5 cm, involute or flat, glaucous, linear-lanceolate, acute. Inflorescence a panicle, c. 25 cm long, erect or nodding with smooth, glabrous, filiform rachis and branches. Callus and rachilla tip bearded with white hairs. Spikelets 5 to 25-flowered, 1.0 - 2.5 cm long, lanceolate-ovate, straw-coloured with purplish tinge. Glumes 5 - 9 mm long, oblong-lanceolate, coriaceous, acute. Lemmas 6 - 9 mm long, oblong-lanceolate, minutely hairy.

Fl. & Fr. : March - September.

Rare, found in dry habitats. Included on the authority of Gupta & Sharma (1971) from Pali district.

46. HEMARTHRIA R. Br.

Lower glume of the sessile spikelets lanceolate, acuminate ; upper glume long tailed. Upper glume of pedicelled spikelets awned, 1 to 3-nerved.

2. *H. protensa*

Lower glume of the sessile spikelets constricted suddenly at the apex into a very blunt bifid point ; upper glume acute, neither acuminate nor tailed. Upper glume of the pedicelled spikelets acuminate, 7 to 9-nerved.

1. *H. compressa*

1. *Hemarthria compressa* (L. f.) R. Br. Prodr. 207. 1810 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 161. 1960 ; Raizada *et al.* in Ind. For. Rec. (n.s.) Bot. 4 : 207. pl. 6. f. 3. 1961. *Rottboellia compressa* L. f. Suppl. 114. 1781 ; Hook. f. Fl. Brit. India 7 : 153. 1896.

Prostrate, spreading, stoloniferous perennials, rooting at the lower nodes. Leaves 2.5 - 12.5 × 0.1 - 0.35 cm, folded when dry, linear, acute ; ligule a very shallow rim fringed with hairs. Racemes 3 - 8 cm long ; internodes obliquely articulated. Sessile spikelets 4.0 - 4.5 mm long, narrowly elliptic-oblong, with a triangular callus. Glumes equal, lower obtuse or bidentate, upper one acute. Pedicellate spikelets longer than the sessile.

Fl. & Fr. : August - November.

Common in moist and marshy habitats.

Selected specimens : Alwar : Naldeshwar, Parmar 9517 (BSJO) ; Banswara : Ghatol, Singh 2943 (BSJO) ; Bundi : Verma 1867 (BSA) ; Jaipur : Ramgarh, Sharma 6932 (RUBL) ; Sirohi : Mt. Abu, Sharma 3357 (RUBL), Mc Cann 1556 (BLAT) ; Tonk : Rampura tank, Shetty 1274 (BSJO).

2. *Hemarthria protensa* Steud. Syn. Pl. Glum. 1 : 359. 1854 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 161. 1960. *Rottboellia protensa* (Steud.) Hack. in DC. Monogr. Phan. 6 : 289. 1889 ; Hook. f. Fl. Brit. India 7 : 153. 1896. *Manisuris protensa* (Steud.) Hitchc. in Brittonia 2 : 127. 1936.

Erect, slender grass, upto 1.5 m high. Leaves upto 12.0 × 0.45 cm, linear, acute ; ligule hairy. Racemes 10 - 15 × 0.25 - 0.35 cm, slender ; joints shorter than sessile spikelets. Spikelets upto 4.5 mm long. Lower glume narrowed from middle upwards.

Fl. & Fr. : October - December.

Rare, colonising in patches along river-banks.

Selected specimen : Bundi : Mangli river, Verma 1867 (CAL).

47. HETEROPOGON Pers.

1a. Annuals. Pedicellate spikelets more than 1.25 cm long :

2a. Ligule of several, narrow membranous segments. Lower glume of pedicellate spikelets devoid of glands but keel with a row of long tubercle-based golden yellow bristles.

3. *H. ritchiei*

2b. Ligule a scarious, rotundate membrane. Lower glume of the pedicellate spikelets with a longitudinal series of depressed glands.

2. *H. melanocarpus*

1b Perennials. Pedicellate spikelets less than 1 cm long.

1. *H. contortus*

1. *Heteropogon contortus* (L.) P. Beauv. ex Roem. & Schult. Syst. Veg. 2 : 836. 1817 ; Blatt. & McC. Bombay Grasses 109. pl. 71. 1935 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 163. f. 6. 1960 ; Raizada *et al.* in Ind. For. Rec. (n.s.) Bot. 4 : 247. pl. 11. f. 5. 1961. *Andropogon contortus* L. Sp. Pl. 1045. 1753 ; Hook. f. Fl. Brit. India 7 : 199. 1896.

Erect, tufted perennials, 25 - 100 cm high. Leaves 5 - 25 × 0.25 - 0.75 cm, linear, acuminate ; sheaths compressed, keeled, glabrous ; ligule a ciliate, scarious rim. Racemes 3 - 12 cm long, mostly solitary. Spikelets closely imbricate ; lower 2 - 6 sessile spikelets awnless, male or neuter ; upper sessile spikelets with long, twisted awns, hermaphrodite. Callus rufously bearded. Lower glume of sessile spikelets c. 6.5 mm long, elliptic-oblong, hispidulous ; awn upto 7.5 cm long, hirtellous. Pedicellate spikelets 7.5 - 15.0 mm long. Lower glume eglandular, hirsute ; callus c. 2.5 mm long. Lower lemma empty, ciliate. Caryopsis oblongish, terete.

Fl. & Fr. : August - November.

Fairly common throughout Rajasthan in open wastelands, fallow fields, along road-sides etc. It is a good fodder grass.

Selected specimens : Ajmer : *Lourie* 200/93 (DD) ; Alwar : Kali Ghati, *Parmar* 9457 (BSJO) ; Banswara : *Singh* 2963 (BSJO) ; Barmer : Naga R.F., *Shetty* 2232 (BSJO) ; Jaipur : *Nautiyal & Raizada* 25410 (DD) ; Kota : Borabans, *Nanda* 442 (DD) ; Sirohi : Mt. Abu, *Sharma* 3342 (RUBL.) ; Udaipur : Kambalighat, *Sharma* 3473 (RUBL).

2. *Heteropogon melanocarpus* (Ell.) Benth. in Journ. Linn. Soc. (Bot.) 19 : 71. 1881 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 165. 1960 ; Raizada *et al.* in Ind. For. Rec. (n.s.) Bot. 4. 248. 1961. *Andropogon melanocarpus* Ell. Sketch. Bot. S. Carol. 1 : 146. 1816 ; Hook. f. Fl. Brit. India 7 : 200. 1896.

Erect, stout, robust annuals, upto 1.75 m high. Leaves 10 - 50 × 0.5 - 1.75 cm, linear, attenuated at the base, acute ; sheaths more or less keeled to terete, glabrous ; ligule scarious, rotundate. Inflorescence comprising many, spatheate racemes forming panicle ; each raceme 2 - 4 cm long. Fertile spikelets 7 - 12 mm long, dark brown, linear-oblong. Lower glume minutely and fulvously hirtellus, many-nerved ; upper glume glabrous. Upper lemma hermaphrodite, with a awn upto 10 cm or more long. Caryopsis c. 5 mm long, linear-oblong. Pedicellate spikelets 1.5 - 2.0 cm long, lanceolate, subulate-acuminate. Lower glume with a longitudinal median series of depressed glands, many-nerved.

Fl. & Fr. : August - November.

Very rare, found in open wastelands.

Selected specimen : Ajmer : *Lourie* 425, 93 (DD).

3. *Heteropogon ritchlei* (Hook. f.) Blatt. & McC. in Journ. Bombay Nat. Hist. Soc. 32 : 623. 1928 & Bombay Grasses 108. pl. 70. 1935. *Andropogon ritchiei* Hook. f. Fl. Brit. India 7 : 201. 1896.

Tall, stout, rigid, erect annuals, c. 1 m high. Leaves 30 - 40 × 0.75 - 1.25 cm, linear, acuminate, margins spinulose serrulate ; ligule c. 5 mm long, membranous, dissected. Racemes upto 5 cm long, smooth and glabrous. Sessile spikelets upto 5 mm long ; callus 2.0 - 2.5 mm long, densely bristly with brown hairs. Lower glume broadly ovate, hairy on the back ; upper one linear-oblong, apiculate, 3-nerved. Awn more than 3.5 cm long, tortuous pubescent. Pedicellate spikelets 10 - 13 mm long. Keel of the lower glume with a row of long tubercular-based golden yellow bristles.

Fl. & Fr. : August - November.

A rare grass, found in open glasslands. Included on the authority of Kanodia & Rao (1966) from Sirohi and Sankhala (1951) from N.W. Rajasthan.

48. HYGRORYZA Nees

Hygroryza aristata (Retz.) Nees ex Wight & Arn. in Edinb. New Phil. Journ. 15 : 380. 1833 ; Hook. f. Fl. Brit. India 7 : 95. 1896 ; Blatt. & McC. Bombay Grasses 271. pl. 184. 1935 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 597. 1960. *Pharus aristatus* Retz. Obs. Bot. 5 : 23. 1789. *Leersia aristata* (Retz.) Roxb. Fl. Ind. 2 : 207. 1832.

Floating, glabrous perennials, with inflated sheaths ; roots feathery. Leaves c. 5.0 × 1.5 cm, ovate-oblong, obtuse, base rounded or subcordate ; ligule a narrow membrane. Panicles upto 5.5 cm long, triangular, much branched. Spikelets upto 2 cm long, sessile or shortly pedicellate. Lemma c. 1 cm long, tapering into a long, scaberulous awn.

Fl. & Fr. : December - March.

Commonly found in floating stage in ponds, rivers, tanks etc. ; often forming pure mats on the surface of the water.

Selected specimens : Alwar : Jai Samand, Hiralal 34607 (LWG) ; Bhilwara : Parvatipur, Singh 6587 (BSJO) ; Kota : Kelwara, Singh 90831 (LWG), Jain 29117 (BSI).

49. HYMENACHNE P. Beauv.

Hymenachne acutigluma (Steud.) Gilliland in Gard. Bull. Sing. 20 : 314. 1964. *Panicum acutigluma* Steud. Syn. Pl. Gram. 66. 1854. *Hymenachne pseudointerrupta* C. Muell. in Bot. Zeit. 19 : 333. 1861 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 313. 1960. *Panicum myuros sensu* Hook. f. Fl. Brit. India 7 : 39. 1896, non Lam. 1791. *Hymenachne amplexicaulis sensu* Bor, Fl. Assam 5 : 218. 1940, non Nees 1829.

Perennials, c. 1 m high, with spongy culms rooting at the lower nodes. Leaves 15-45 × 1.5-2.5 cm, ovate-lanceolate, acute, base cordate, margins serrulate ; sheaths smooth ; ligule very short, rounded. Panicles 10-30 × 1.0-2.5 cm, interrupted. Spikelets 4-5 mm long, lanceolate-acuminate, erect. Lower glume c. 2.5 mm long, 1-nerved, keeled, cuspidate ; upper one 4-5 mm long, 5-nerved. Caryopsis oblong.

Fl. & Fr. August - October.

Rare, found in wet to aquatic habitats. It is a good fodder grass.

Selected specimen : Kota : Kelwara, Singh 91099 (LWG).

50. IMPERATA Cyr.

Imperata cylindrica (L.) Rauschel. *Nom. Bot.* ed. 3. 10. 1797 ; Blatt. & McC. *Bombay Grasses.* 42. pl. 30. 1935 ; Bor, *Grass. Burm. Ceyl. Ind. Pak.* 169. 1960 ; Raizada *et al.* in *Ind. For. Rec. (n.s.) Bot.* 4 : 182. pl. 2. f. 2. 1961. *Lagurus cylindricus* L. *Syst. Nat.* ed. 10. 2 : 878. 1759. *Imperata arundinacea* Cyr. *Pl. Rar. Neap.* 2 : 26. 1792 ; Hook. f. *Fl. Brit. India* 7 : 106. 1896.

High variable, erect, rhizomatous perennials, 15 - 100 cm high ; nodes bearded. Leaves 5 - 15 × 0.25 - 0.5 cm, tapering at both ends, villous at the base. Panicles upto 20 cm long, spiciform, cylindrical, silky-white hairy. Spikelets 2.25 - 5.75 mm long. Lemmas hyaline, denticulate. Stamens 2.

Fl. & Fr. : May - August.

Fairly common in moist and marshy localities, neglected corners of lawns, gardens and play grounds. Young grass is used as a fodder. The floss is used for stuffing cushions and culm and leaves for making screens, brushes and for thatching purposes.

Selected specimens : Alwar : Bhangarh, Parmar 9788 (BSJO) ; Hanswara : Kanodia 75572, 51134 (BSI) ; Chittorgarh : Dhanerao Mahadeo, Singh & Pandey 6988 (BSJO) ; Ganganagar : Kumbharwali, Roy 4927 (BSJO) ; Jaipur : Jobner, Sharma 1800 (UBL) ; Tonk : Fordisagar, Pandey 4819 (BSJO).

51. INDOCHLOA Bor.

Indochloa clarkei (Hack.) Bor in *Kew Bull.* 1954 : 76. 1954 & *Grass. Burm. Ceyl. Ind. Pak.* 171. 1960. *Andropogon clarkei* Hack. in *Ost. Bot. Zeit.* 41 : 49. 1891 ; Hook. f. *Fl. Brit. India* 7 : 197. 1896. *Dichanthium clarkei* (Hack.) Haines, *Bot. Bihar and Orissa* 1040. 1924.

Much-branched, erect annuals, 20 - 45 cm high ; culms glabrous below the inflorescence. Leaves 5 - 10 cm long, linear-lanceolate. Spikes solitary on capillary peduncles, spatheate ; joints and pedicels silky villous, sulcate. Pedicellate and neuter spikelets reddish-brown when dry. Lower glume 2-toothed, keels scaberulous, awned.

Fl. & Fr. : August - November.

Rare, along streams on the hills.

Selected specimen : Sirohi : Mt. Abu, Rao 66513 (BSI).

52. ISACHNE R. Br.

- 1a. Annuals. Lower and upper florets almost similar in shape, size and texture. ... 1. *I. elegans*
- 1b. Mostly perennials. Lower and upper florets dissimilar :
- 2a. Leaves upto 2.5 cm long, without cartilaginous margins. Ligule of 1.5 mm long hairs. Nodes bearded. Spikelets upto 2 mm long. ... 3. *I. miliacea*
- 2b. Leaves more than 3 cm long, with cartilaginous thickened margins. Ligule of more than 2 mm long hairs. Nodes glabrous. Spikelets more than 2.5 mm long. ... 2. *I. globosa*

1. *Isachne elegans* Dalz. in Dalz. & Gibs. Bombay Fl. 291. 1861 ; Hook. f. Fl. Brit. India 7 : 23. 1897, *pro parte* ; Bor, Grass. Burm. Ceyl. Ind. Pak. 580. 1960 ; Ved Prakash & Jain in Fl. India Fasc. 14 : 18. f. 1 - 10. 1984.

Densely tufted, erect annuals; with fibrous roots. Leaves upto 10.0 × 0.5 cm, linear, margins, with cartilaginous teeth. Panicles 5 - 12 cm long ; pedicels mostly without glands. Spikelets c. 2.25 mm long, globose-ovoid. Glumes glabrous to setose on the back. Lemmas similar, subequal, pubescent and with a purplish tinge on the top.

Fl. & Fr. : August - November.

Rare, found in moist habitats. So far, this taxon is known to occur in Western Ghats, Maharashtra and Karnataka.

Selected specimens : Sirohi : Mt. Abu, Mehta 145 (JAC), Jain 60167 (BSI).

2. *Isachne globosa* (Thunb.) O. Ktze. Rev. Gen. Pl. 2 : 778. 1891 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 580. 1960 ; Ved Prakash & Jain in Fl. India Fasc. 14 : 22. f. 1 - 13. 1984. *Milium globosum* Thunb. Fl. Jap. 49. 1784. *Isachne australis* R. Br. Prodr. Fl. Nov. Holl. 1 : 196. 1810 ; Hook. f. Fl. Brit. India 7 : 24. 1896. *I. australis* R. Br. var. *effusa* Trin. ex Hook. f. l.c. 7 : 25. 1896. *I. globosa* (Thunb.) O. Ktze. var. *effusa* (Trin. ex Hook. f.) Senaratna, Grass. Ceyl. 109. 1956 ; Bor, l.c. 580. 1960. *I. dispar auct.* non Trin. 1828 ; Hook. f. l.c. 7 : 26. 1896, *pro parte* ; Bor, l.c. 580. 1960, *pro parte*.

Tufted, erect or ascending, mostly perennial grass, 15 - 75 cm high. Leaves 3.5 - 10.0 × 0.25 - 1.0 cm, linear-lanceolate or ovate-lanceolate. Panicles 5 - 15 cm long, loose or compact. Pedicels with or without glandular bands. Spikelets c. 2.5 mm long, globose or obovoid. Glumes

glabrescent or hirsute. Upper lemma upto 2 mm long, ovate-elliptic, coriaceous, concave, mostly pubescent on back.

Fl. & Fr. : Almost throughout the year.

Occasional, found near moist and marshy habitats.

Selected specimens : Bhilwara : Bijolia, *Singh* 5705 (BSJO) ; Sirohi : Mt. Abu, *Duthie* Acc. No. 1068 (DD), *Rao* 66543 (BSI) ; Kota : Shahabad, *Majumdar* 10445 (BSA).

3. *Isachne miliacea* Roth ex Roem. & Schult. Syst. Veg. 2 : 476. 1817 ; Hook. f. Fl. Brit. India 7 : 25. 1896 ; Bor, Grass. Burm Ceyl. Ind. Pak. 582. 1960, *excl. specimen* *Duthie* 9961 ; Ved Prakash & Jain in Fl. India Fasc. 14 : 31. 1984. *I. dispar auct. non Trin.* 1828 ; Bor, *l.c.* 580. 1960, *pro parte*.

Erect or ascending, weak perennials, often rooting at lower nodes. Leaves ovate-lanceolate to lanceolate, obtuse, rough and striated above. Panicles 2-6 cm long ; pedicels and branches with or without glandular bands. Spikelets c. 2 mm long, obovoid. Upper lemma upto 1.5 mm long.

Fl. & Fr. : August - November.

Occasional, found in moist and shaded localities.

Selected specimens : Chittorgarh : Pratapgarh, *Majumdar* 12325 (BSA) ; Kota : Sitabari, *Wadhwa* 9313 (BSA) ; Udaipur : Kotra, *Rao* 66543 (BSA).

53. ISCHAEMUM L.

- | | |
|---|---|
| 1a. Margins of the lower glume of the sessile spikelets expanded below the middle. ... | 4. <i>I. indicum</i>
var. <i>indicum</i>
sub var. <i>villosum</i> |
| 1b. Margins of the lower glume of the sessile spikelets narrowly and evenly inturred from base to apex : | |
| 2a. Pedicel of the pedicelled spikelet more than one-third the length of the sessile spikelets : | |
| 3a. Perennial grass : | |
| 4a. Lower glumes of the sessile spikelets oblong-obtuse, perfectly smooth and glabrous. ... | 3. <i>I. imprestum</i> |
| 4b. Lower glumes of the sessile spikelets lanceolate or elliptic-lanceolate ; dorsal surface pilose, flat or depressed. ... | 7. <i>I. pilosum</i> |

3b. Annual grass :

5a. Lower glumes of the sessile spikelets with two tufts of hairs on the margins about the middle... 2. *I. diplopogon*

5b. Lower glume without such tufts of hairs :

6a. Lower glume more than 9 mm long, deeply bicuspidate. Upper glume with a tuft of hairs in the upper third, dorsally rounded, neither humped nor with a broad wing. ... 5. *I. kingti*

6b. Lower glume less than 7 mm long, muticous. Upper glume without a tuft of hairs on the back ; back rounded with a hump in the middle and an auricle-like wing above.... 3. *I. impressum*

2b. Pedicel of the pedicelled spikelet less than one-third of the length of the sessile spikelet :

7a. Leaves cordate to rounded at the base. Ridges very shallow. Dorsal surface of the lower glume often almost smooth and frequently densely covered with white hairs. ... 6. *I. molle*

7b. Leaves tapering at the base. Ridge deep. Lower glume glabrous on dorsal surface or pilose :

8a. Slender grass. Spikelets upto 6 mm long. ... 8. *I. rugosum*

8b. Robust grass. Spikelets 8 - 9 mm long. ... 1. *I. bombalense*

1. *Ischaemum bombalense* Bor in Journ. Bombay Nat. Hist. Soc. 49 : 166. 1950 & Grass. Burm. Ceyl. Ind. Pak. 178. 1960.

Annual grass, upto 30 cm high. Leaves upto 12.0 × 0.75 cm, linear-acuminate, covered on both surface with bulbous-based hairs ; petioles covered with dense white hairs ; ligules 2 - 3 mm long, scarious. Racemes in pairs ; joints of the rachis very stout, villous-ciliate and toothed at the upper articulation. Sessile spikelets. Lower glume c. 8 mm long, oblong-acute, keeled ; upper one c. 8 mm long, boat-shaped, strongly keeled, 3-nerved. Lower lemma c. 8 mm long, oblong-elliptic, acute ; upper one c. 6 mm long, with a geniculate awn. Stamens 3. Pedicellate spikelet : Pedicel c. 1.5 mm long, villous-ciliate on the outer margins.

Fl. & Fr. : August - December.

Rare, found in rocky habitats. So far this taxon was considered endemic to Maharashtra (Bor, *l.c.*). Closely allied to *I. rugosum* Salisb.

Selected specimens : Chittorgarb : Banji, Majumdar 12282, 12201

(BSA); Jhalawar : Lotia *ghil*, *Wadhwa* 5487 (BSA); *Verma* 1832-A, 1832-B (BSA).

2. *Ischaemum diplopogon* Hook. f. *Fl. Brit. India* 7 : 129. 1896 ; Blatt. & McC. *Bombay Grasses* 14, pl. 8. 1935 ; Bor, *Grass. Burm. Ceyl. Ind. Pak.* 178. 1960.

Annual grass, upto 50 cm high. Leaves 7 - 15 × 0.5 - 1.5 cm, linear-lanceolate, acuminate ; ligule a glabrous membrane. Racemes usually 2, each 2 - 4 cm long, compressed, spatulate ; pedicels about half the length of spikelets. Sessile spikelets c. 6 mm long. Lower glume c. 5 mm long, oblong, bicuspidate. Upper one c. 5 mm long, ovate, 2-fid, 3-nerved, awned. Pedicellate spikelets often imperfect, not awned.

Fl. & Fr. : August - October.

Sporadically found in rocky habitats.

Selected specimens : Jaipur : Ramgarh, *Sharma* 160 (RUBL) ; Sirohi : Mt. Abu, *Sharma* 1104, 3352 (RUBL).

3. *Ischaemum impressum* Hack. in DC. *Monogr. Phan.* 6 : 210. 1889 ; Hook. f. *Fl. Brit. India* 7 : 132. 1896 ; Bor, *Grass. Burm. Ceyl. Ind. Pak.* 180. 1960.

Small, prostrate annuals or perennials, 10 - 20 cm high. Leaves 3.5 - 7.5 × 0.8 - 1.75 cm, ovate or oblong-lanceolate, cordate, petioled, margins crenulate ; ligule oblong. Spikes 2, yellowish ; joints and pedicels stout, clavate, ciliate with rigid hairs forked at the top. Sessile spikelets 6 - 8 mm long, shining ; callus bearded. Lower glume with shallow subsemilunar pits in the lower two-thirds, above it winged and bicuspidate, wings erose ; upper one with a median gibbosity and an auricle-like wing above it. Lower lemma hyaline, 3-nerved, ciliate ; upper one shorter, cleft to above the middle, awned. Pedicellate spikelets smaller than the sessile.

Fl. & Fr. : August - November.

Rare, in rocky habitats on the hills. Included on the authority of Raizada (1954) and Kanodia & Rao (1966) from Sirohi. It was considered apparently endemic to the W. Ghats.

4. *Ischaemum indicum* (Houtt.) Merrill var. *indicum* subvar. *villosum* (Nees) Bor, *Grass. Burm. Ceyl. Ind. Pak.* 180. 1960. *Spodiopogon villosus* Nees in Hook. et Arn. *Bot. Beech. Voy.* 242. 1838. *Ischaemum ciliare* Retz. var. *villosum* (Nees) Hack. in DC *Monogr. Phan.* 6 : 227. 1889.

Tufted, erect or decumbent grass, 30 - 70 cm high, often rooting at the lower nodes. Leaves 5 - 15 × 0.35 - 1.25 cm, linear-lanceolate, acumi-

nate, margins scabrid; sheath with erect hairs; ligule membranous, ciliate, obtuse. Racemes 2, each upto 5 cm long; rachis fragile. Sessile spikelets c. 4.5 mm long; callus very short, bearded. Lower glume bicuspidate, smooth or pitted, winged; upper glume narrowly winged towards the top. Lower lemma acuminate; upper lemma cleft to the middle. Pedicellate spikelets with awned upper lemma.

Fl. & Fr. : August - November.

Rare, found in moist situations.

Selected specimen : Chittorgarh : Pratapgarh, *Majumdar* 10029 (BSA).

5. *Ischaemum kingii* Hook. f. *Fl. Brit. India* 7 : 129. 1896; Bor, *Grass. Burm. Ceyl. Ind. Pak.* 182. 1960.

Annual grass, upto 30 cm high. Leaves 3.5 - 5.0 × 0.15 - 1.25 cm, ovate-lanceolate, acuminate, base rounded or subcordate, margins scaberrulous; sheath open, glabrous; ligule a short membrane. Racemes 2, with shining joints. Sessile spikelets with a short, rounded, bearded callus. Lower glume long bicuspidate and without tufts of hairs on the margins above the middle; upper glume dorsally rounded with a broad pencil of stiff hairs on the upper one-third, awned. Lower lemma 1-nerved; upper one shorter than lower, 3-nerved, awned. Pedicellate spikelets much smaller, awned.

Fl. & Fr. : August - October.

Rare, in moist habitats. Endemic to Rajasthan.

Selected specimens : Sirohi : Mt. Abu, *Rao* 66542, *Jain* 48160, 46589 (BSI).

6. *Ischaemum molle* Hook. f. *Fl. Brit. India* 7 : 128. 1896; Bor, *Grass. Burm. Ceyl. Ind. Pak.* 183. 1960; *Raizada et al.* in *Ind. For. Rec. (n.s.) Bot.* 4 : 201. 1961.

Tufted, erect or geniculately ascending perennials, 50 - 100 cm high. Leaves 10 - 20 × 0.5 - 1.25 cm, linear-lanceolate, acute, sparsely hairy on both the sides. Sheaths ribbed, glabrous or sparsely hairy. Racemes 2, silky-villous, each 7 - 12 cm long; joints and pedicels clavate, ciliate. Sessile spikelets c. 5.5 mm long; callus short, bearded. Lower glume coriaceous and nodular on the margins below, densely ciliate, 2-keeled along its length. Upper lemma with a long awn. Pedicellate spikelets almost equal to the size of sessile ones, awnless.

Fl. & Fr. : March - September.

Occasional, found near swampy areas. Closely allied to *I. rugosum* Salisb.

Selected specimens : Chittorgarh : Pratapgarh, *Majumdar* 10216, 10156 (BSA) ; Jhalawar : *Verma* 1832, 1832-A (BSA) ; Kota : *Wadhwa* 9276 (BSA) ; Jogpura plantation, *Raizada* 2/55 (DD).

7. *Ischaemum pilosum* (Klein ex Willd.) Wight in Madras Lit. Sci. J. 138. 1835 ; Hook. f. Fl. Brit. India 7 : 130. 1896 ; Blatt. & McC. Bombay Grasses 14. t. 9. 1935 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 183. 1960. *Andropogon pilosum* Klein ex Willd. Sp. Pl. 4 : 920. 1806.

Tufted, erect or geniculately ascending, rhizomatous perennials. Leaves 10 - 25 × 0.5 - 0.75 cm, linear, acuminate, glabrous ; sheaths glabrous ; ligule membranous. Racemes 2 - 6, fasciated, each upto 10 cm long, pilose. Sessile spikelets 5 - 6 mm long, narrowly lanceolate ; callus bearded with long hairs. Lower glume chartaceous, dorsally hairy, with incurved margins ; upper one slightly longer, acuminate, 5-nerved. Lower lemma obtuse, ciliate ; upper one cleft. Pedicellate spikelets 4 - 5 mm long, with shorter awns.

Fl. & Fr. : August - November.

Weed in cultivated and fallow fields and neglected corners of gardens, particularly in the southeastern parts of the state.

Selected specimens : Chittorgarh : Pratapgarh, *Majumdar* 12216 (BSA) ; Jhalawar : Bijliya-Bhadak, *Wadhwa* 7585 ; Dug, *Verma* 3506 (BSA) ; Kota : Baran, *Majumdar* 10805 (BSA.)

8. *Ischaemum rugosum* Salisb. Icon. Strip. Rar. 1. t. 1. 1791 ; Hook. f. Fl. Brit. India 7 : 127. 1896 ; Blatt. & McC. Bombay Grasses 12. pl. 7. 1935 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 184. 1960 ; *Raizada et al.* in Ind. For. Rec. (n.s.) Bot. 4 : 200. 1961.

Erect or ascending annuals, 20 - 60 cm high. Leaves 7 - 25 × 0.25 - 1.25 cm, linear-lanceolate, acuminate, with scabrid margins ; ligule truncate. Racemes mostly 2, erect, each upto 10 cm long ; joints and pedicels clavate, ciliate. Sessile spikelets upto 6 mm long, oblong-ovate. Lower glume coriaceous and transversely ridged below, membranous above, 2-keeled ; upper one oblong-lanceolate, acuminate, keeled, with a narrow ciliolate wing. Upper lemma with a long awn ; lower one hyaline. Pedicellate spikelets variable, slightly shorter than the sessile.

Fl. & Fr. : September - December.

Commonly found near moist-marshy habitats. Often used as a fodder grass.

Selected specimens : Ajmer : *Lourie* 27 (DD); Banswara : *Majumdar* 10289 (BSA) ; Bhilwara : Hamirgarh, *Singh* 6009 (BSJO) ; Chittorgarh : Pratapgarh, *Majumdar* 12205 (BSA) ; Jaipur : Ramgarh, *Sharma* 876 (RUBL) ; Jhalawar : Shyamgarh, *Majumdar* 10091-B (BSA).

54. ISEILEMA Anders.

- 1a. Pedicels of involucrel spikelets as broad as long, sides and base densely bearded. Lower glume of the hermaphrodite spikelet dorsally appressedly hairy at the base and ciliate on margins. Upper pedicels c. 4 mm long. ... 1. *I. anthephoroides*
- 1b. Pedicels of involucrel spikelets longer than broad, glabrous. Lower glume of the hermaphrodite spikelet glabrous at the base, appressed-hairy above and eciliate on the margins below. Upper pedicel c. 2 mm long :
- 2a. Spathe and upper floral leaf tubercled on the keel. ... 3. *I. prostratum*
- 2b. Spathe and upper floral leaf not tubercled on the keel. ... 2. *I. laxum*

1. *Iseilema anthephoroides* Hack. in DC. Monogr. Phan. 6 : 683, 1889 ; Hook. f. Fl. Brit. India 7 : 219, 1896 ; Blatt. & McC. Bombay Grasses 112. pl. 72, 1935 ; Bor, Grass. Burm. Ceyl. Ind Pak. 187, 1960 ; Raizada *et al.* in Ind. For. Rec. (n.s.) Bot. 4 : 256, 1961.

Tufted annual grass, upto 75 cm high, with glabrous nodes. Leaves c. 12.0 × 0.5 cm, ciliate at the base, with tubercle-based hairs ; ligule of short, fine hairs. Panicles long interrupted by spatheoles. Involucrel spikelets c. 4 mm long, broadly oblong, pedicellate. Lower glume with narrowly inflexed margins, strongly 2-nerved ; upper one oblong, obtuse, 1-nerved. Lemmas absent. Sessile spikelets c. 5 mm long, beaked. Lower glume bicuspidate, 4-nerved, hispid hairy on the lower broader part ; upper one narrowly lanceolate, with prominent ciliate keel. Lower lemma 2-nerved. Pedicelled spikelets represented by long, capillary pedicels, c. 2.5 mm long, bearing reduced glumes.

Fl. & Fr. : August - November.

Occasional, found in rocky habitats, particularly in south and south-eastern parts of the state.

Selected specimens ; Banswara : *Raizada* 3/55 (DD) ; Chittorgarh : *Majumdar* 10169 (BSA) ; Kota : *Majumdar* 10813 (BSA).

2. *Iseilema laxum* Hack. in DC. Monogr. Phan. 6 : 682, 1889 ; Hook. f. Fl. Brit. India 7 : 218, 1896 ; Bor, Grass. Burm. Ceyl. Ind.

Pak. 188. 1960 ; Raizada *et al.* in Ind. For. Rec. (n.s.) Bot. 4 : 256. 1961 ; Mahesh., Ill. Fl. Delhi f. 229. 1966.

Tufted, erect, 20-80 cm tall, perennial grass. Leaves upto 15.0×0.35 cm, linear, with scabrid margins ; sheaths lax, quite glabrous ; ligule membranous, ciliate. Panicles of distant, axillary, pedunculate fascicles. Spathes and upper floral leaves glabrous or with few hairs near the margins. Involucral spikelets c. 4 mm long, truly whorled, pedicellate, oblong-lanceolate, acute. Lower glume oblong-lanceolate, acuminate, 3-nerved ; upper one 3 to 5-nerved, acute. Lower lemma linear. Pedicellate spikelets lanceolate, glabrous. Hermaphrodite spikelets c. 5 mm long, narrowly lanceolate. Lower glume chartaceous, faintly 3 to 5-nerved ; upper one 1-nerved, acuminate. Upper lemma with a long geniculate awn.

Fl. & Fr. : August December.

Commonly found in protected forests, open grasslands and in fallow fields.

Selected specimens : Banswara : Mahi river near Pipalkhunt, Singh 2915 (BSJO) ; Chittorgarh : Verma 1612 (BSA) ; Panchdevla Singh & Pandey 6951 (BSJO) ; Jaipur : Dixit Acc. No. 1175 (RUBL) ; Kota : Majumdar 10900 (BSA) ; Sawai Madhopur : Verma 1934 (BSA).

3. *Iseilema prostratum* (L.) Anders. in Nova Act. R. Soc. Sci. Upsal. (ser. 3) 2 : 251. 1856 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 188. 1960 ; Raizada *et al.* in Ind. For. Rec. (n.s.) Bot. 4 : 257. 1961. *Andropogon prostratus* L. Mant. Alt. 304. 1771. *Anthistiria wightii* Nees ex Steud. Syn. Pl. Glum. 1 : 400. 1855. *Iseilema wightii* (Nees ex Steud.) Anders. l.c. 2 : 251. 1856 ; Hook. f. Fl. Brit. India 7 : 218. 1896 ; Blatt. & McC. Bombay Grasses 113. pl. 73. 1935.

Tufted, prostrate or straggling, reddish perennials. Leaves $5 - 15 \times 0.25 - 0.45$ cm, linear-lanceolate, acuminate to acute, scabridly ciliate ; sheaths bearded at the nodes ; ligule truncate, membranous, ciliate. False panicle or racemes of distant, axillary, pedunculate fascicles ; spathes $0.75 - 1.25$ cm long, tuberculate. Involucral spikelets male or neuter, c. 3 mm long, with bearded pedicel at the base, lanceolate-oblong, green with purplish tinge. Lower glume strongly ribbed ; upper one glabrous, 1-nerved. Upper lemma male, mostly equal to glumes. Pedicellate spikelets male or neuter. Sessile spikelets hermaphrodite, upto 3 mm long, lanceolate, glabrous, with a long, stout awn.

Fl. & Fr. : August November.

Mostly found near shady and moist places.

Selected specimens : Ajmer : *Lourie* 200/97 (DD) ; Barswara : *Raizada* 4/55 (DD) ; Jaipur : Baragaon, *Sharma* 1893 (RUBL) ; Jhalawar : Kokanda, *Wadhwa* 5402 (BSA) ; Jodhpur : Tolesar, *Singh* 4355 (BSJO) ; Pali : Gundoj, *Shetty* 1978 (BSJO).

55. KOELERIA Pers.

Koeleria macrantha (Ledeb.) Schult. Mant. 2 : 345. 1924. *Aira cristata* L. Sp. Pl. 63. 1753, *pro parte*, non *Koeleria cristata* Pers. 1805. *A. macrantha* Ledeb. in Mem. Acad. Sci. Petersb. 5 : 515. 1812. *Koeleria gracilis* Pers. Syn. Pl. 1 : 97. 1805, *nom. superfl.* based on *Poa nitida* Lam. *K. cristata auct.* (L.) non Pers. 1805 ; Hook. f. Fl. Brit. India 7 : 308. 1896 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 444. 1960.

Tufted, erect or ascending perennials, with creeping rhizomes. Leaves 5 - 15 × 0.15 - 0.25 cm, linear, acute, glabrescent ; ligule c. 1 mm long. Panicles upto 10 cm long, oblong, often lobed at the base, shining silvery-white. Spikelets 2 to 3-flowered, upto 5.5 mm long. Glumes shortly aristulate, lower one slightly shorter than upper one, 3-nerved. Lemmas 3 - 5 mm long, oblong-elliptic, 3-nerved, glabrous, acuminate.

Fl. & Fr. : March - August.

Common weed in irrigated cultivated fields. It is a denizen of N.W. Himalaya and has, perhaps, been introduced in this state with canal water.

Selected specimens : Ganganagar: *Sharma* Acc. No. 10487 (RUBL) ; Jaipur : Durgapura, *Sharma* 6646 (RUBL) ; Sanganar, *R. Singh* Acc. No. 11347 (RUBL).

56. LASIURUS Boiss.

Lasiurus scindicus Henr. in Blumea 4 : 514. 1941 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 189. 1960. *Sacchar. m hirsutum* Forsk. Fl. Aegypt.-Arab. 16. 1775, non *Rottboellia hirsuta* Vahl 1790, nec. *Lasiurus hirsutus* (Vahl) Boiss. 1859. *L. ecaudatus* Satyan. & Shankar. in Journ. Bombay Nat. Hist. Soc. 60 : 763. pl. 1. 1963. 'Shevan Ghass' (Hindi).

Densely tufted perennials, with woody rhizomatous root-stock, covered with silky cataphylls. Leaves upto 15.0 × 0.5 cm, linear, finely acuminate, convolute or flat, glaucous ; ligule a fringe of hairs. Racemes upto 10 cm long, solitary, erect, densely villous. Sessile spikelets 6 - 12 mm long. Lower glume c. 1 cm long, coriaceous, 7 to 9-nerved, 2-toothed at the apex, acuminate, densely silky villous ; upper one c. 6 mm long,

ovate, acuminate, 3 to 5-nerved. Lemma hyaline, 3-nerved. Pedicellate spikelets similar to sessile one, slightly shorter, male or neuter.

Fl. & Fr. : Almost throughout the year.

Abundant in sandy habitats in western Rajasthan, forming extensive pasture land. It is a very good fodder grass.

Selected specimens : Barmer : Kavar, Shetty 2295 (BSJO) ; Bikaner : Bhikampur, Roy 2003 (BSJO) ; Churu : Sardar Shahr, Roy 2596 (BSJO) ; Ganganagar : Bisarasar, Roy 6403 (BSJO) ; Jaisalmer : Phalari, Pandey 7827 (BSJO).

57. LEPTOCHLOA P. Beauv.

Leptochloa panicea (Retz.) Ohwi in Bot. Mag. Tokyo 55 : 311. 1941 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 517. 1960 ; Mahesh. Illus. Fl. Delhi f. 269. 1966. *Poa panicea* Retz. Obs. Bot. 3 : 11. 1783. *Leptochloa filiformis sensu* Hook. f. Fl. Brit. India 7 : 298. 1896, non P. Beauv. 1812.

Tufted, geniculately ascending annuals, 50 - 80 cm high. Leaves upto 20.0 × 0.75 cm, linear, long attenuated. Panicles upto 25 cm long, diffuse. Spikelets 2 to 3(-5)-flowered, c. 2 mm long, overlapping. Lower glume upto 1.5 mm long, lanceolate, acute ; upper one slightly longer, oblong, mucronate or obtuse. Lemmas minutely hairy on the back, 2-lobed. Caryopsis c. 0.5 mm long, broadly elliptic, 3-gonous.

Fl. & Fr. : August - October.

Rare, weed in moist paddy fields in S.E. Rajasthan.

Selected specimen : Bundi : Shar-Bagh, Singh 74682 (LWG).

58. LEPTOTHRIUM Kunth

Leptothrium senegalense (Kunth) W D. Clayton in Kew Bull. 27 : 151. 1972. *Latipes senegalensis* Kunth, Rev. Gram. 1 : 261. t. 42. 1830 ; Hook. f. Fl. Brit. India 7 : 97. 1896 ; Blatt. & McC. Bombay Grasses 218. pl. 145. 1935 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 682. 1960.

Short-lived annuals, with few, leafy, ascending branches. Leaves 2 - 8 × 0.1 - 0.35 cm, subulate, convolute, eligulate. Racemes upto 15 cm long, bright green ; peduncle cuneate, flattened, ciliate with hooked hairs on the margins. Spikelets in pairs. First spikelet perfect, 5 - 8 mm long. Lower glume with pectinate margins ; upper one tuberculate on the back. Second spikelet upto 4 mm long, sterile or perfect. Both glumes tuberculate spinulose. Caryopsis. c. 1.5 mm long, obliquely ovoid-lanceolate, free.

Fl. & Fr. : August - October.

Common in sandy habitats in W. Rajasthan ; often met with as a weed in cultivated fields.

Selected specimens : Barmer : Khurja, *Shetty* 2284 (BSJO) ; Bikaner ; Kolyat, *Roy* 2041 (BSJO) ; Jaisalmer : Saton, *Pandey* 7890 (BSJO) ; Jodhpur : Sergarh, *Singh* 3127 (BSJO).

59. LOLIUM L.

Lolium temulentum L. Sp. Pl. 83. 1753 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 546. 1960.

Tufted, erect or geniculately ascending annual grass, upto 1 m high. Leaves 5 - 20 × 0.25 - 1.25 cm, broadly linear-lanceolate, with spreading auricles at the base. Spikes upto 35 cm long, erect, rigid. Spikelets 0.75 - 2.75 cm long, 5 to 10-flowered. Upper glume 0.75 - 3.0 cm long, reaching nearly to or exceeding the uppermost lemma, many-nerved. Lemma 6 - 8 mm long, very turgid, rounded on the back, awned ; awn upto 2 cm long.

Fl. & Fr. : March - July.

Native of Mediterranean region and south-west Asia ; occasionally found as a weed in cultivated fields.

Selected specimen : Jaipur : Sanganer, *Sharma* 3002 (RUBL). Also reported from Ganganagar (Dhillon & Bajwa, 1969).

60. MELANOCENCHRIS Nees

Ligule of short hairs, upto 1 mm long. Clusters of spikelets, including the awns, upto 8 mm long. ... 2. *M. jacquemontii*

Ligule of long hairs, more than 1.5 mm long. Clusters of spikelets, including awns, more than 10 mm long. ... 1. *M. abyssinica*

1. *Melanocenchris abyssinica* (R.Br. ex Fresen.) Hochst. in Flora 38 : 274. 1855 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 473. 1960 ; Nair & Nayar in Bull. Bot. Surv. India 16 : 142. f. 2. 1977. *Eutriana abyssinica* R. Br. ex Fresen. in Mus. Sencken. 2 : 142. 1837. *Gracilea royleana* Hook. f. var. *plumosa* Hook. f. Fl. Brit. India 7 : 284. 1896.

Tufted, erect or geniculately ascending annuals, upto 25 cm high. Leaves upto 5.5 × 0.15 cm, filiform. margins convolute, scabridulous ; sheaths covered with scattered, whitish tubercle-based hairs ; ligule a

thick row of short white hairs. Spikes upto 5 cm long. Spikelets 1.0 - 1.5 cm long including the awns, many flowered, with purplish tinge. Glumes villous at the base. Lemma 3-nerved, aristate, 3-lobed. Caryopsis c. 1 mm long ; hilum punctiform.

Fl. & Fr. : August - October.

Commonly found in open rocky habitats.

Selected specimens : Jaisalmer : Near Miajlar, *Shetty* 3396 (BSJO) ; Jodhpur : Kui, *Singh* 3168 (BSJO) ; Tonk : Sohela and Bani plantation, *Raizada* 655 (DD).

2. *Melanocenchris jacquemontii* Jaub. & Spach. Ill. Pl. Or. 4 : 36. t. 325. 1851 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 473. 1960 ; Nair & Nayar in Bull. Bot. Surv. India 16 : 142. f. 1 A-F. 1977. *M. royleana* Nees ex Steud. Syn. Pl. Glum. 1 : 218. 1854. *Gracilea royleana* (Nees ex Steud.) Hook. f. Fl. Brit. India 7 : 284 1896.

Tufted, slender annuals, upto 20 cm high. Leaves 1 - 6 × 0.05 - 0.25 cm, filiform, convolute, acute, base with whitish, tubercle-based hairs ; sheaths covered with scattered, long, tubercle-based hairs ; ligule a hairy ridge. Spikes upto 6(-10) cm long, with triquetrous, smooth, flexuous rachis. Clusters of spikelets including the awns upto 8 cm long, green with purplish tinge, 2-flowered. Glumes persistent, elongate-subulate, awn antrorsely barbellate. Lower lemma 3-lobed at the apex, awned. Stamens 3. Stigmas plumose. Caryopsis upto 2.5 mm long, oblong-elliptic, brownish.

Fl. & Fr. : August - November.

Common in open gravelly and rocky habitats, particularly on isolated hills.

Selected specimens : Banswara : Wadita, *Singh* 2877 (BSJO) ; Bikaner : Mud, *Roy* 2047 (BSJO) ; Jaipur : Moti Dungri, *Sharma* 1575 (RUBL) ; Jhalawar : Aklera, *Wadhwa* 7653 (BSA) ; Pali : Guru Pratap Singh hills, *Shetty* 1384 (BSJO) ; Sirohi : Mt. Abu, *Blatter* 2683 (BLAT).

61. *MISCANTHUS* Anders.

Miscanthus nepalensis (Trin.) Hack. in DC. Monogr. Phan. 6 : 104. 1889 ; Hook. f. Fl. Brit. India 7 : 107. 1896 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 196. 1960. *Eulalia nepalensis* Trin. in Mem. Acad. Sci. Petersb. ser. 6. 2 : 333. 1832.

Tufted perennials, with very short rhizomes, upto 1.25 m high. Leaves 20 - 40 × 0.5 - 1.0 cm, flat, linear-lanceolate, acute. Panicles upto

15 cm long, spreading. Spikelets c. 2 mm long ; callus 3 - 4 times as long as the spikelets, with golden brown hairs. Lower glume brownish, emarginate, hairy. Upper lemma bidentate, with a 1.5 cm long awn. Caryopsis oblong-lanceolate.

Fl. & Fr. : December - March.

Rare, found on the top of hills in moist and shaded places.

Selected specimen : Sirohi : Mt. Abu, Sharma 3614 (RUBL).

62. MNESITHEA Kunth

Mnesithea laevis (Retz.) Kunth, Rev. Gram. 1 : 154. 1829 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 197. 1960. *Rottboellia laevis* Retz. Obs. Bot. 3 : 11. 1783. *R. perforata* Roxb. Pl. Corom. 2 : 43. t. 182. 1798 ; Hook. f. Fl. Brit. India 7 : 158. 1896.

Tufted, rhizomatous perennials, 25 - 100 cm high. Leaves upto 20.0×0.5 cm, linear ; sheaths ciliate at the apex. Racemes upto 15 cm long, terminal and axillary. Sessile spikelets 3 - 4 mm long. Lower glume narrowly oblong-elliptic, smooth, wingless. Pedicellate spikelets wanting.

Fl. & Fr. : August - November.

Rare, in wastelands among grasses.

Selected specimen : Jhalawar : Wadhwa 7510 (BSA).

63. OCHTHOCHLOA Edgew.

Ochthochloa compressa (Forsk.) Hilu in Kew Bull. 36 : 560. 1981. *Panicum compressum* Forsk. Fl. Aegypt. Arab. 18. 1775. *Eleusine flagellifera* Nees in Linnaea 16 : 220. 1842 ; Hook. f. Fl. Brit. India 7 : 294. 1896 ; Blatt. & McC. Bombay Grasses 261. pl. 175. 1935. *E. compressa* (Forsk.) Asch. & Schweinf. ex C. Christ. in Dansk. Bot. Arch. 4 (3) : 12. 1922 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 492. 1960.

Prostrate or geniculately ascending, stoloniferous perennials ; nodes leafy and rooting at lower nodes. Leaves 1 - 5×0.1 - 0.35 cm, linear-lanceolate, acuminate, glaucous ; ligule a hairy line. Spikes 3 - 6, digitate, each 1 - 4 cm long. Spikelets 3 - 8 mm long, subsessile, imbricate, 4 to 8-flowered. Lower glume 2.75 - 3.25 mm long ; upper one 3.5 - 4.5 mm long, lanceolate, aristate. Lemmas c. 5 mm long, lanceolate, apiculate.

Fl. & Fr. : September - March.

Commonly found in open gravelly plains. It is used as a fodder grass.

Selected specimens : Ajmer : *Lourie* 4952 (DD) ; Barmer : *Shco, Tiwari* 933 (BSJO) ; Bikaner : *Diatra, Roy* 1721 (BSJO) ; Jaipur : *Naraina, Sharma* 2297 (RUBL) ; Jaisalmer : *Nachna, Shetty* 6175 (BSJO) ; Pali : *Sardar Samand, Shetty* 1642 (BSJO).

64. OPHIUROS Gaertn. f.

Ophiuros exaltatus (L.) O. Kuntze, Rev. Gen. Pl. 2 : 780. 1891 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 199. 1960. *Aegilops exaltata* L. Mant. 2 : 575. 1771. *Ophiuros corymbosus* Gaertn. f. Fruct. 3 : 4. t. 181. f. 3a. 1805 ; Hook. f. Fl. Brit. India 7 : 160. 1896, *pro parte* ; Blatt. & McC. Bombay Grasses 40. pl. 28. 1935.

Erect, rhizomatous perennials. 50 - 100 cm high. Leaves 20 - 45 × 0.5 - 2.5 cm, flat, linear-lanceolate, acuminate, base rounded, margins with tubercles ; sheaths terete, smooth ; ligule very short. Spikes upto 12 cm long, very slender, terminal, corymbosely fasciated on filiform peduncles. Spikelets c. 2.25 mm long, glabrous, almost equalling the joints. Glumes equal, lower one with many longitudinal lines of small pits, rounded at the top. Lemma 2-nerved, hyaline. Stamens 3. Caryopsis slightly compressed.

Fl. & Fr. : November - February.

Commonly found near moist sandy situations.

Selected specimens : Banswara : *Raizada* 2/55 (DD) ; Chittorgarh : *Mujumdar* 12225 (BSA) ; Jhalawar : *Aklara, Wadhwa* 3591 (BSA) ; Kota : *Verma* 454 (BSA). Also reported from Pali (*Gupta & Sharma*, 1971).

65. OPLISMENUS P. Beauv. *nom. cons.*

Each raceme upto 2 cm long, dense. Rachis and pedicels with long hairs. Awns pale, barbellate. ... 1. *O. burmannii*

Each raceme 3.5 - 10.0 cm long, lax. Rachis and pedicels with short hairs. Awns reddish, smooth, viscid. ... 2. *O. compositus*

1. *Oplismenus burmannii* (Retz.) P. Beauv. Ess. Agrost. 54, 168, 169. 1812 ; Hook. f. Fl. Brit. India 7 : 68. 1896 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 317. 1960 ; *Raizada & Jain* in Ind. For. Rec. (n.s.) Bot. 5 : 181. pl. 4. f. 2. 1965. *Panicum burmannii* Retz. Obs. Bot. 3 : 10. 1783.

Prostrate or trailing annuals, upto 50 cm high ; leaves c. 2.5×1.5 cm, ovate or ovate-lanceolate, acuminate, sparsely pilose ; sheaths glabrous or pubescent ; ligule a ciliate rim. Panicles upto 6 cm long, terminal ; rachis slender, angular, covered with long, slender, white hairs. Spikelets c. 2.5 mm long, secund, lanceolate, pedicellate, pubescent. Lower glume c. 1.5 mm long, ovate, hyaline, silky-hairy, awned ; upper one similar to lower. Lower lemma with a transverse band of hairs across the middle, 7 to 9-nerved ; upper lemma acute.

Fl. & Fr. : July - December.

Common in moist and shaded localities.

Selected specimens : Alwar : Pandupole, *Sharma* Acc. No. 5237 (RUBL) ; Banswara : Ghatol, *Kanadia* 75495 (BSI) ; Jhalawar : Ghatoli forest, *Wadhwa* 7551 (BSA) ; Sawaimadhapur : Ranthambhore, *Sharma* 3106 (RUBL) ; Sirohi : Mt. Abu, *Jain* 60124 (BSI) ; Udaipur : Kodra, *Rao* 66540 (BSA).

2. *Oplismenus compositus* (L.) P. Beauv. Ess. Agrost. 54, 168, 169. 1812 ; Hook. f. Fl. Brit. India 7 : 66. 1896 ; Blatt. & McC. Bombay Grasses 152. pl. 96. 1935 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 317. 1960 ; Raizada & Jain in Ind. For. Rep. (n.s.) Bot. 5 : 180. 1965. *Panicum compositum* L. Sp. Pl. 57. 1753.

Annual or perennials, upto 1.25 m high, with decumbent culms rooting at the base. Leaves upto 12.5×1.0 cm, linear-lanceolate to narrowly ovate, hairy beneath ; ligule truncate, ciliate. Panicles upto 20 cm long ; rachis glabrous or pilose. Spikelets 3.5 - 5.0 mm long, 2 - 3-nate, lanceolate-oblong, often tinged with purple, glabrous or pubescent. Lower glume c. 2.5 mm long, 5-nerved ; upper one 9-nerved, awned. Lower lemma 3.5 - 4.25 mm long, membranous. Caryopsis dorsally compressed.

Fl. & Fr. : September - December.

Rare, found in wet and shady habitats, often gregarious.

Selected specimens : Banswara : Punapathar, *Singh* 3662 (BSJO) ; Sirohi : Mt. Abu, *Jain* 45189 (BSI), *Puri* 56616 (BSI).

66. OROPETIUM Trin.

- 1a. Leaves pubescent. Spikes upto 1.5 cm long. ... 3. *O. villosulum*
 1b. Leaves glabrous except at margins. Spikes more than 2.5 cm long :

- 2a. Perennials. Spikes solitary. Spikelets 4 to 5-flowered, c. 3 mm long. Lower lemma dorsally hairy at the base. ... 1. *O. roxburghianus*
- 2b. Annuals. Spikes 1 - 3. Spikelets 1-flowered, less than 2.25 mm long. Lower lemma scabrid on the keel. ... 2. *O. thomaeum*

1. ***Oropetium roxburghianus*** (Steud.) Phillips in Kew Bull. 30 : 469. 1975. *Lepturus roxburghianus* Steud. Syn. Pl. Glum. 1 : 357. 1854 ; Hook. f. Fl. Brit. India 7 : 365. 1896. *Tripogon roxburghianus* (Steud.) Bhide in Journ. Proc. Asiat. Soc. Bengal n.s. 7. 1911 : 515. 1912 ; Bor. Grass. Burm. Ceyl. Ind. Pak. 524. 1960.

Densely tufted, erect perennials, 7 - 20 cm high. Leaves filiform, upto 2.5 cm long, with long hairs on the margins and at the ligule ; ligule an oblong, lacerated membrane. Spikes 4 - 6 cm long, solitary. Spikelets c. 3 mm long, 1 to 2-flowered, with jointed rachilla. Lower glume hyaline, slightly lobed on one side, 1-nerved, upper one 3-nerved, double the size of lower glume. Lower lemma membranous, 3-nerved, 2-toothed.

Fl. & Fr. : August - November.

Rare, found in moist and shaded habitats, particularly on the hills.

Selected specimens : Ajmer : *Lourie* 200/183 (DD) ; Jaipur : Ramgarh, *Sharma* 2038 (RUBL) ; Jodhpur : *Puri* 21824, 21887 (BSI) ; Udaipur : *Titardi, Agrawal* 524 (DD).

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 ; Jain, in Bull. Bot. Surv. India 9 : 284. f. 1. 1968. *Nardus thomaea* L. f. Suppl. Pl. 105. 1781.

Tiny, tufted grass, 5 - 10 cm high, with fibrous, capillary roots. Leaves upto 3.5 × 0.25 cm, filiform, rolled. Spikes 1 - 3, each upto 4.5 cm long, straight or curved. Spikelets 1-flowered, deeply embedded in the distichous cavities of the rachis. Upper glume c. 2 mm long, 3-nerved, acute. Lemmas ovate, truncate or 3-toothed. Caryopsis c. 0.75 mm long, obovate or oblong, shining, brownish.

Fl. & Fr. : August - October.

Ephemeral, monsoon grass commonly found in rocky and gravelly habitats on the isolated hillocks.

Selected specimens : Alwar : *Bandipur, Parmar* 9648 (BSJO) ; Banskara : *Wadita, Singh* 2873 (BSJO) ; Jaipur : University R.F., *Sharma* Acc. No. 4917 (RUBL) ; Jaisalmer : near Sam, *Shetty* 3441 (BSJO) ; Jhalawar : *Wadhwa* 7410-A (BSA) ; Pali : Barr, *Shetty* 1809 (BSJO).

3. **Oropetium villosulum** Stapf ex Bor in Kew Bull. 1949 : 571. 1950 & Grass. Burm. Ceyl. Ind. Pak. 474. 1960.

Caespitose, tufted, tiny grass, 4-6 cm high. Leaves filiform, seldom exceeding the culms, hairy. Spikes 1 to 3-together. Spikelets half embedded in the alternating cavities of the rachis. Lemma 1-nerved, fertile, hirsute. Caryopsis oblong, terete, free.

Fl. & Fr. : August-October.

Rare, found in open dry rocky habitats particularly in south-eastern parts of the state.

Selected specimen : Kota : Darah, Singh 83617 (LWG).

67. ORYZA L.

Oryza rufipogon Griff. Notul. 3 : 5. 1851 & Icon. Pl. As. 3 : t. 144. f. 2. 1851 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 605. 1960. *O. nivara* Sharma & Shastri in Ind. Journ. Gen. & Pl. Breed. 25 : 161. 1965.

Tufted, marshy or aquatic perennials or annuals, upto 1 m high. Leaves upto 30.0 × 0.75 cm ; ligule 7-12 mm long, membranous, finally splitting. Panicles effuse. Spikelets c. 1 cm long, deciduous. Sterile lemma 1-nerved, keeled. Fertile lemma with a conical callus, coriaceous, sparsely hispid, apex glandular and terminating into about 6 cm long, scabrid awn with jointed base.

Fl. & Fr. : September-December.

Occasional, found near marshy habitats.

Selected specimens : Banswara : Sagwara, Kanodia 82167 (BSI) ; Bhilwara : Khari dam, Singh 6514 (BSJO) ; Kota : Shahabad, Majumdar 13158 (BSA) ; Tonk : Saroi village, Shetty 1224 (BSJO).

68. PANICUM L.

- | | | |
|---|-----|------------------------|
| 1a. Upper lemma finely transversely rugose. | ... | 4. <i>P. maximum</i> |
| 1b. Upper lemma quite smooth and shining : | | |
| 2a. Spikelets more than 4 mm long : | | |
| 3a. Leaves cordate at the base. Leaf-sheath hairy.
Spikelets persistent. | ... | 5. <i>P. miliaceum</i> |
| 3b. Leaves narrowed or rounded at the base. Leaf-sheath glabrous. Spikelets deciduous : | | |

- 4a. Perennial grass, with woody root-stock.
Spikelets very turgid, acuminate. ... 13. *P. turgidum*
- 4b. Annual grass, without woody root-stock.
Spikelets not turgid, acute. ... 3. *P. hippothrix*
- 2b. Spikelets upto 3.5 mm long :
- 5a. Spikelets upto 1.75 mm long. ... 14. *P. walense*
- 5b. Spikelets over 2 mm long :
- 6a. Spikelets widely gaping at the maturity.
Lower glume cuspidate-acuminate. ... 12. *P. trypheron*
- 6b. Spikelets not gaping at maturity. Lower
glume not cuspidate-acuminate :
- 7a. Spikelets narrowly lanceolate to
lanceolate-oblong, acute :
- 8a. Aquatic grass. Culms soft, spongy,
green, floating. Leaves flat, broad.
Spikelets narrowly lanceolate. ... 8. *P. paludosum*
- 8b. Terrestrial grass. Culms tough,
rhizomatous, not floating. Leaves
involute, narrow. Spikelets lanceo-
late to lanceolate-oblong. ... 10. *P. repens*
- 7b. Spikelets oblong, ovate-oblong to
elliptic, mostly obtuse :
- 9a. Lower glume a quarter to half the
length of spikelet :
- 10a. Annuals :
- 11a. Panicles effuse. Spikelets
deciduous, upto 3 mm
long. ... 9. *P. psilopodium*
- 11b. Panicles contracted.
Spikelets plump, subper-
sistent, upto 3.5 mm
long. ... 11. *P. sumatrense*
- 10b. Perennials :
- 12a. Root-stock villous-hairy,
stout, creeping. Lower
florets, neuter. ... 1. *P. antidotale*
- 12b. Root-stock absent ; roots
wiry and fibrous. Lower
florets male. ... *P. nehruense*

- 9b. Lower glume one-half to three-quarters the length of spikelet or more :
- 13a. Tall perennials, with woody root-stock. Leaves deeply cordate at the base. Ligule obscure, with long, soft hairs. Spikelets obtuse. ... 7. *P. notatum*
- 13b. Dwarf annuals. Leaves rounded at the base. Ligule membranous, ciliate. Spikelets acute. ... 2. *P. atrosanguineum*

1. *Panicum antidotale* Retz. Obs. Bot. 4 : 17. 1786 ; Hook. f. Fl. Brit. India 7 : 52. 1896 ; Blatt. & McC. Bombay Grasses 163. pl. 104. 1935 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 322. 1960 ; Raizada & Jain in Ind. For. Rec. (n.s.) Bot. 5 : 159. 1965 ; Majumdar in Bull. Bot. Soc. Bengal 27 : 51. f. 20. 1973. 'Garmano' (Hindi).

Stout grass, with creeping, woody root-stock, 0.75 - 1.5 m tall. Leaves 5 50×0.35 1.0 cm, linear, acute ; ligule short, membranous, ciliate. Panicles 10 - 30 cm long, effuse or contracted. Spikelets 2.5 - 3.0 mm long, ovoid, acute, glabrous. Lower glume broadly ovate, about one half to two-third the length of the spikelet, 5-nerved ; upper one equal to lower lemma, with hyaline margins, 5 to 7-nerved. Upper lemma pallid.

Fl. & Fr. : October - March.

Found in sandy habitats throughout Rajasthan, but more common in the desertic zones. It is a very valuable fodder grass and also an effective sand binder.

Selected specimens : Alwar : Pandupole, Sharma Acc. No. 5156 (RUBL) ; Barmer : Sheo, Tiwari 898 (BSJO) ; Bikaner : near Mud, Roy 2370 (BSJO) ; Chittorgarh : Wagan river bed, Singh & Pandey 7244 (BSJO) ; Ganganagar : Sherpura, Roy 4879 (BSJO) ; Kota : Chhabra, Singh 90631 (LWG) ; Sirohi : Mt. Abu, Blatter 5533 (BLAT).

2. *Panicum atrosanguineum* Hochst. ex A. Rich. Tent. Fl. Abyss. 2 : 375. 1851 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 322. f. 36. 1960 ; Majumdar in Bull. Bot. Soc. Bengal. 27 : 45. f. 17. 1973. *P. hydaspicum* Edgew. in Journ. Linn. Soc. Bot. 6 : 207. 1862 ; Hook. f. Fl. Brit. India 7 : 48. 1896.

Tufted, erect or geniculately ascending grass, 25-60 cm high. Leaves 3 - 7×0.25 - 0.75 cm, flat, linear-lanceolate, acute, margins undulate and

ciliate ; sheath hispid. Panicles upto 20 cm long, open, spreading. Spikelets c. 2.25 mm long, elliptic-oblong, glabrous. Lower glume half to two-third the length of spikelets, ovate, acute, 3 to 5-nerved ; upper one equalling the lower lemma, 5 to 7-nerved. Lower lemma 7-nerved ; upper one crustaceous, chestnut brown. Caryopsis 0.75 - 1.25 mm long, elliptic-oblong, whitish.

Fl. & Fr. : August - November.

An occasional weed in fallow and cultivated fields and open wastelands.

Selected specimens : Kota : Shahabad, Verma 428, 429, 436 (CAL) ; Pali : Jawai Dam, Shetty 1951 (BSJO) ; Paras Ram Mahadev R.F., Pandey 4187 (BSJO).

3. *Panicum hippothrix* K. Schum. in Engl. Pflanzenw. Ost. Afr. C. 103. 1895 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 326. 1960 ; Majumdar in Bull. Bot. Soc. Bengal 27 : 42. f. 3. 1973. *Isachne obscurans* Woodrow in Gard. Chron. ser. 3. 23 : 161. 1898. *Panicum obscurans* (Woodrow) Stapf in Journ. Bombay Nat. Hist. Soc. 13 : 434. 1901.

Erect or geniculately ascending grass, 50 - 100 cm high. Leaves 10 - 20 × 0.25 - 0.6 cm, linear, with rounded base ; ligule membranous, with ciliate rim. Panicles 10 - 20 cm long, loosely spiculate. Spikelets c. 4.5 mm long, acuminate, glabrous. Lower glume two-third the length of the spikelet, acuminate, 5-nerved ; upper one 7 to 9-nerved, rounded on the back. Lower lemma coriaceous, 9-nerved ; upper one sub-coriaceous, yellowish.

Fl. & Fr. : August - December.

Rare, found in wastelands. Included on the authority of Sankhala (1951) from N.W. Rajasthan.

4. *Panicum maximum* Jacq. Icon. Pl. Rar. 1 : 2. t. 13. 1781 & Collect. Bot. 1 : 76. 1787 ; Hook. f. Fl. Brit. India 7 : 49. 1896 ; Blatt. & McC. Bombay Grasses 161. pl. 103. 1935 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 327. 1960 ; Majumdar in Bull. Bot. Soc. Bengal 27 : 53. f. 22. 1973.

Tufted, stout, erect or suberect perennials, upto 2.5 m or more high. Leaves upto 50 × 3 cm, flat, broadly linear-lanceolate, acuminate, softly hirsute, rough, with distinct, white mid-vein ; nodes white, bearded ; sheaths compressed, keeled, bearded at the mouth ; ligule 3-6 mm long, membranous, ciliolate, hairy. Panicles upto 40 cm long, erect, open or contracted, lowest branches whorled. Spikelets upto 3.5 mm long, oblong, obtuse. Glumes unequal ; lower one half to one-fourth the length of

spikelets, hyaline, with obscure nerves ; upper one 5 to 7-nerved. Lemma and palea crustaceous. Caryopsis c. 1.25 mm long, pallid.

Fl. & Fr. : March August.

Native of tropical Africa ; naturalized in most parts of the state on the top of hills and along the streams. Used as a fodder grass.

Selected specimens : Ajmer : *Lourie* 497A (DD) ; Alwar : *Siliserh, H. Lal* 34563 (LWG) ; Jaipur : *Ramgarh, Sharma* 2097 (RUBL) ; Pali : Way to Paras Ram Mahadev R.F., *Pandey* 4189 (BSJO) ; Sirohi : Mt. Abu, *Raizada* 20578 (DD) ; Udaipur : *Wingale* 58 (DD).

5. *Panicum miliaceum* L. Sp. Pl. 58. 1753 ; Hook. f. Fl. Brit. India 7 : 45. 1896 ; Blatt. & McC. Bombay Grasses 159. pl. 100. 1935 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 327. 1960 ; Majumdar in Bull. Bot. Soc. Bengal 27 : 44. f. 5. 1973.

Tufted, tall annuals, 50-150 cm high. Leaves upto 20×1 cm, linear-lanceolate, often covered with tubercle-based hairs ; ligule a narrow ciliate rim. Panicles upto 20 cm long, lax. Spikelets c. 4.5 mm long, ovate, acute, green. Lower glume half to two-third the length of the spikelet, cuspidate, 5-nerved ; upper one cuspidate-acuminate, 7 to 11-nerved, equalling the lower lemma. Upper lemma upto 2.5 mm long, crustaceous.

Fl. & Fr. : August - October.

Often found as a weed in irrigated fields ; rarely cultivated. Included on the authority of *Dhillon & Bajwa* (1969) from Ganganagar and *Sankhala* ((1951) from N.W. Rajasthan.

6. *Panicum nehruense* Jauhar & Joshi in Bull. Bot. Surv. India 8 : 97. f. A. 1966.

Robust, erect to decumbent grass with pubescent and red-coloured nodes. Leaves 15-35×0.5-0.75 cm, linear-lanceolate, densely hirsute ; ligule 1-2 mm long, membranous, densely ciliate. Panicles 15-25 cm long, effuse. Spikelets 2.5-2.75 mm long, acute to acuminate, tinged with purple. Lower glume c. 1 mm long, pointed ; upper glume and lower lemma 5 to 8-nerved. Upper lemma coriaceous, glossy.

Fl. & Fr. : September March.

According to *Jauhar & Joshi* (*l.c.*, 1966), the type was isolated from a composite seed lot of *Panicum coloratum* L. obtained from Jodhpur, where it is reported to have been introduced from Australia. This species is allied to *Panicum coloratum* L. and has long been misidentified under that taxon. It is however, distinct from *Panicum coloratum* L. in

its growth habit, morphological features, characters of epidermal pattern & cytological characteristics including the chromosome numbers.

7. *Panicum notatum* Retz. Obs. Bot. 4 : 18. 1786 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 701. 1960. *P. montanum* Roxb. Fl. Ind. 1 : 315. 1820 ; Hook. f. Fl. Brit. India 7 : 53. 1896 ; Bor, *l. c.* 329. 1960 ; Raizada & Jain in Ind. For. Rec. (n.s.) Bot. 5 : 160. 1965.

Tufted, erect, glabrous grass, upto 1.25 m tall, with woody root-stock. Leaves upto 15.0 × 2.5 cm, broadly lanceolate, margins pectinately ciliate. Panicles upto 25 cm long, lax, with glandular rachis. Spikelets c. 2.25 mm long, ellipsoid-oblong. Lower glume c. 1.7 mm long, 5-nerved, sparsely hairy ; upper one equalling the lower lemma. Upper lemma coriaceous, ovoid, yellowish-brown, rounded on the back.

Fl. & Fr. : August - September.

Rare, found in moist places in hilly areas.

Selected specimen : Jaipur : Ramgarh, Sharma 2055 (RUBL). Also reported from Jodhpur (Gupta & Sharma, 1971).

8. *Panicum paludosum* Roxb. Fl. Ind. 1 : 310. 1820 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 329. 1960 ; Raizada & Jain in Ind. For. Rec. (n.s.) Bot. 5 : 157. pl. 1. f. 4. 1965 ; Majumdar in Bull. Bot. Soc. Bengal 27 : 51. f. 19. 1973. *P. proliferum* auct. plur. non Lam. 1797 ; Hook. f. Fl. Brit. India 7 : 50. 1896.

Aquatic perennials, 0.5 - 1.5 m tall. Culms emerged or floating, creeping and rooting at lower nodes. Leaves 5 - 20 × 0.5 - 1.25 cm, linear-lanceolate, glabrous, acute ; ligule a rim of hairs. Panicles upto 25 cm long. Spikelets 3 - 4 mm long, solitary or paired; acute, glabrous. Lower glume orbicular, hyaline, obscurely nerved ; upper one ovate-lanceolate, 7 to 9-nerved. Lower lemma 9-nerved ; upper one pallid.

Fl. & Fr. : October - May.

Common creeping grass in aquatic habitats. Used as a fodder grass.

Selected specimens : Banswara : Majumdar 10300-A (BSA) ; Bhilwara : Banera, Singh 6025 (BSJO) ; Jaipur : Ramgarh, Sharma 2101 (RUBL) ; Jhalawar : Majumdar 10056 (BSA) ; Sirohi : Mt. Abu, Jain 46606, 60402 (BSI) ; Udaipur : Kamblighat, Kanodia 82392 (BSI).

9. *Panicum psilopodium* Trin. Gram. Panic. 217. 1826 ; Hook. f. Fl. Brit. India 7 : 46. 1896, incl. var. *coloratum* Hook. f. ; Bor, Grass. Burm. Ceyl. Ind. Pak. 329. 1960 ; Majumdar in Bull. Bot. Soc. Bengal 27 : 50. f. 17. 1973.

Tufted, erect or geniculately ascending grass, 50 - 100 cm high, with glabrous nodes. Leaves 10 - 30 × 0.5 - 1.0 cm, broadly linear-lanceolate to narrowly lanceolate, acute, often rounded at the base; ligule a lacerate ring. Panicles 10 - 25 cm long, green. Spikelets 2.5 - 3.0 mm long, solitary or binate, ovate-lanceolate, glabrous, acute. Lower glume c. 1 mm long, broadly ovate, acute, 3 to 5-nerved; upper one equal to lower lemma, acute, many-nerved. Caryopsis 1.5 - 2.0 mm long, ovoid, smooth.

Fl. & Fr. : July - October.

Common in moist places.

Selected specimens : Banswara : Shergarh forest, *Singh* 3086 (BSJO); Jaisalmer : Pokaran, *Wadhwa* 4946 (BSA); Jhalawar : Bijliya Bhadok, *Wadhwa* 5336 (BSA); Kota : *Verma* 428 (BSA); Sirohi : Mt. Abu, *Duthie* 6730-A (DD); Tonk : *Raizada* 17/55 (DD).

10. *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; Raizada & Jain in Ind. For. Rec. (n. s.) Bot. 5 : 157. pl. 1. f. 5. 1965; Majumdar in Bull. Bot. Soc. Bengal 27 : 51. f. 18. 1973.

Stoloniferous perennials, rooting at the lower nodes. Leaves distichous, 5 - 15 × 0.25 - 0.75 cm, lanceolate, stiff, rigid, glaucous, acute, rounded at the base; ligule a narrow coriaceous ring. Panicles upto 20 cm long, contracted. Spikelets 2.5 - 3.5 mm long, sessile, glabrous, green with purplish tinge. Lower glume one fourth the length of the spikelet, orbicular, truncate, obscurely nerved; upper one equalling the lower lemma, 7 to 9-nerved. Upper lemma 2.0 - 3.5 mm long, dorsally convex.

Fl. & Fr. : Almost throughout the year.

Probably a native of tropical America; naturalized in moist places. It is a good fodder grass.

Selected specimens : Bundi : Mangli river, *Verma* 1870 (BSA); Jaisalmer : Ramgarh, *Wadhwa* 5169-A (BSA); Kota : Baran, *Majumdar* 10438, 13286 (BSA); Sirohi : Mt. Abu, *Sharma* 3533 (RUBL).

11. *Panicum sumatrense* Roth ex Roem. & Schult. Syst. Veg. 2 : 434. 1817; Bor, Grass. Burm. Ceyl. Ind. Pak. 701. 1960. *P. miliare acut.* non Lam. 1791; Hook. f. Fl. Brit. India 7 : 46. 1896; Bor, *l. c.* 329. 1960; Raizada & Jain in Ind. For. Rec. (n.s.) Bot. 5 : 156. pl. 1. f. 3. 1965.

Tufted, erect or geniculately ascending grass, c. 1 m tall. Leaves 15 - 45 × 0.35 - 2.5 cm, flat, linear, acute to acuminate, with rounded

base, margins often cartilaginous; ligule shortly truncate, ciliate. Panicles 10 - 30 cm long; pedicels unequal in length, cup-shaped at the top. Spikelets solitary or paired, ovate-lanceolate, glabrous. Lower glume 0.75 - 1.75 mm long, orbicular, apiculate, clasping at the base, 3 to 7-nerved; upper one broadly elliptic-ovate, many-nerved, membranous. Lower lemma upto 3.5 mm long, empty, 9-nerved; upper one coriaceous, apiculate. Caryopsis ovoid.

Fl. & Fr. : August - October.

Occasional, runs wild in the forests near water courses. Mostly cultivated for its grains.

Selected specimens : Banswara : Shergarh, *Majumdar* 10230 (BSA); Shyampura, *Kanodia* 75900 (BSI); Sirohi : Abu hills, *Chavan* 19 (DD).

12. *Panicum trypheron* Schult. Syst. Veg. Mant. 2 : 244. 1824; Hook. f. Fl. Brit. India 7 : 47. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 331. 1960; Raizada & Jain in Ind. For. Rec. (n.s.) Bot. 5 : 154. pl. 1. f. 1. 1965; Majumdar in Bull. Bot. Soc. Bengal 27 : 47. f. 8. 1973.

Tufted, erect or geniculately ascending annuals, 20 - 90 cm high. Leaves upto 25.0 × 0.75 cm, narrowly lanceolate, hairy; ligule short, fimbriate. Panicles upto 25 cm long, open. Spikelets 2.5 - 3.5 mm long, glabrous, green, acuminate. Lower glume 2/3 the length of the spikelets, broadly ovate; upper one equalling the lower lemma, both subcuspidate, 7 to 9-nerved. Upper lemma crustaceous, yellowish-white.

Fl. & Fr. : August - November.

Found in the sandy habitats and among the hedges of cultivated fields. It is a very good fodder grass.

Selected specimens : Alwar : Pandupole, *Parmar* 9472 (BSJO); Jaisalmer : *Blatter* 4961 (BLAT); Jhalawar : *Eklera*, *Wadhwa* 7498 (BSA); Tonk : Deoli, *Nanda* 414 (DD). Also reported from Jhunjhunu (*Joshi & Sharma*, 1964).

13. *Panicum turgidum* Forsk. Fl. Aegypt. - Arab. 18. 1775; Hook. f. Fl. Brit. India 7 : 44. 1896; Blatt. & McC. Bombay Grasses 156. pl. 98. 1935; Bor, Grass. Burm. Ceyl. Ind. Pak. 331. 1960; Majumdar in Bull. Bot. Soc. Bengal 27 : 42. f. 1. 1973.

Suffruticose, erect, glaucous grass, 0.5 - 1.5 m high, with woolly root-fibres. Leaves 5 - 15 × 0.25 - 0.75 cm, linear-lanceolate, folded or convolute, stiff and pungent; ligule a row of short hairs. Panicles 5 - 15 cm long, subpyramidal, loose. Spikelets 4.25 - 5.0 mm long, ovate-orbicular, glabrous. Lower glume shorter than the spikelet, 5 to 7-nerved,

broadly ovate ; upper one equalling the lower lemma, 7 to 9-nerved. Upper lemma coriaceous, yellowish.

Fl. & Fr. : July - November.

Fairly common in sandy habitats throughout the desert. It is a very good fodder grass and sand binder.

Selected specimens : Barmer : Tapara, *Shetty* 2274 (BSJO) ; Bikaner : Bhikampur, *Roy* 1714 (BSJO) ; Ganganagar : Anupgarh, *Roy* 4893 (BSJO) ; Jaisalmer : Phalari, *Pandey* 7828 (BSJO). Also reported from Jalore (Gupta & Sharma, 1971) and Sikar (Nair & Nathawat, 1957).

14. *Panicum walense* Mez. Bot. Jahrb. 34 : 146. 1904, 'watense' ; Majumdar in Bull. Bot. Soc. Bengal 27 : 47. f. 9. 1973. *P. humile* Nees ex Steud. Syn. Pl. Glum. 1 : 84. 1854, non Thunb. ex Trin. 1826 ; Hook. f. Fl. Brit. India 7 : 48. 1896. *P. austroasiaticum* Ohwi in Act. Phytotax. & Geobot. 2 (1) : 45. 1942 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 324. 1960 ; Raizada & Jain in Ind. For. Rec. (n.s.) Bot. 5 : 155. 1965.

Tufted, erect, annual grass, 5 - 50 cm high, with fascicled branches and glabrous nodes. Leaves upto 15.0×0.5 cm, linear, narrowed at the base ; ligule a minute, ciliolate rim. Panicles 5 - 15 cm long, lax. Spikelets narrowly lanceolate, 2-nate, glabrous. Lower glume half to two-third the length of the spikelets, ovate, acuminate, 3 to 5-nerved ; upper one 3 to 5-nerved. Upper lemma pallid. Caryopsis blackish.

Fl. & Fr. : September - November.

Occasional, found in moist and shaded localities.

Selected specimens : Kota : Shahabad, *Majumdar* 13202 (BSA) ; Sirohi : Mt. Abu, *Sharma* 3638 (RUBL) ; Udaipur : Sarhod, *Wadhwa* 3570 (BSA).

69. PASPALIDIUM Stapf

- | | |
|---|------------------------|
| 1a. Upper lemma rugulose. Lower floret sterile, without palea. | 3. <i>P. punctatum</i> |
| 1b. Upper lemma granulose. Lower floret male, with a palea : | |
| 2a. Leaves obtuse ; sheaths terete, glabrous. Racemes usually distant by 2 - 4 times their own length. Spikelets gibbously globose. | 1. <i>P. flavidum</i> |
| 2b. Leaves acuminate ; sheaths compressed, keeled, ciliate. Racemes usually less than their own length apart. Spikelets plano-convex. | 2. <i>P. geminatum</i> |

1. *Paspalidium flavidum* (Retz.) A. Camus in Lecomte, Fl. Gen. Indo-Chine 7 : 419. 1922 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 333. 1960 ; Raizada & Jain in Ind. For. Rec. (n.s.) Bot. 5 : 167. pl. 3. f. 1. 1965. *Panicum flavidum* Retz. Obs. Bot. 4 : 15. 1786 ; Hook. f. Fl. Brit. India 7 : 28. 1896.

Tufted, erect or ascending perennials. Leaves upto 22×1 cm, flat or convolute. Ligule a ring of hairs. Panicles 10 - 50 cm long, with 5 - 10 remote racemes ; rachis winged. Spikelets 2 - 3 mm long, 2-rowed. Lower glume suborbicular, 5-nerved, truncate ; upper one 7-nerved, about half as long as upper granular lemma. Caryopsis 2.0 - 2.5 mm long, ovoid.

Fl. & Fr. : July - October.

Common in moist, marshy and aquatic habitats.

Selected specimens : Alwar : Kankwari forest, Parmar 9417 (BSJO) ; Banswara ; Kanodia 75406 (BSA) ; Chittorgarh : Pratapgarh, Majumdar 12303 (BSA) ; Jaipur : Chaksu, Sharma 1746 (RUBL) ; Jhalawar : Kokanda, Wadhwa 5424 (BSA) ; Sirohi : Mt. Abu, Jain 5648 (BSI) ; Tonk : Deoli, Nanda 420 (DD).

2. *Paspalidium geminatum* (Forsk.) Stapf in Prain, Fl. Trop. Africa 9 : 583. 1920 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 333. 1960 ; Raizada & Jain in Ind. For. Rec. (n.s.) Bot. 5 : 168. 1965. *Panicum geminatum* Forsk. Fl. Aegypt. - Arab. 18. 1775. *P. paspaloides* Pers. Syn. 1 : 81. 1805 ; Hook. f. Fl. Brit. India 7 : 30. 1896.

Creeping perennials, rooting at nodes, with spongy rhizomes. Leaves 5 - $20 \times 0.25 - 1.0$ cm, linear, finely acuminate. Racemes 1 - 3 cm long, adpressed to the common winged axis, glabrous or sparsely ciliate. Spikelets 1.75 - 2.7 mm long, ovate, acute. Glumes unequal. Lower lemma equal to spikelet, coriaceous, shining.

Fl. & Fr. : September - March.

Selected specimens : Ajmer : Raizada 1/55 (DD) ; Alwar : Baran Viar, Parmar 9754 (BSJO) ; Banswara : Talwara, Singh 4300 (BSJO) ; Jaipur : Galta, Sharma 2238 (RUBL) ; Jodhpur : Luni river, Singh 3532 (BSJO) ; Sirohi : Mt. Abu, Sharma 3360 (RUBL).

3. *Paspalidium punctatum* (Burm. f.) A Camus in Lecomte, Fl. Gen. Indo-Chine 7 : 419. 1922 ; Blatt. & McC. Bombay Grasses 142. pl. 91. 1935 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 333. 1960. *Panicum punctatum* Burm. f. Fl. Ind. 26. 1768 ; Hook. f. Fl. Brit. India 7 : 29. 1896.

Creeping or floating perennials, with spongy rhizomes, often rooting at the lower nodes. Leaves upto 25.0×0.75 cm, flat or convolute, scabrid

at margins ; ligule absent or reduced to a short hairy rim. Panicles upto 20 cm long, with each raceme upto 5 cm long ; rachis narrowly winged. Spikelets 2 - 3 mm long, ovate-oblong, plano-convex, glabrous. Lower glume membranous, truncate ; upper one slightly shorter or equal to lower glume. Caryopsis orbicular, compressed.

Fl. & Fr. : August - November.

Rare, found in aquatic and marshy situations.

Selected specimen : Jaipur : Durgapura, Sharma 1025 (RUBL). Also reported from Alwar (Vyas, 1964), Jhunjhunu (Nair *et al.*, 1961) and Bundi (Maheshwari & Singh, 1974).

70. PASPALUM L.

- | | | |
|--|-----|----------------------------|
| 1a. Spikelets upto 1.25 mm long. | ... | 1. <i>P. canarae</i> |
| 1b. Spikelets more than 2 mm long : | | |
| 2a. Spikelets fringed with fine white hairs on the margins of the upper glume. | ... | 2. <i>P. dilatatum</i> |
| 2b. Spikelets glabrous or minutely pubescent ; glumes not ciliate on the margins : | | |
| 3a. Spikelets broadly elliptic to ovate-elliptic, acute. Upper glume herbaceous, mostly pubescent : | | |
| 4a. Erect or geniculate grass. Racemes upto 9 cm long. Spikelets elliptic, twice as long as broad. Upper glume pubescent. Lower lemma with a prominent middle nerve. | ... | 3. <i>P. paspaloides</i> |
| 4b. Prostrate grass, with stem rooting at the nodes. Racemes less than 4 cm long. Spikelets broadly lanceolate, three times as long as broad. Upper glume glabrous. Lower lemma with faint middle nerve. | ... | 5. <i>P. vaginatum</i> |
| 3b. Spikelets rotundate-elliptic, broadly obovate-elliptic to almost orbicular, obtuse. Upper glume papery, glabrous. | ... | 4. <i>P. scrobiculatum</i> |

1. *Paspalum canarae* (Steud.) Veldk. in *Blumea* 21 : 72. 1973. *Panicum canarae* Steud. *Syn. Pl. Glum.* 1 : 58. 1854. *Paspalum compactum* Roth, *Nov. Pl. Sp.* 36. 1821, '*compactus*' ; Hook. f. *Fl. Brit. India* 7 : 12. 1896 ; Blatt. & McC. *Bombay Grasses* 138. pl. 88. 1935 ; Bor, *Grass. Burm. Ceyl. Ind. Pak.* 336. 1960.

Erect or decumbent, leafy grass, 10-30 cm high. Leaves 2-7 × 0.75-1.25 cm, linear-lanceolate, acute, hairy on both surfaces; sheaths hairy; ligule very short. Racemes many, glabrous, each 5-8 cm long. Spikelets c. 1.25 mm long, pedicellate, arranged in 2 rows. Lower glume absent; upper one suborbicular. Upper lemma subcoriaceous, concave, orbicular, whitish.

Fl. & Fr. : July - October.

Occasional, found in rock crevices on the top of Aravalli hills and in moist-shaded places in dry deciduous forests. It is a highly polymorphic species as regards to its habit.

Selected specimens : Sirohi : Mt. Abu, *Tiagi* Acc. No. 5147 (RUBL), *Duthie* 6729 (DD), *Blatter* 2663 (BLAT). Also reported by Sankhala (1951) from N.W. Rajasthan.

2. *Paspalum dilatatum* Poir. in Lam. *Encycl. Meth. Bot.* 5 : 35. 1804; Bor, *Grass. Burm. Ceyl. Ind. Pak.* 338. 1960; Sharma & Tiagi, *Fl. N.E. Raj.* 479. 1979.

Robust, tufted, erect grass, upto 1.5 m tall, with thick root-stock. Inflorescence composed of 3-5 or more racemes. Spikelets 2.5-3.5 mm long, ovate, acute, crowded in 2-4 rows. Upper glume equalling the spikelets, sparsely pilose and ciliate on the margins. Lower lemma eciliate; upper one papillose-striated, pallid.

Fl. & Fr. : August - November.

Rare, found in moist crevices of rocks and other moist places. It is a good fodder grass.

Selected specimen : Udaipur : *Majumdar* 11639 (BSA).

3. *Paspalum paspaloides* (Michaux) Scribner in *Mem. Torrey Bot. Club* 5 : 29. 1894; Jain & Das in *Ind. For.* 99 : 575. 1973. *Digitaria paspaloides* Michaux, *Fl. Bor. Amer.* 1 : 46. 1803. *Paspalum distichum auct. pl.* non L. 1759; Hook. f. *Fl. Brit. India* 7 : 12. 1896; Bor, *Grass. Burm. Ceyl. Ind. Pak.* 338. 1960; Raizada & Jain in *Ind. For. Rec. (n.s.) Bot.* 5 : 198. 1965.

Creeping, stoloniferous and rhizomatous perennials, rooting at nodes. Leaves 3-15 × 0.25-0.75 cm, sparsely hairy; ligule short, membranous. Inflorescence consisting of 2-3, one-sided, divaricate racemes; rachis flattened, hispidulous. Spikelets 2-3 mm long, ovate, plano-convex. Lower glume reduced to a small scale; upper one acute, 5-nerved. Lower lemma 3-nerved, glabrous; upper lemma smooth, pallid.

Fl. & Fr. : September - March.

Fairly common in moist-marshy habitats.

Selected specimens : Alwar : Jai Samand, *H. Lal* 34599 (LWG) ; Bikaner : Balabh garden, *Roy* 1740 (BSJO) ; Ganganagar : Bhadra, *Roy* 6455 (BSJO) ; Jaipur : Ramgarh, *Sharma* ; 2181 (RUBL) ; Galta, *Sharma* 2237 (RUBL) ; Kota : Shahabad, *Verma* 700 (BSA) ; Sirohi : Mt. Abu, *Jain* 60131, 46578 (BSI).

4. ***Paspalum scrobiculatum*** L. Mant. 1 : 29. 1767 ; Hook. f. Fl. Brit. India 7 : 10. 1896 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 340. 1960 ; Raizada & Jain in Ind. For. Rec. (n.s.) Bot. 5 : 198. pl. 7. f. 2. 1965. *P. orbiculare* Forst. Fl. Insul. Austr. Prodr. 7. 1786 ; Bor, l.c. 340. 1960. *P. commersonii* Lam. Tab. Encycl. Meth. Bot. 1 : 175. t. 43. f. 1. 1791 ; Bor, l.c. 335. 1960. *P. scrobiculatum* L. var. *commersonii* (Lam.) Stapf in Prain, Fl. Trop. Africa 9 : 573. 1919.

Erect or ascending perennials, upto 1 m high, often rooting at lower nodes. Leaves upto 20×1 cm, linear, tapering to a fine point, pubescent. Racemes digitate, erect or spreading, each upto 5 cm long. Spikelets c. 2.75 mm long, 2-ranked. Lower glume wanting; upper one 3 to 7-nerved. Lower lemma coriaceous, 3 to 5-nerved. Upper lemma finely striate. Stamens 3. Caryopsis subglobose.

Fl. & Fr. : September February.

Commonly found near ponds, tanks etc. in marshy habitats.

Selected specimens : Ajmer : Bhim, *Duthie* 4989 (DD) ; Banswara : Majumdar 10290 (BSA) ; Shyampura, *Kanodia* 75394 (BSI) ; Jaipur : Ramgarh, *Sharma* 2066 (RUBL) ; Jhalawar : Eklara, *Wadhwa* 7504 (BSA) ; Sirohi : Mt. Abu, *Blatter* 2710-A (BLAT).

5. ***Paspalum vaginatum*** Swartz, Prodr. Veg. Ind. Occ. 21. 1788 ; Blatt. & McC. Bombay Grasses 139. pl. 89. 1935 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 341. 1960. *P. distichum* auct. pl. non L. 1753, nom. conf. ; Hook. f. Fl. Brit. India 7 : 12. 1896. *P. distichum* L. var. *vaginatum* (Sw.) Griseb. Fl. Brit. W. Ind. 541. 1864.

Creeping, rhizomatous perennials, rooting at lower nodes. Leaves distichous, upto 10.0×0.5 cm, linear-lanceolate, acuminate ; sheaths bearded at mouth ; ligule a short, truncate, membranous rim. Racemes 2 to 3-nate. Spikelets sessile, solitary or 2-nate, 2 - 4 mm long, dorsally flattened, glabrous. Lower glume wanting ; upper one membranous, eciliate. Palea not or obscurely auricled. Caryopsis elliptic.

Fl. & Fr. : July - November.

Fairly common throughout Rajasthan in ponds, pools and low-lying areas.

Selected specimens : Banswara : Loharia tank, *Singh 3707* (BSJO) ; Ghatol, *Singh 2948* (BSJO).

71. PENNISSETUM L.C. Rich.

- 1a. Rachis with decurrent wings on the ribs below the pedicels. Lemmas heteromorphous, lower mostly 3-lobed, upper one readily disarticulating :
- 2a. Spikelets solitary and pedicelled or in groups of 2 - 5, with one sessile and the other pedicelled. Lower glume atleast half the length of the lower lemma :
- 3a. Involucre containing 3 or more spikelets, atleast one of them seated on a pedicel and the rest sessile. ... 4. *P. pedicellatum* subsp. *pedicellatum*
- 3b. Involucre containing a solitary spikelet on a 0.5 - 1.0 mm long pedicel. ... 5. *P. pedicellatum* subsp. *unispiculum*
- 2b. Spikelets solitary, sessile. Lower glume minute or small :
- 4a. Bristles densely plumose. ... 6. *P. polystachyon*
- 4b. Bristles glabrous or scaberulous. ... 2. *P. hordeoides*
- 1b. Rachis ribbed, not winged. Lemmas more or less alike, neither lower 3-lobed, nor upper deciduous ;
- 5a. Anther cells bearded at the apex. ... 7. *P. purpureum*
- 5b. Anther cells not bearded at the apex :
- 6a. Rachis of the spikes villous or woolly. Spikelets upto 4 mm long. ... 3. *P. orientale*
- 6b. Rachis of the spikes glabrous, often scabrid. Spikelets more than 6.5 mm long. ... 1. *P. hohenackeri*

1. *Pennissetum hohenackeri* Hochst. ex Steud. Syn. Pl. Glum. 1 : 103, 1854 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 344, 1960 ; Raizada & Jain in Ind. For. Rec. (n.s.) Bot. 5 : 209. pl. 9. f. 4. 1965. *P. alopecurus* Nees ex Steud. Syn. Pl. Glum. 1 : 102, 1854, non Jacq. 1844 ; Hook. f.

Fl. Brit. India 7 : 84. 1896 ; Blatt. & McC. Bombay Grasses 178. pl. 113. 1935.

Densely tufted, stout, erect perennials, c. 1 m high. Leaves upto 40.0×0.5 cm, convolute, narrowly linear, glabrous ; sheaths keeled, glabrescent ; ligule a hairy ring. Panicles upto 20 cm long : involucre pedicellate ; bristles unequal, longest much longer than the spikelets, enclosing one sessile spikelet. Spikelets 7-12 mm long, lanceolate, acute. Lower glume c. 1.5 mm long, suborbicular, hyaline ; upper one 3.5-5.0 mm long, acuminate. Lower lemma 6.5-8.5 mm long, lanceolate-acuminate, many-nerved. Anther-tips with a tuft of hairs. Caryopsis c. 6 mm long, oblong, brownish.

Fl. & Fr. : September - March.

Common near moist, sandy-clayey soils along the dam sides and along the river-beds.

Selected specimens : Jaipur : Ramgarh, Sharma Acc. No. 4496 (RUBL) ; Jhalawar : Pirawa, Verma 6834, 3346 (BSA) ; Kota : Shahabad, Verma 684 (BSA) ; Pali : Jawai dam, Rao 66797 (BSI) ; Sirohi : Mt. Abu, Duthie 6739 (BSI), Jain 45187, 4658-B (BSI).

2. *Pennisetum hordeoides* (Lam.) Steud. Syn. Pl. Glum. 1 : 103. 1854 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 345. 1960 ; Raizada & Jain in Ind. For. Rec. (n.s.) Bot. 5 : 210. pl. 9. f. 3. 1965. *Panicum hordeoides* Lam. Tab. Encycl. Meth. Bot. 1 : 170. 1791. *Pennisetum parviflorum* Trin. Gram. Panic. 65. 1826 ; Hook. f. Fl. Brit. India 7 : 86. 1896.

Tufted, erect annuals, with hollow culms. Leaves upto 25.0×0.75 cm, linear, acute to acuminate, with serrulate margins ; ligule a short fimbriate membrane. Panicles 5-10 cm long, spiciform, dense, with spreading spikelets. Involucres sessile ; bristles unequal, purplish. Spikelets c. 4 mm long, oblong. Lower glume reduced or absent ; upper one cuspidate, hyaline, 5-nerved. Upper lemma chartaceous, smooth, shining.

Fl. & Fr. : September - December.

Fairly common in the dry deciduous forests on Aravalli hills.

Selected specimens : Ajmer : Lourie 14 (DD) ; Banswara : Puna-pathar, Singh 3668 (BSJO) ; Jaipur : Bassi, Raizada Acc. No. 130139 (DD) ; Sirohi : Mt. Abu, Duthie 6741 (DD) ; Udaipur : Kodiat, Wingate 130 (DD).

3. *Pennisetum orientale* L. C. Rich. in Pers. Syn. Pl. 1 : 72. 1805 ; Hook. f. Fl. Brit. India 7 : 86. 1896 ; Blatt. & McC. Bombay Grasses 179. pl. 114. 1935 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 345. 1960.

Tufted, erect or ascending perennials, upto 1.5 m high with woody, stout root-stock. Leaves 7-30 × 0.25-1.25 cm, convolute or flat, narrowly linear, finely acuminate, base truncate; sheaths close, striated, with ciliate margins; ligule ciliate. Panicles upto 20 cm long, dense; involucre shortly pedicellate, enclosing 2-5 spikelets; bristles unequal, inner ones densely plumose, pigmented purple. Spikelets 5-6 mm long, lanceolate. Lower glume upto 2.5 mm long, hyaline, acuminate, 1-nerved; upper one 3-4 mm long, acuminate. Lower lemma c. 5.5 mm long, male, awned. Stamens 3; anthers glabrous, apiculate. Caryopsis oblongish.

Fl. & Fr. : September-December.

Commonly found as a forest undergrowth on the Aravalli hills.

Selected specimens : Ajmer : Taragarh, *Sharma* 18 (DD); Jhalawar : Manoharthana, *Singh* 83657 (LWG); Pali : Paras Ram Mahadev R.F., *Pandey* 19411 (BSJO); Udaipur : Chhapli, *Kanodia* 82464 (BSI).

4. *Pennisetum pedicellatum* Trin. in Mem. Acad. Sci. Petersb. ser. 6. 3 : 184. 1834, *pro parte*; Hook. f. Fl. Brit. India 7 : 86. 1896, *pro parte*; Bor, Grass. Burm. Ceyl. Ind. Pak. 346. 1960, *pro parte*; Raizada & Jain in Ind. For. Rec. (n.s.) Bot. 5 : 209. pl. 9. f. 1. 1965.

subsp. *pedicellatum*

Tufted, erect annuals or perennials 30-80 cm high. Leaves upto 20.0 × 1.25 cm, flat, linear-lanceolate, acuminate, truncate or rounded at the base, sparsely hairy; sheath glabrous, striated. Ligule a ciliate membrane. Panicles 3-10 cm long, cylindrical, dense. Involucre containing 3 or more spikelets, 3.0-4.5 mm long, lanceolate, pedicellate. Involucre-bristles many, unequal, upto 1.5 cm long, densely woolly below the middle, pigmented with purple. Lower glume upto 2.75 mm long; upper one equal to spikelets. Caryopsis oblongish.

Fl. & Fr. : September-December.

Common in rocky habitats.

Selected specimens : Banswara : Ghatol, *Kanodia* 75145 (BSI); Bhilwara : Karoi, *Singh* 6563 (BSJO); Jhalawar : Aklera, *Wadhwa* 3543 (BSA); Jaipur : *Kanodia* 75539 (BSI); Sirohi Mt. Abu, *Duthie* 6740 (DD), *Sharma* 3358 (RUBL).

5. subsp. *anispiculum* Brunken in Journ. Linn. Soc. 79 : 62. 1979. *P. pedicellatum* Trin. in Mem. Acad. Sci. Petersb. ser. 6. 3 : 184. 1834, *pro parte*; Hook. f. Fl. Brit. India 7 : 86. 1896, *pro parte*; Blatter & McC. Bombay Grasses 180. pl. 115. 1935, *pro parte*; Bor, Grass. Burm. Ceyl. Ind. Pak. 346. 1960, *pro parte*; Raizada & Jain in Ind. For. Rec. (n.s.) Bot. 5 : 209. pl. 9. f. 1. 1965.

Very closely allied to the subsp. *pedicellatum*, but can be distinguished by having a single spikelet on a 0.5 - 1.0 mm long pedicel.

Fl. & Fr. : September - December.

Rare, found in rocky habitats on the Aravalli hills. Being reported for the first time from Rajasthan.

Selected specimens : Alwar : Pandupole, *Parmar* 9470 (BSJO) ; Pali : Malgarh hills near Ranakpur, *Shetty* 1497 (BSJO).

6. ***Pennisetum polystachyon*** (L.) Schult. Syst. Veg. Mant. 2 : 146. 1824 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 346. f. 39. 1960 ; Raizada & Jain in Ind. For. Rec. (n.s.) Bot. 5 : 210. pl. 9. f. 2. 1965. *Panicum polystachyon* L. Syst. Nat. ed. 10. 2 : 870. 1759.

Erect or geniculately ascending perennials or annuals, 1 - 2 m high. Leaves 10 - 40 × 0.25 - 1.5 cm, linear-lanceolate, acute, glabrous or pilose. Panicles spike-like, upto 20 cm long, cylindrical, erect, green with purplish tinge ; rachis winged. Involucel sessile ; bristles many, unequal. Spikelets 4 - 5 mm long, oblong, acute, glabrous. Lower glume smaller, hyaline, sometimes wanting ; upper one flattened ; acute or 3-lobed, 5-nerved, papillose at the top. Upper lemma chartaceous, shining. Anthers with glabrous tip. Caryopsis c. 1.25 mm long, elliptic-oblong.

Fl. & Fr. : Most part of the year.

Native of the tropics of the Old World ; commonly found in south-eastern parts of the state in open waste-lands and fallow fields. It is a good fodder grass.

Selected specimens : Bundi : Kota dam, *Singh* 90153 (LWG) ; Jhalawar : Manoharthana, *Singh* 74456 (LWG) ; Kota : Atru, *Singh* 83778 (LWG).

7. ***Pennisetum purpureum*** K. Schum. Beskr. Guin. Pl. 44. 1827 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 348. f. 40. 1960. *P. macrostachyum* Benth. in Hook. Niger Fl. 563. 1849.

Tufted, erect, stout perennials, with creeping rhizomes, 2 - 3 m tall. Inflorescence upto 35 cm long, dense cylindric spike made up of deciduous spikelets. Spikelets upto 6 mm long, solitary, sessile, not gaping. Bristles 1.0 - 1.75 cm long, linear, golden-yellow. Glumes unequal. Caryopsis not exposed.

Fl. & Fr. : September - November.

Native of tropical Africa ; occasionally escapes from cultivation. It is a good fodder grass.

Selected specimen : Jhalawar : *Singh* 83665 (LWG).

72. PEROTIS W. Aiton

Glumes with loosely scattered hairs on the dorsal surface.

Callus definite. ...

2. *P. indica*

Glumes with definite lines of hairs on the dorsal surface.

Callus minute, 0.2 - 0.5 mm long or obsolete. ...

1. *P. hordeiformis*

1. *Perotis hordeiformis* Nees in Hook. & Arn. Bot. Beech. Voy. 247, 248. 1838; Bor, Grass. Burm Ceyl. Ind. Pak. 611. 1960. *P. latifolia* Ait. Hortus Kew. 1 : 85. 1789, *pro parte*; Hook. f. Fl. Brit. India 7 : 98. 1896, *pro parte*.

Geniculately ascending annuals or perennials, upto 50 cm or more high. Leaves upto 5.0×0.75 cm, narrowly ovate or ovate lanceolate, acute, base subamplexicaul, margins with cartilaginous teeth, undulate; sheaths loose, glabrous; ligule membranous. Inflorescence upto 5 - 20 cm long, delicate, bottle-brush-like, slender, purplish green spike. Spikelets c. 2.5 mm long, narrowly linear, ascending, with conical, minute callus. Glumes equal; lower ones linear-lanceolate, 1-nerved, awned, with definite lines of shining, white hairs on the dorsal surface. Lemmas c. 1.5 mm long, solitary. Caryopsis c. 1.5 mm long, subcylindric, pale brown.

Fl. & Fr. : August - November.

Common weed in sandy habitats in fallow fields and wastelands.

Selected specimens : Banswara : Shergarh, Singh 3073 (BSJO); Bhilwara : Badnor, Singh 6253 (BSJO); Pali : Near Desuri, Shetty 1866 (BSJO); Tonk : Benthali, Shetty 1231 (BSJO). Also reported from Churu (Gupta & Sharma, 1971) and Jhunjhunu (Joshi & Sharma, 1964, 1966).

2. *Perotis indica* (L.) O. Ktze. Rev. Gen. Pl. 2 : 787. 1891; Blatt. & McC. Bombay Grasses 220. pl. 147. 1935; Bor, Grass. Burm. Ceyl. Ind. Pak. 611. f. 72. 1960. *Anthoxanthum indicum* L. Sp. Pl. 28. 1753. *Perotis latifolia* Ait. Hort. Kew. 1 : 85. 1789, *pro parte*; Hook. f. Fl. Brit. India 7 : 98. 1896, *pro parte*.

Geniculately ascending grass, with hairy sheaths and slender, spike-like, upto 15 cm long racemes. Callus definite. Spikelets c. 3 mm long, linear, shortly pedicelled, 1-flowered, 2-awned. Glumes equal, with loosely scattered hairs on the dorsal surface. Stamens 3. Caryopsis cylindric.

Fl. & Fr. : August - October.

Common in open, dry waste places and fallow fields.

Selected specimens : Ajmer : Lourie 4992 (DD), Tiagi 7 (DD); Alwar : Naldeshwar, Parmar 9525 (BSJO); Banswara : Shergarh forest, Kanodia 34 (BSI); Jaipur : Raizada 3/55 (DD); Jaisalmer : Pokaran, Raizada 11/55 (DD); Jodhpur : Kanodia-purohita, Singh 4341 (BSJO); Tonk : Bani plantation, Raizada 11/55 (DD).

73. PHALARIS L.

Phalaris minor Retz. Obs. Bot. 3 : 8. 1783 ; Hook. f. Fl. Brit. India 7 : 221. 1896 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 616. 1960 ; Mahesh. Illus. Fl. Delhi f. 246. 1966.

Annual grass, 50-100 cm high. Panicles upto 6 cm long, contracted, ovate - oblong. Spikelets c. 5 mm long, oblong. Glumes equal, 4 - 6 mm long, broadly winged, winged margins erose - denticulate or rarely entire, apiculate, 3 - nerved. Fertile lemmas 2.5 - 4.0 mm long, broadly lanceolate - ovate, 5 nerved, awnless, shining, pubescent. Caryopsis closely invested by the indurated lemmas and paleas.

Fl. & Fr. : December - March.

Common winter season weed in cultivated fields. Used as a fodder grass.

Selected specimens : Bikaner : Balabh garden, Roy 1748 (BSJO) ; Churu : Sujangarh, Roy 2484 (BSJO) ; Ganganagar : Sohan Lal orchard, Roy 5941 (BSJO) ; Kota : Chhabra, Singh 90935 (LWG).

74. PHRAGMITES Adanson

Leaves smooth beneath, the apex filiform and flexuous.

Rachilla - hairs 7 - 12 mm long. Upper glume 6 - 9 mm long. ... 1. *P. australis*

Leaves scabrid - beneath, the apex attenuate, stiff.

Rachilla - hairs upto 6 mm long. Upper glume upto 5.5 mm long. ... 2. *P. karka*

1. *Phragmites australis* (Cav.) Trin. ex Steud. Nom. Bot. ed. 2. 2 : 324. 1841. *Arundo phragmites* L. Sp. Pl. 81. 1753. *A. australis* Cav. in Ann. Hist. Nat. 1 : 100. 1799. *Phragmites communis* Trin. Fund. Agrost. 134. 1820 ; Hook. f. Fl. Brit. India 7 : 303. 1896 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 416. 1960.

Densely tufted, erect, reed-like perennials, 1.5 - 2.5 m high, with creeping rhizomes. Leaves upto 50 × 3 cm, bifarious, linear - lanceolate, acuminate, smooth beneath, apex filiform ; sheaths loose, glabrous, with auricled mouth ; ligule a ciliate ridge. Panicles 20 - 50 cm long, with filiform and spreading branches. Spikelets 9 - 12 mm long ; rachilla hairs 7 - 12 mm long, silky brown. Lower glume c. 3.5 mm long,

glabrous, acute, 3 nerved; upper one apiculate, 3 nerved. Lemmas heteromorphous. Stamens 3. Caryopsis terete.

Fl. & Fr. : September - January.

Found near marshy habitats like ditches, tanks, ponds and streams.

Selected specimen : Pali : Near Sendra, Pandey 10310 (BSJO). Also reported from Bundi (Maheshwari & Singh, 1974).

2. *Phragmites karka* (Retz.) Trin ex Steud. Nom. Bot. ed. 2: 2 : 324. 1841; Hook. f. Fl. Brit. India 7 : 304. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 416. 1960; Matthew, Illus. Fl. Tam. Carnatic pl. 914 & 915. 1982. *Arundo karka* Retz. Obs. Bot. 4 : 21. 1786.

This grass species is quite identical to *Phragmites australis* (Cav.) Trin. ex Steud., but can be distinguished by having leaves scabrid beneath, the apex attenuate, stiff; rachilla - hairs less than 6 mm long and the upper glume upto 5.5 mm long.

Fl. & Fr. : September - January.

Commonly found in moist crevices of rocks and in low-lying plains.

Selected specimens : Ajmer : Lourie 200/212 (DD); Alwar : Paudupole, Parmar 9486 (BSJO); Bikaner : Lunkaransar, Roy 2426 (BSJO); Dungarpur : Sharma 2119 (RUBL); Ganganagar : Head 281, Roy 4895 (BSJO); Tonk : Niwai, Shetty 515 (BSJO); Udaipur : Jaisamand, Verma 85 (DD).

75. PIPTATHERUM P. Beauv.

Piptatherum aequiglume (Duthie ex Hook. f.) Rozhev. in Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk SSSR 14 : 113. 1951. *Oryzopsis aequiglanis* Duthie ex Hook. f. Fl. Brit. India 7 : 234. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 639. 1960.

Loosely tufted, robust perennials, upto 1.25 m high. Leaves 5 - 25 × 0.5 - 0.75 cm, flat, scabrid on both surfaces; ligule c. 4 mm long. Panicles upto 30 cm long, lax. Spikelets 5.0 - 6.5 mm long, not densely glomerate at the tip of branches, densely covered with long hairs. Glumes with long, exerted awns. Lemmas narrowly elliptic, acuminate, covered with hairs. Anther - tips bearded. Caryopsis elliptic - acuminate, covered all over the back with short hairs.

Fl. & Fr. : July - October.

Rare, found in aquatic habitats viz. ponds, tanks, ditches etc, particularly in south - eastern parts of the state.

Selected specimen : Kota : Singh 90520 (LWG).

76. POA L.

Poa annua L. Sp. Pl. 68. 1753 ; Stapf in Hook. f. Fl. Brit. India 7 : 345. 1896 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 555. 1960 ; Mahesh. Illus. Fl. Delhi f. 278. 1966.

Tufted, erect or decumbent - ascending annual or perennials, upto 20 cm high, sometimes rooting at the lower nodes. Leaves 1 - 10 × 0.15 - 0.25 cm, lanceolate, scaberulous on the margins. Panicles upto 7.5 cm long, effuse. Spikelets 2.5 - 10.0 mm long, lanceolate - oblong or ovate, with more than 2 florets. Glumes unequal, lower 1 nerved and upper 3 nerved. Lemma semi - elliptic to oblong.

Fl. & Fr. : Most part of the year.

Common weed in irrigated fields, neglected corners of gardens and along streams. It is a highly polymorphic species.

Selected specimens : Ganganagar : Dhillon 417 (DD) ; Kota : Barabagh, Singh 74782 (LWG) ; Jaipur : Amer, Sharma Acc. No. 8043 (RUBL) ; Sirohi : Mt. Abu, Mehta 339 (JAC).

77. POLYPOGON Desf.

Polygomon monspeliensis (L.) Desf. Fl. Atlant. 1 : 67. 1798 ; Hook. f. Fl. Brit. India 7 : 245. 1896 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 403. 1960 ; Mahesh. Illus. Fl. Delhi f. 274. 1966. *Alopecurus monspeliensis* L. Sp. Pl. 61. 1753.

Tufted, erect or geniculately ascending annuals, 20 - 60 cm high. Leaves 2.5 - 15.0 × 0.25 - 0.6 cm, flat, broadly lanceolate, acute ; ligule 2 - 10 mm long. Panicles upto 15 cm long, compact, broadly cylindrical. Spikelets 2 - 3 mm long, pale greenish - yellow. Glumes notched at the apex, hairy on the margins, with two or three times long, antrorsely

barbellate awns. Lemmas about half the length of the glumes, smooth, awned.

Fl. & Fr. : March - September.

Common in moist places.

Selected specimens : Ajmer : *Wadhwa* 9551 (BSA) ; Banswara : Ghatol, *Singh* 4209 (BSJO) ; Bharatpur : Ghana Bird Sanctuary, *Parmar* 8625 (BSJO) ; Ganganagar : Dostier, *Roy* 4076 (BSJO) ; Jaisalmer ; Amar Sagar tank, *Shetty* 6135 (BSJO) ; Kota : Samarania, *Wadhwa* 9351 (BSA) ; Sirohi : Mt. Abu, *Mehta* 492 (JAC) ; Udaipur : *Verma* 1,79 (BSA).

78. PSEUDODICHANTHIUM Bor

Pseudodichanthium serrafalcoides (Cooke & Stapf) Bor, in Ind. For. 66 : 272. 1940 & Grass. Burm. Ceyl. Ind. Pak. 204. 1960. *Andropogon cookei* Stapf ex Woodrow in Journ. Bombay Nat. Hist. Soc. 13 : 438. 1901, *nom. tantum*. *A. serrafalcoides* Cooke & Stapf in Kew Bull. 1908 : 450. 1908. *Dichanthium serrafalcoides* (Cooke & Stapf) Blatt. & McC. in Journ. Bombay Nat. Hist. Soc. 32 : 426. 1928.

Weak, straggling, gregarious annuals. Leaves 10 - 15 × 0.25 - 0.5 cm, linear, with tubercle based hairs. Ligules c. 1 mm long, ovate, ciliate. Racemes solitary, upto 1.75 cm long ; pedicels densely ciliate, sessile. Spikelets hermaphrodite, awned. Lower glume c. 8.5 mm long, lanceolate, acute, 7 to 9 - nerved. Upper one c. 6.5 mm long, lanceolate, acute, 3 - nerved. Upper lemma with a long awn. Pedicellate spikelets with upper glume 5 - nerved. Caryopsis c. 3 mm long, elliptic - oblong, dorsally compressed.

Fl. & Fr. : August - November.

Rare, growing in moist and shaded places. So far considered apparently endemic to Maharashtra.

Selected specimen : Sirohi : Mt. Abu, *Jain* 48151 (BSI). Also reported by Kanodia & Rao (1966) from Mt. Abu.

79. PSEUDORAPHIS Griff.

Pseudoraphis spinescens (R. Br.) Vickery in Proc. Roy. Soc. Queensl. 62 (7) : 69. 1952 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 353. 1960. *Panicum*

asperum Koenig in Naturf. 23 : 209. 1788, non Lam. 1778. *P. spinescens* R. Br. Prodr. 193. 1810. *Chamaeraphis spinescens* (R. Br.) Poir. in Lam. Encycl. Meth. Bot. Suppl. 2 : 189. 1811 ; Hook. f. Fl. Brit. India 7 : 62. 1896. *Pseudoraphis aspera* (Koenig) Pilger. in Notizbl. Bot. Gard Berlin 10 : 210. 1928, *non illegit.* ; Blatt. & McC. Bombay Grasses 168. pl. 109. 1935 ; Raizada & Jain in Ind. For. Rec. (n. s.) Bot. 5 : 207. pl. 6. f. 4. 1965.

Floating grass, forming much - branched masses with leafy, ascending culms, hairy on the nodes. Leaves upto 7.0 × 0.35 cm, flat, linear - lanceolate, acuminate ; ligule a ridge of minute hairs. Panicles upto 10 cm long, contracted. Spikelets 4 - 8 mm long, subsessile. Lower glume hyaline, suborbicular ; upper one lanceolate, setosely scabrid on the sides, many nerved, awned. Lower lemma shorter than the upper glume ; upper one c. 2 mm long, ovate lanceolate, acute.

Fl. & Fr. : October - December.

Fairly common in low-lying areas, ponds, pools, ditches etc.

Selected specimens : Banswara : Loharia tank, Singh 3706 (BSJO) ; Bhilwara : Jahajpura, Singh 5724 (BSJO) ; Jhalawar : Aklera, Wadhwa 7536 (BSA) ; Sawaimadhapur : Sharma 3172 (RUBL) ; Sirohi : Mt. Abu, Jain 60130 (BSI).

80. RHYNCHELYTRUM C.G.D. Nees

Rhynchelytrum repens (Willd.) C.E. Hubb. in Kew Bull. 1934 : 110. 1934 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 355. 1960. *Saccharum repens* Willd. Sp. Pl. ed. 4. 1 (1) : 322. 1798. *Monachyron villosum* Parl. in Hook. Niger. Fl. 191. 1849. *Tricholaena wightii* Nees & Arn. ex Steud. Syn. Pl. Glum. 1 : 93. 1854 ; Hook. f. Fl. Brit. India 7 : 65. 1896. *Rhynchelytrum villosum* (Parl.) Chiov. in Ann. R. Ist. Bot. Roma 8 : 310. 1908 ; Bor, l. c. 355. 1960 ; Raizada & Jain in Ind. For. Rec. (n. s.) Bot. 5 : 219. pl. 6. f. 3. 1965.

Tufted, geniculately ascending or erect annual or perennials, 25 - 80 cm high, often rooting at the lower nodes. Leaves upto 12.0 × 0.75 cm, flat or convolute, linear, acute, pubescent ; ligule a ciliate rim. Panicles upto 15 cm long ; rachis slender, grooved, glabrescent. Spikelets 6.5 - 8.5 mm long, golden - yellow with reddish tinge, silky hairy on the top ; pedicels hairy at the top. Lower glume 0.5 - 2.5 mm long, narrowly oblong, membranous ; upper one with a long awn,

5 nerved, silky on the back. Lower lemma similar to upper glume, 2 lobed ; upper lemma about half the length of upper glume, chartaceous.

Fl. & Fr. : August - October.

Common in open gravelly sandy wastelands and fallow fields. It is a highly polymorphic species as regards to habit, size, shape and indumentum of spikelets.

Selected specimens : Ajmer : *Duthie* 6746 (DD), *Lourie* 4985 (DD) ; Puskar road, *Raizada* Acc. No. 130135 (DD) ; Jaipur : Univ. R.F., *Sharma* 631 (RUBL) ; Jhalawar : *Aklara*, *Majumdar* 10009 (BSA).

81. ROSTRARIA Trin.

Rostraria pumila (Desf.) Tzvelev in Nov. Sist. Vyssh. Rest. 7 : 48. 1970. *Avena pumila* Desf. Fl. Atlant. 1 : 103. 1798. *Lophochloa pumila* (Desf.) Bor, Grass. Burm. Ceyl. Ind. Pak. 445. 1960.

Tufted, erect or geniculately ascending annuals, upto 30 cm high. Leaves upto 6.5 × 0.25 cm, linear-lanceolate, acute, pubescent or glabrous. Panicles 1.5 - 5.5 cm long, lax or lobed. Spikelets c. 3 mm long, usually 4-flowered ; rachilla produced, densely villous. Glumes subequal, elliptic, acute, 3-nerved ; lower ones densely hairy than upper. Lemma c. 3 mm long, elliptic, glabrous, acute, with an awn upto 2.5 mm long.

Fl. & Fr. : March - May.

A high altitude grass probably introduced in Ganganagar district in the fields with the canal water used for irrigation. Included on the authority of *Dhillon & Bajwa* (1969).

82. ROTTOELLIA L. f. *nom. cons.*

Rottboellia exaltata L. f. Nov. Gram. Gen. 40 t. 1. 1779 & Suppl. Pl. 114. 1781 ; Hook. f. Fl. Brit. India 7 : 156. 1896 ; Blatt. & McC. Bombay Grasses 38. pl. 27. 1935 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 206. f. 13. 1960 ; *Raizada et al.* in Ind. For. Rec. (n. s.) Bot. 4 : 208. 1961.

Tall, erect annuals, upto 3 m high. Leaves 20 - 50 × 1.0 - 2.5 cm, linear-lanceolate, acute, scabrid ; sheaths with tubercle-based hairs ; ligule membranous, rounded, ciliolate. Racemes upto 15 cm long, stiff, glabrous, forming spatheate false panicles. Sessile spikelets 6 - 8 mm

long, oblong elliptic, glabrous. Lower glume coriaceous, minutely two-toothed, smooth; upper one boat shaped, keeled, many nerved. Pedicelled spikelets 6-8 mm long, compressed, narrowly ovate, green.

Fl. & Fr. : August - October.

Rare, found in open plains. Used as a fodder grass.

Selected specimen : Alwar : Pandupole, *Sharma* 3935 (RUBL).

83. SACCHARUM L.

- 1a. Spikelets awnless, or if awned then awns not visible beyond the tips of the glumes :
- 2a. Leaves petiolate, base with a narrow wing on either side of the mid nerve. Peduncles hairy below the panicles. Rachis very fragile. Lower glume of the sessile spikelets glabrous on the back. ... 3. *S. spontaneum*
- 2b. Leaves neither petiolate nor winged at the base. Peduncles glabrous below the panicles. Rachis not so fragile. Lower glume of the sessile spikelets hairy on the back. ... 1. *S. bengalense*
- 1b. Spikelets conspicuously awned. ... 2. *S. ravennae*

1. *Saccharum bengalense* Retz. Obs Bot. 5 : 16. 1789 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 211. 1960. *S. munja* Roxb Fl. Ind. 1 : 246. 1820 ; Blatt. & McC. Bombay Grasses 48. pl. 32. 1935 *S. arundinaceum* Hook. f. Fl. Brit. India 7 : 119. 1896, non Retz. 1786 ; Blatt. & McC. l. c. 47. 1935.

Erect perennials, upto 3.5 m tall and with solid stem. Leaves upto 80 × 1 cm, flat, channelled, glaucous, linear, acuminate, with scabrid margins ; sheaths very long, hairy at the base and margins, striated ; ligule membranous. Panicles upto 80 cm long, silvery white, woolly. Spikelets upto 5.25 mm long, in pairs, one pedicelled and other sessile ; callus hairy. Glumes equal. Lower glume of the sessile spikelet hirsute on the back ; the upper one quite glabrous. Lower lemma hairy on the back, hyaline, membranous, shorter than the glume ; upper one ciliate on the margins. Stamens 3. Caryopsis oblongish, brown.

Fl. & Fr. : September - March.

Common along the hedges of cultivated fields, river - beds and in other moist-dumpy situations in sandy - alluvial soils.

Selected specimens : Alwar : Pandupole, *Parmar* 9483 (BSJO); Banswara : *Majumdar* 10252 (BSA); Bikaner : Shivbari, *Roy* 2135 (BSJO); Ganganagar : Satrana, *Roy* 4906 (BSJO); Jaipur : Durgapura, *Sharma* 754 (RUBL); Pali : Narpura, *Pandey* 10324 (BSJO).

2. *Saccharum ravennae* (L.) Murr. Syst. Veg. ed. 13. 88. 1774; Hook f. Fl. Brit. India 7 : 121. 1896; Blatt. & McC. Bombay Grasses 50. pl. 33. 1935; Bor, Grass. Burm. Ceyl. Ind. Pak. 213. 1960. *Andropogon ravennae* L. Sp. Pl. ed. 2. 2 : 1481. 1763. *Erianthus ravennae* (L.) P. Beauv. Ess. Agrost. 14. 1812; Bor, *l. c.* 151. 1960. *E. elephantinus* Hook. f. Fl. Brit. India 7 : 122. 1896.

Tall, erect, perennial grass, 2-4 m or more high, with solid culms. Leaves 30-100 × 0.25-2.25 cm, linear, acuminate; sheaths hirsute; ligule a narrow membranous rim, entire or deeply 2-lobed. Panicles upto 80 cm long, dense, silvery silky with a tinge of purplish pink. Callus hairs shorter or subequal to the length of spikelets. Spikelets heteromorphous, 3.5-6.5 mm long. Glumes equal, of sessile spikelets glabrous, those of pedicelled ones sparsely hairy on the back. Lower lemma lanceolate, glabrous; upper one with a long awn.

Fl. & Fr. : August - November.

Rare, found along irrigation channels.

Selected specimen : Ganganagar : Futhai, *Roy* 5018 (BSJO).

3. *Saccharum spontaneum* L. Mant. Alt. 2 : 183. 1771; Hook. f. Fl. Brit. India 7 : 118. 1896; Blatt. & McC. Bombay Grasses 45. pl. 31. 1935; Mukerjee in Bull. Bot. Soc. Bengal 8 : 145. 1949; Bor, Grass. Burm. Ceyl. Ind. Pak. 214. 1960; Raizada *et. al.* in Ind. For. Rec. (n. s.) Bot. 4 : 185. pl. 2. f. 3. 1961.

Erect, rhizomatous perennials, upto 2 m tall, with solid culms above and fistular at the base. Leaves upto 80 × 0.75 cm, rigid, coriaceous, folded, narrowly linear, acute, glaucous, margins scabrid; sheaths auricled, glabrous; ligule membranous, triangular. Panicles upto 50 cm long, silvery purple; rachis sulcate; peduncles with very long, white, silky hairs concealing the spikelets. Spikelets 2.5-5.5 mm long, all alike, in pairs; callus hairs double to triple the size of spikelets, silky-white. Glumes similar, sub-coriaceous, lanceolate-acuminate, hyaline. Lower lemma hyaline, ovate-lanceolate, ciliate on the margins, pubescent above; upper one mucronate or awned. Stamens 3. Caryopsis oblong.

Fl. & Fr. : January - December.

Common in moist - marshy situations throughout Rajasthan.

Selected specimens : Alwar : Naldeshwar, *Parmar* 9521 (BSJO) ; Banswara : Ganoda, *Singh* 3007 (BSJO) ; Ganganagar : Sakhi, *Roy* 4900 (BSJO) ; Jaipur : Sanganer, *Sharma* 1268 (RUBL) ; Jodhpur : Birai Dam, *Singh* 4400 (BSJO) ; Sirohi : Mt. Abu, *Duthie* 6756 (DD), *Sharma* 3618 (RUBL).

84. SACCIOLEPIS Nash

Sacciolepis myosuroides (R. Br.) A. Camus in Lecomte, Fl. Gen. de l'Indo - Chine 7 : 460. 1922 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 358. 1960 ; Raizada & Jain in Ind. For. Rec. (n. s.) Bot. 5 : 175. pl. 3. 1965. *Panicum myosuroides* R. Br. Prodr. 189. 1810 ; Hook. f. Fl. Brit. India 7 : 42. 1896.

Erect or decumbent grass, upto 50 cm high. Leaves 10 - 20 × 0.25 - 0.75 cm, linear, acuminate, with long, woolly hairs ; sheaths glabrous. Panicles upto 20 cm long, erect, dense, spiciform. Spikelets 1.5 - 2.0 mm long, crowded, olive - green, glabrescent. Lower glume 0.5 - 1.0 mm long, clasping, convex, 3 nerved ; upper one ovate - oblong, obtuse, more than 5 nerved. Lower lemma upto 1.5 mm long, membranous, ovate, obtuse ; upper one bisexual, upto 1 mm long, white, smooth shining.

Fl. & Fr. : December - March.

Rare, found in moist and shaded localities. Included on the authority of Sankhala (1951) from N.W. Rajasthan.

85. SCHOENEFLDIA Kunth

Schoenefeldia gracilis Kunth, Rev. Gram. 1 : 283. t. 53. 1830 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 474. 1960. *S. pallida* Edgew. in Journ. Asiat. Soc. Bengal 21 : 183. 1852. *Chloris pallida* (Edgew.) Hook. f. Fl. Brit. India 7 : 289. 1896 ; Blatt. & McC. Bombay Grasses 252. pl. 167. 1935.

Tufted, erect or geniculately ascending annuals, upto 50 cm high. Leaves 7 - 20 × 0.15 - 0.5 cm, narrowly linear, acuminate, pilose ; ligule hairy. Spikes 2 - 4, 10 - 20 cm long, digitate, golden yellow, with closely pectinate, straight, bifarious, awned spikelets. Spikelets 2.5 - 4.5 mm long, sub - sessile, 1 flowered. Lower glume upto 4.25 mm long ; upper one 3.0 - 3.75 mm long, ovate lanceolate, aristate,

1 - nerved, ciliate at the keel. Lower lemma with a scaberulous awn. Caryopsis c. 1.25 mm long, linear, with loose pericarp.

Fl. & Fr. : August - November.

Common weed in cultivated and fallow fields, wastelands etc.

Selected specimens : Alwar : Aigal, *Sharma* 3917 (RUBL) ; Chittorgarh : Sumelpura, *Verma* 1654 (BSA) ; Jaisalmer : Mohangarh, *Wadhwa* 5085 (BSA) ; Jodhpur : Tolesar, *Singh* 4358 (BSJO) ; Tonk : Kakor, *Shetty* 1265 (BSJO).

86. SCHIZACHYRIUM Nees

Culms with divaricate branches. Leaves obtuse at the tip. Racemes sparsely hairy ; joints of the racemes upto 3 mm long, bidentate.

1. *S. brevifolium*

Culms with fastigiate branches. Leaves acuminate at the tip. Racemes silky villous ; joints of the racemes more than 4 mm long, appendaged.

... 2. *S. extle*

1. *Schizachyrium brevifolium* (Sw.) Nees ex Buse in Miquel, *Plant. Jungh.* 359. 1854 ; Bor, *Grass. Burm. Ceyl. Ind. Pak.* 215. 1960 ; Raizada *et al.* in *Ind. For. Rec. (n. s.) Bot.* 4 : 235. pl. 10. f. 2. 1961. *Andropogon brevifolius* Sw. *Prodr. Veg. Ind. Occ.* 26. 1788 ; Hook. f. *Fl. Brit. India* 7 : 165. 1896.

Weak, decumbent - ascending annuals, 10 - 50 cm high, pigmented with red. Leaves c. 2.5 × 0.5 cm, linear, glabrous except on margins ; ligule very short, membranous, ciliolate. Racemes 1 - 3 cm long, slender, filiform, pedunculate, spatheate ; joints bidentate. Sessile spikelets 2.5 - 3.25 mm long, linear lanceolate, acuminate. Glumes equal. Lower glume chartaceous, bidentate ; upper one boat - shaped, 4 - nerved, ciliolate. Upper lemma 2 - fid, awned. Anthers reddish. Caryopsis sub - linear. Pedicelled spikelets reduced to a minute glume or bristle.

Fl. & Fr. : August - November.

Rare, found on the hills and along the streams. The dried grass looks rosy-red.

Selected specimens : Kota : Shahabad, *Majumdar* 10018 (CAL) ; Baran, *Majumdar* 10885 (CAL), *Majumdar* 13149, 13255 (BSA).

2. *Schizachyrium exile* (Hochst.) Stapf in Prain, Fl. Trop. Africa 9 : 191. 1917 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 216. 1960 ; Raizada *et al.* in Ind. For. Rec. (n. s.) Bot. 4 : 236. pl. 10. f. 3. 1961. *Andropogon exilis* Hochst. in Flora 27 : 241. 1844.

Annual grass, with culms upto 60 cm high and fascicled. Leaves upto 15.0 × 0.35 cm, linear, acute, glabrous, often turning red ; ligule short, membranous, rounded. Racemes 1.75 - 3.0 cm long, spatheate ; peduncles with hollow, clavate tips which are produced into obtuse appendages. Sessile spikelets narrowly linear - lanceolate, with long, bearded callus. Glumes equal ; lower subcoriaceous, convolute, bidentate, hairy on the back, keeled ; upper ones linear, membranous, 1 - nerved. Upper lemma bifid, glabrous, with a long awn. Anthers 2. Caryopsis c. 3.5 mm long, linear. Pedicelled spikelets reduced to a lanceolate - subulate glume.

Fl. & Fr. : August - October.

Rare, found in moist and shady places in the forests and wastelands.

Selected specimen : Jaipur : Singh 850 (DD).

87. SEHIMA Forsk.

- 1a. Lower glumes of the sessile spikelets 2 - nerved, rounded on the back and with a distinct, deep, longitudinal slit-like groove. Joints and pedicels white hairy on one margin. ... 3. *S. sulcatum*
- 1b. Lower glumes of the sessile spikelets more than 3 - nerved, without slit, but more or less deeply grooved. Joints and pedicels white hairy on both margins :
- 2a. Annuals. Lower glumes of the sessile spikelets more than 9 mm long and with a membranous tip for half of its length. Awns distinctly ciliate along spirals. Lower glumes of the pedicelled spikelets narrowly lanceolate, long aristate and with two long setaceous teeth. ... 1. *S. ischaemoides*
- 2b. Perennials. Lower glumes of the sessile spikelets upto 8 mm long and with a membranous tip upto a quarter of its length. Awns indistinctly ciliate along the spirals. Lower glumes of the pedicellate spikelets lanceolate - acuminate, indistinctly 2 - toothed, ... 2. *S. nervosum*

1. *Sehima ischaemoides* Forsk. Fl. Aegypt. - Arab. 178. 1775 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 218. 1960. *Ischaemum laxum* R. Br. Prodr. 205. 1810, *pro parte* ; Hook. f. Fl. Brit. India 7 : 136. 1896, *pro parte*.

Tufted, ascending grass, 10 - 45 cm high. Leaves upto 15.0×0.5 cm, flat, linear, glaucous, with a long, filiform tip ; sheaths glabrous. Racemes upto 10 cm long, mostly solitary. Sessile spikelets 1.0 - 1.5 mm long, laterally compressed. Lower glume coriaceous with a long membranous tip, 2 toothed, 2 - keeled ; upper one shorter, with a long bristle tip. Upper lemma hermaphrodite, with a long, spirally twisted ; dark brown awn. Pedicelled spikelets 12 - 16 mm long, narrowly lanceolate, glabrous, male or neuter, awnless.

Fl. & Fr. : September - November.

Occasionally found in open sandy plains, particularly in the desertic zones.

Selected specimens : Pali : Near Jadan village, Gupta & Sharma s. n. (CAZRI). Also reported from W. Rajasthan by Das & Bhimaya (1964).

2. *Sehima nervosum* (Rottl.) Stapf in Prain, Fl. Trop. Africa 9 : 36. 1917 ; Blatt. & McC. Bombay Grasses 21. pl. 14. 1935 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 218. 1960 ; Raizada *et al.* in Ind. For. Rec. (n. s.) Bot. 4 : 198. 1961. *Andropogon nervosus* Rottl. *apud* Willd. in Verh. Ges. Naturf. Freunde Berlin Neue Schr. 4 : 218. 1803. *Ischaemum laxum* R. Br. Prodr. 205. 1810, *pro parte* ; Hook. f. Fl. Brit. India 7 : 136. 1896, *pro parte*.

Densely tufted, erect grass, 30 - 70 cm high. Leaves upto 20.0×0.75 cm, flat, linear, acuminate, glaucous ; sheaths terete, striated, glabrescent. Racemes upto 10 cm long, terminal, solitary. Sessile spikelets upto 11 mm long, laterally compressed, acuminate. Lower glume subchartaceous, tip membranous, 2 - toothed, 2 keeled, upto 4 - nerved ; upper one shorter, boat - shaped, with a long bristle tip. Upper lemma 4 - 5 mm long, with a spirally twisted, upto 4 cm long, ciliate awn. Pedicelled spikelets upto 11 mm long, lanceolate, acuminate, awnless. Stamens 3.

Fl. & Fr. : August - November.

Fairly common on low hillocks and alluvial plains. It is a common fodder grass.

Selected specimens : Ajmer : Duthie 4973, 6757 (DD) ; Banswara : Singh 3006 (BSJO) ; Bharatpur : Near Sikandra, Parmar 8741 (BSJO) ;

Jodhpur : Kailana, *Moorthy* 34 (BSJO) ; Kota : Kishanganj, *Verma* 735 (BSA) ; Pali : Gundoj hills, *Shetty* 1399 (BSJO) ; Tonk : Kacha Bundha, *Shetty* 1047 (BSJO).

3. *Setaria sulcatum* (Hack.) A. Camus in Bull. Mus. Hist. Nat. Paris 27 : 373. 1921 ; Blatt. & McC. Bombay Grasses 23. pl. 15. 1935 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 219. 1960 ; Raizada *et al.* in Ind. For. Rec. (n. s.) Bot. 4 : 199. 1961. *Ischaemum sulcatum* Hack, in DC. Monogr. Phan. 6 : 248. 1889 ; Hook. f. Fl. Brit. India 7 : 137. 1896.

Weak, geniculately ascending annuals, upto 50 cm high, with glabrous nodes. Leaves 5 - 15 × 0.25 - 0.5 cm, linear - lanceolate, long acuminate, glaucous, glabrous ; sheaths loose, glabrous ; ligule a ciliate membrane. Racemes upto 7 cm long, solitary, terminal. Sessile spikelets 8 - 10 mm long. Lower glume 8 + 10 mm long, subchartaceous, 2 dentate ; upper one shorter, 3 to 5 - nerved, awned. Upper lemma 2 lobed at the top, with a 3.5 cm long awn. Pedicelled spikelets awnless, smaller.

Fl. & Fr. : August - November.

Occasional, found in rocky habitats.

Selected specimens : Pali : Barr, *Duthie* 32, 4997a (DD). Also reported from Jhalawar and Chittorgarh by Majumdar *et al.* (1969).

88. *SETARIA* P. Beauv. *nom. cons.*

1a. Leaves folded in fan - fashion between the longitudinal nerves. Inflorescence a loose, spreading panicle :

2a. Branches of the panicle divided from the base and bearing short racemes. Spikelets elliptic, acute, crowded. Upper glume half to three - quarter the length of the upper lemma. Lower lemma male or barren.

... 1. *S. barbata*

2b. Branches of the panicle simple from the base. Spikelets abruptly acute, elliptic. Upper glume almost as long as the upper lemma. Lower lemma barren.

4. *S. homonyma*

1b. Leaves folded or flat. Inflorescence a cylindrical, dense or sometimes lobed spiciform panicle :

3a. Perennial grass.

2. *S. geniculata*

3b. Annual grass :

- 4a. Bristles retrorsely barbellate. ... 8. *S. verticillata*
- 4b. Bristles antrorsely barbellate :
- 5a. Upper glume as long as the upper lemma ; the latter quite smooth or minutely rugulose. ... 6. *S. italica*
- 5b. Upper glume shorter than the upper lemma ; the latter distinctly rugose :
- 6a. Inflorescence a cylindric, false spike :
- 7a. Spikelets 3 mm long. Upper lemma coarsely rugose, boat - shaped and slightly keeled upwards, broad and dorsally strongly curved in profile. ... 3. *S. glauca*
- 7b. Spikelets upto 2.25 mm long. Upper lemma finely rugose, narrow and dorsally gently curved, not keeled. ... 7. *S. pumila*
- 6b. Inflorescence a narrow panicle, sometimes loosely lobed below and tapering upwards. ... 5. *S. intermedia*

1. *Setaria barbata* (Lam.) Kunth, Rev. Gram. 1 : 47. 1829 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 360. 1960. *Panicum barbatum* Lam. Tab. Encycl. Meth. Bot. 1 : 171. 1791. *P. flavescens sensu* Hook. f. Fl. Brit. India 7 : 56. 1896, non Sw. 1788.

Tufted, erect or ascending annual grass, upto 1.5 m high, often rooting at nodes. Leaves 10 - 30 × 1.5 - 3.25 cm, linear - lanceolate, acuminate, pubescent on both surfaces. Panicles 7 - 18 cm long. Spikelets solitary.

Fl. & Fr. : August - November.

Rare, found in moist places. Included on the authority of Jain (1962) from Mt. Abu.

2. *Setaria geniculata* (Lam.) P. Beauv. Ess. Agrost. 51, 169, 178. 1812 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 360. 1960. *Panicum geniculatum* Lam. Encycl. Meth. Bot. 4 : 727. 1798.

Knotty, rhizomatous, perennial grass. Leaves 3 - 6 × 0.25 - 0.45 cm, convolute, linear, acute ; ligule of short stiff hairs. Inflorescence spike -

like, with hairy rachis. Bristles antrorsely barbellate. Spikelets *c.* 1.75 cm long. Lower glume *c.* 0.5 mm long, hyaline, acute, 3 - nerved ; upper one *c.* 1.25 mm long, hyaline, 5 - nerved. Lower lemma hyaline, 7 - nerved, equal to upper glume or longer ; upper one indurated, transversely rugose, acute.

Fl. & Fr. : August - October.

Commonly found on hill - slopes.

Selected specimens : Jaipur : Amer, *Sharma* 129 (RUBL) ; Sirohi : Mt. Abu, *Sharma* 3637 (RUBL).

3. *Setaria glauca* (L.) P. Beauv. Ess. Agrost. 51, 169, 178. 1812 ; Hook. f. Fl. Brit. India 7 : 78. 1896 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 360. 1960 ; Raizada & Jain in Ind. For. Rec. (n. s.) Bot. 5 : 204. pl. 8. f. 5. 1965. *Panicum glaucum* L. Sp. Pl. 56. 1753 (var.) & Syst. Nat. ed. 10. 870. 1759 & Sp. Pl. ed. 2. 83. 1762. 'Kutta' Hindi.

Decumbent - ascending or erect annuals, upto 0.5 m tall, with glabrous nodes. Leaves 5 - 25 × 0.25 - 1.5 cm, linear, acuminate, base rounded, with scabrid margins ; sheaths compressed, smooth ; ligule a ridge of hairs. Inflorescence *c.* 10 cm long, dense, cylindrical, spike - like raceme. Spikelets *c.* 3 mm long, ellipsoid, solitary, glabrous, enclosed in an involucre. Bristles upto 12, each upto 7.5 mm long, antrorsely barbellate, reddish - brown. Lower glume *c.* 1.5 mm long, hyaline, broadly ovate, 3 - nerved, apiculate ; upper one longer, suborbicular, 5 - nerved. Lower lemma membranous, 5 - nerved ; upper one coarsely rugose, boat - shaped, keeled.

Fl. & Fr. : August - December.

Common weed in sandy and rocky habitats ; sometimes cultivated in some parts of Rajasthan. It is a useful fodder grass and grains are eaten during scarcity.

Selected specimens : Ajmer : *Lourie* 4997 (DD) ; Banswara : *Kanodia* 75228 (BSI) ; Jaipur : *Jain* 58490 (BSI) ; Jhalawar : *Khanpur, Wadhwa* 9579 (BSA) ; Sirohi : Mt. Abu, *Jain* 5387 (BSJO) ; Tonk : *Maheshwari* 53231 (LWG) ; Udaipur : *Kodra dam, Rao* 66593 (BSA).

4. *Setaria homonyma* (Steud.) Chiov. in Nuovo Giorn. Bot. Ital. (n. s.) 26 : 78. 1919 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 361. 1960 ; Raizada & Jain in Ind. For. Rec. (n. s.) Bot. 5 : 202. pl. 8. f. 1. 1965.

Panicum homonymum Steud. Syn. Pl. Glum. 1 : 48. 1854. *P. rhachitrichum* Hook. f. Fl. Brit. India 7 : 56. 1896.

Erect or prostrate annuals, often rooting at the lower nodes ; nodes hairy. Leaves upto 25×4 cm, elliptic - ovate, acuminate, sparsely hairy ; ligule reduced to a dense fringe of hairs. Panicle upto 15 cm long ; axis scaberulous or smooth. Spikelets c. 2.75 mm long. Lower glume upto 0.75 mm long, hyaline, orbicular, 3 - nerved, upper one broadly elliptic, rounded at the top, 5 to 7 - nerved. Lower lemma elliptic-ovate, smooth, 5 - nerved ; upper one crustaceous, rugose. Stamens 3.

Fl. & Fr. : August - November.

Rare, found near moist habitats.

Selected specimens : Sirohi : Mt. Abu, Mehta 378 (JAC), Blatter 2659 (BLAT), Jain 46420 (BSI).

5. *Setaria intermedia* Roem. & Schult. Syst. Veg. 2 : 489. 1817 ; Hook. f. Fl. Brit. India 7 : 79. 1896. *Panicum tomentosum* Roxb. Fl. Ind. 1 : 303. 1820. *P. intermedium* (Roem. & Schult.) Roth, Nov. Pl. Sp. 47. 1821, non Vahl ex Hornem. 1813. *Setaria tomentosa* (Roxb.) Kunth, Rev. Gram. 1 : 47. 1829 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 365. 1960 ; Raizada & Jain in Ind. For. Rec. (n. s.) Bot. 5 : 205. pl. 8. f. 4. 1965.

Weak-ascending annuals, 10 - 60 cm high, often rooting at the lower nodes. Leaves upto 18×1 cm, narrowly linear lanceolate, acuminate, sparsely hairy ; sheaths loose, keeled, ciliate at the margins ; ligule shortly ciliate. Panicles upto 18 cm long, lax, more or less cylindrical, interrupted, branched. Spikelets 1.5 - 2.0 mm long, solitary, enclosed in an involucre. Bristles upto 5, each 5 - 10 mm long, antrorsely scabrid, stiff, slender. Lower glume c. 1.25 mm long, membranous, broadly ovate, acutish ; upper one half to two third the length of the spikelets. Lower lemma membranous, 5 - nerved ; upper one boat-shaped, transversely rugose. Caryopsis 1.5 - 1.75 mm long, plano - convex, rotundate - ovate, with punctiform hilum.

Fl. & Fr. : August - November.

Found in rocky habitats in open wastelands, road-sides etc. It is used as a fodder grass.

Selected specimens : Ajmer : Lourie 4998 (DD) ; Alwar : Bandipur, Parmar 9653 (BSJO) ; Banswara : Kanodia 75413, 75183 (BSI) ;

Ganganagar : Loyalpuria, Roy 4997 (BSJO) ; Jaipur : Ramgarh, Sharma 2050 (RUBL) ; Jhalawar : Piplosa, Verma 6957 (BSA) ; Sirohi : Mt. Abu, Vasavada 22649 (BSA), Rao 66673 (BSI).

6. *Setaria italica* (L.) P. Beauv. Ess. Agrost. 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.

Tufted erect grass. Leaves upto 15.0×0.35 cm, linear lanceolate, acute, mouth of the sheaths bearded. Panicles 7-20 cm long, dense, cylindric, lobed. Spikelets pale to dark brown ; upper glume equal to upper lemma. Lemmas quite smooth or minutely rugulose.

Fl. & Fr. : August - October.

Occasionally escapes from cultivation ; found in sandy loam soils.

Selected specimens : Ajmer : Kaul 8517 (LWG) ; Banswara : Kushalgarh, Singh 3768 (BSJO) ; Kota : Kishanganj, Verma 742 (CAL) ; Udaipur : Dabok, Ram Chandra 199 (BSI).

7. *Setaria pumila* (Poir.) Roem. & Schult. Syst. Veg. 2 : 891. 1817. *Panicum pumilum* Poir. in Lam. Encycl. Meth. Bot. Suppl. 4 : 273. 1816. *P. pallide-fuscum* K. Schum. Beskr. Guin. Pl. 58. 1827. *Setaria pallide-fusca* (K. Schum.) Stapf & Hubb. in Kew Bull. 1930 : 259. 1930 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 363. 1960 ; Raizada & Jain in Ind. For. Rec. (n. s.) Bot. 5 : 204, pl. 8. f. 6. 1965.

Tufted, geniculately ascending annuals, upto 70 cm high, with glabrous nodes. Leaves upto 20.0×0.5 cm, flat or convolute, linear-lanceolate ; ligule membranous, truncate, ciliate. Inflorescence 0.5 - 3.5 (10) cm long, cylindric, speciform. Spikelets c. 2.25 mm long, solitary, enclosed in an involucre. Bristles upto 8, each 5-8 mm long, slender, rigid, antrorsely barbellate. Both glumes half to two third the size of spikelet. Lower lemma shorter ; upper one longer than the upper glume, yellowish, finely transversely rugose, narrowly and dorsally curved. Caryopsis 1.5 - 1.75 mm long, plano-convex, elliptic-rotundate.

Fl. & Fr. : August - October.

Common near moist places and in rocky habitats. Used as a fodder grass.

Selected specimens : Alwar : Kankwari forest, Parmar 9408 (BSJO) ; Banswara : Rowal Hindvela forest, Singh 2871 (BSJO) ; Jaipur :

Ram Niwas garden, *Sharma* 214 (RUBL) ; Kota : Kishanganj, *Verma* 742 (BSA) ; Pali : Ghanerao P.F., *Shetty* 1899 (BSJO).

8. *Setaria verticillata* (L.) P. Beauv. Ess. Agrost. 51, 178. 1812 ; Hook. f. Fl. Brit. India 7 : 80. 1896 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 365. 1960 ; Raizada & Jain in Ind. For. Rec. (n. s.) Bos. 5 : 203. pl. 8. f. 2. 1965. *Panicum verticillatum* L. Sp. Pl. ed. 2. 82. 1762.

Loosely tufted, geniculately ascending or erect grass, 1/4 to 3 m high. often rooting at the lower nodes. Leaves upto 25.0 × 2.75 cm, linear lanceolate, acuminate, narrowed or subauricled, scabrid on both the sides ; sheaths striated, compressed, keeled, pubescent ; ligule truncate, ciliate. Panicles upto 15 cm long, spiciform, cylindrical to oblong, lobed. Spikelets 2.0 - 2.5 mm long, enclosed in an involucre ; bristles few, each upto 7.5 mm long. Lower glume c. 1 mm long, hyaline, acute ; upper one equal to the spikelets, 5 to 7 nerved, obtuse. Lower lemma dorsally compressed, 5 to 7 nerved ; upper one plano - convex, faintly rugulose, coriaceous.

Fl. & Fr. : August - December.

Commonly found in sandy - clayey soils, particularly along irrigation channels, dam - sides and in open waste places. It is a very good fodder grass.

Selected specimens : Ajmer : Todgarh, *Lourie* 4999, 4999 - A (DD) ; Bharatpur : *Raizada* 1/55 (DD) ; Bikaner : Gajner, *Roy* 2058 (BSJO) ; Jaipur : Ramgarh, *Sharma* 773 (RUBL) ; Jaisalmer : Bara Bagh, *Shetty* 3426 (BSJO) ; Jhalawar : Piplosa, *Verma* 6957 (BSA) ; Pali : Hemawas Dam, *Shetty* 1356 (BSJO).

89. SORGHUM Moench. *nom. cons.*

1a. Sheath - nodes glabrous or finely pubescent, not bearded ;

2a. Perennials, with well developed more or less extensively creeping rhizomes. Sessile spikelets upto 5.5 mm long.

... 2. *S. halepense*

2b. Annual or short - lived perennials, without rhizomes. Sessile spikelets 6 - 7 mm long.

... 4. *S. verticilliflorum*

1b. Sheath - nodes densely bearded :

- 3a. Sessile spikelets 8 - 10 mm long, elliptic - lanceolate, coarsely ciliate along the margins of the glumes, otherwise glabrous. Lower glume with a narrow, raised, semi-cylindrical, beak-like tip, apex truncate. Keels spinulosely ciliate. ... 3. *S. purpureo-sericeum*
- 3b. Sessile spikelets 7.5 - 8.5 mm long, flask-shaped, densely and coarsely hirsute with hairs 3 - 4 mm long. Lower glume narrowed upwards into a beak-like tip in the upper one-fourth part, without a keel. Keel either absent or without spinulosely ciliate. ... 1. *S. deccanense*

1. *Sorghum deccanense* Stapf ex Raizada in Ind. For. Rec. 4 : 100. 1954 ; Raizada *et al.* in Ind. For. Rec. 4 (7) : 214. 1961 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 245. 1960. *Andropogon purpureo-sericeus* auct. plur. non Hochst. ex A. Rich. 1851 ; Hook. f. Fl. Brit. India 7 : 185. 1896, *pro parte*.

Erect, slender annuals, upto 1 m high, with densely bearded nodes and sheaths. Leaves 5 - 30 × 0.25 - 0.5 cm, lanceolate, acuminate. Panicles 10 - 15 cm long, loose ; branches upto 6 in a whorl. Rachis terete, bearded at the nodes. Joints and pedicels subequal, two-third the length of sessile spikelets, with reddish-brown hairs. Sessile spikelets 7.5 - 8.5 mm long, flask-shaped, densely and coarsely hirsute with hairs upto 4 mm long. Lower glume narrowed upwards, beaked with minutely 2-toothed apex.

Fl. & Fr. : August - November.

Rare, in protected forests and grasslands ; considered apparently endemic to Central India.

Selected specimens : Banswara : *Majumdar* 10229 (BSA) ; Chittorgarh : *Majumdar* 12254, 12437 (BSA).

2. *Sorghum halepense* (L.) Pers. Syn. Pl. 1 : 101. 1805 ; Blatt. & McC. Bombay Grasses 55. pl. 37. 1935 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 222. 1960 ; Raizada *et al.* in Ind. For. Rec. (n. s.) Bot. 4 : 215. 1961, *Holcus halepensis* L. Sp. Pl. 1047. 1753. *Andropogon halepensis* (L.) Brot. Fl. Lusit. 1 : 89. 1804 ; Hook. f. Fl. Brit. India 7 : 182. 1896. *A. miliaceus* Roxb. Fl. Ind. 1 : 276. 1820. *Sorghum miliaceum* (Roxb.) Snowden in Journ. Linn. Soc. Bot. 55 : 207. 1955 ; Bor, *l. c.* 223. 1960.

Stout, erect perennials, upto 2.25 m high, with creeping, stoloniferous root stock ; lower nodes silky and rooting. Leaves upto 50.0 ×

3.5 cm, broadly linear-lanceolate, acuminate, base rounded or subamplexicaul; junction of sheath and leaf usually pubescent or villous externally and silky inside above the ligule; ligule a ciliate membrane. Panicles upto 50 cm long, lax, open. Spikelets 2 nate, in pairs. Sessile spikelets 4-5 mm long, narrowly elliptic, acute. Lower glume keeled, 3-toothed, glabrescent, 7 to 11 nerved; upper one narrower, cuspidate, 7-nerved, silky on the back. Upper lemma long awned, 2-toothed. Pedicellate spikelets equal to the sessile spikelets, lanceolate. Stamens 3.

Fl. & Fr. : September - December.

Common in open wastelands and in fallow fields.

Selected specimens : Alwar : Kali Ghati, *Parmar* 9456 (BSJO); Barmer : Naga R.F., *Shetty* 2229 (BSJO); Ganganagar : Loyalpuria, *Roy* 3947 (BSJO); Jaipur : Durgapura, *Sharma* 1017 (RUBL); Jhalawar : Shyamgarh, *Majumdar* 10108 (BSA); Sirohi : Devali tank, *Rao* 66648, 66717 (BSA).

3. ***Sorghum purpureo-sericeum*** (Hochst. ex A. Rich.) Aschers. & Schweinf. in Schweinf. Beitr. Fl. Aethiop. 310. 1867; Blatt. & McC. Bombay Grasses 57. pl. 38. 1935; Bor, Grass. Burm. Ceyl. Ind. Pak. 246. 1960. *Andropogon purpureo-sericeus* Hochst. ex A. Rich. Tent. Fl. Abyss. 2 : 469. 1851; Hook. f. Fl. Brit. India 7 : 185. 1896, *pro parte*.

Robust, erect, annual grass, 1.0-1.5 m high, with villous nodes. Leaves upto 25.0 × 0.75 cm, linear, finely acuminate, pubescent on both sides; sheaths with villous mouth; ligule short, ciliate. Panicles 7-20 cm long, with glabrous rachis. Sessile spikelets upto 6 mm long, densely purplish villous. Lower glume ovate, acuminate, 7 nerved, hairy; upper one equal or slightly longer than the lower, oblong-lanceolate, aristulate, 5-nerved, upper portion hairy at the top. Lower lemma membranous, densely ciliate, glabrous; upper one fragile, hyaline, 2-lobed, awned. Pedicellate spikelets paler and narrower.

Fl. & Fr. : August - October.

Occasionally found in dry habitats.

Selected specimens : Bhilwara : Mandal, *Singh* 6004 (BSJO); Jhalawar : Eklera, *Singh* 83684 (LWG).

4. ***Sorghum verticilliflorum*** (Steud.) Stapf in Prain, Fl. Trop. Africa 9 : 116. 1917, Bor, Grass. Burm. Ceyl. Ind. Pak. 223. 1960. *Andropogon arundinaceus* Willd. Sp. Pl. 4 : 906. 1805, non Berg. 1767, nec. Scop. 1772.

Rhaphis arundinacea Desv. Opusc. 69. 1831, based on *Andropogon arundinaceus* Willd. 1805, *nom. illegit.* *A. verticilliflorus* Steud. Syn. Pl. Glum. 1 : 393. 1854. *A. stapfii* Hook. f. Fl. Brit. India 7 : 184. 1896. *Sorghum arundinaceum* (Desv.) Stapf l. c. 9 : 114. 1917, *nom. illegit.*; Cope in Nasir & Ali, Fl. W. Pak. 143 : 297. 1982.

Tall annual or short lived perennials, upto 2.5 m high, with glabrescent nodes. Leaves 30-50 × 0.5-0.75 cm, linear, with rounded or clasping base, hairy just behind the ligule. Panicles upto 50 cm long, spreading. Sessile spikelets 4-8 mm long, lanceolate or narrowly ovate, awned, straw coloured; callus bearded. Pedicellate spikelets narrowly lanceolate, smaller.

Fl. & Fr. : September - November.

Occasionally found in sandy-loam soils. It is a complex and studied in detail by Snowden (in Journ. Linn. Soc. Bot. 55 : 191-260. 1955).

Selected specimens : Jodhpur : Kharda, Shetty 197 (BSJO); Tonk : Haji ki kothi, Shetty 1248 (BSJO).

90. SPODIOPOGON Trin.

Spodiopogon rhizophorus (Steud.) Pilger in Engler & Prantl, Naturl. Pflanzenf. Auff. 2. 14 : 119. 1940; Bor, Grass. Burm. Ceyl. Ind. Pak. 246. 1960. *Andropogon albidus* Wall. Cat. 8821. 1829, *nom. nud.* *A. rhizophorus* Steud. Syn. Pl. Glum. 1 : 381. 1854. *Spodiopogon albidus* (Wall.) Benth. in Journ. Linn. Soc. (Bot.) 19 : 66. 1881, *nom. illegit.*; Hook. f. Fl. Brit. India 7 : 108. 1896; Blatt. & McC. Bombay Grasses 51. pl. 34. 1935.

Tufted, weak, straggling annuals. Leaves upto 25 × 2 cm, lanceolate, acuminate, narrowed at base; ligule oblong, glabrous. Panicles spatheate, narrow, with compressed, ciliate rachis. Spikelets 2 to 3 nate, laterally compressed, one sessile, one or two pedicellate, both similar, lanceolate, silky villous. Glume equal, ovate-lanceolate, silky hairy. Lemmas truncate with erose top, hyaline; upper lemma awned. Lodicules 2. Stamens 3. Styles 2, free.

Fl. & Fr. : August - February.

Fairly common as a forest undergrowth on the Aravalli hills.

Selected specimens : Banswara : Arargarh, Kanodia 75617 (BSI); Sirohi : Gomukh, Sharma 3543 (RUBL); Duthie 6747 (DD).

91. SPOROBOLUS R. Br.

- 1a. Lower glume as long as the lemma. ... 5. *S. helvolus*
- 1b. Lower glume much shorter than lemma :
- 2a. Lowest branches of inflorescence not in whorls.
Upper glume distinctly shorter than the lemma :
- 3a. Panicles effuse, open :
- 4a. Lemma more than 1.5 mm long :
- 5a. Spikelets c. 2 mm long. Panicle -
branches alternate. ... 8. *S. nervosus*
- 5b. Spikelets upto 1.75 mm long.
Panicle - branches spiculate :
- 6a. Panicles upto 20 cm long.
Spikelets crowded, slate - grey
in colour. Lower glume truncate.
Stamens 2. ... 3. *S. diander*
- 6b. Panicles upto 45 cm long.
Spikelets scattered. Lower glume
obtuse. Stamens 3. ... 12. *S. wallichii*
- 4b. Lemmas upto 1 mm long. ... 9. *S. tenuissimus*
- 3b. Panicles contracted :
- 7a. Lower glume one-half to
two - third the length of the
spikelet. Stamens 2. ... 10. *S. tourneuxii*
- 7b. Lower glume half or less
than half the length of the
spikelet. Stamens 3. ... 4. *S. fertilis*
- 2b. Lowest branches in whorls. Upper glume equal
or longer than the lemma :
- 8a. Panicles contracted :
- 9a. Leaf - margins
smooth. Spikelets
1.5 - 1.75 mm long.
Lower glume
c. 1 mm long. ... 11. *S. tremulus*
- 9b. Leaf - margins
spinulose. Spikelets
2 mm long. Lower
glume c. 0.5 mm
long. ... 7. *S. maderaspatanus*

8b. Panicles effuse,
spreading :

10a. Annual grass ;
rootlets not
covered with
sand particles :

11a. Lower
glume at -
least half
as long as
the lemma.
Caryopsis
discoid. ...

1. *S. capillaris*

11b. Lower
glume
minute,
less than
half the
length
of the
lemma.
Caryopsis
obovate. ...

2. *S. coromandelianus*

10b. Perennial grass ;
rootlets covered
with minute sand
particles. ...

6. *S. ioclados*

1. ***Sporobolus capillaris*** Miq. in Verh. Konink. Nederl. Inst. 3 : 4, 37. 1851 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 627. 1960. *S. scabrifolius* Bhide in Journ. and Proc. Asiat. Soc. Beng. (n. s.) 8 : 312. 1912.

Tufted, annual grass. Leaves upto 15.0 × 0.5 cm, linear-lanceolate, acute. Panicles effuse, lower branches in whorls. Lower glume atleast half as long as lemma ; upper one exceeding lemma in length. Stamens 3. Caryopsis discoid.

Fl. & Fr. : August - October.

Rare, found in moist, sandy - clayey habitats.

Selected specimen : Jaisalmer : Pokaran, Wadhwa 4997 (BSA).

2. ***Sporobolus coromandelianus*** (Retz.) Kunth, Rev. Gram. 1 : 68. 1829 ; Hook. f. Fl. Brit. India 7 : 252. 1896 ; Blatt. & McC. Bombay Grasses 228. pl. 153. 1935 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 627. 1960.

Agrostis coromandeliana Retz. Obs. Bot. 4 : 19. 1786. *Vilfa coromandeliana* (Retz.) P. Beauv. Ess. Agrost. 16, 147. 1812.

Densely tufted, erect or ascending annuals, 15-40 cm high. Leaves upto 8.5×0.5 cm, linear-lanceolate, acuminate, with subcordate base; ligule hairy. Panicles upto 8.5 cm long, pyramidal; branches in distant, 4-6 whorls. Spikelets upto 1.4 mm long, greenish. Lower glume minute, scale-like, suborbicular, hyaline; upper one equal to the spikelet, 1-nerved, obtuse. Lemmas equal or slightly shorter than the spikelet, oblong, obtuse, 1-nerved. Stamens 3. Caryopsis upto 0.75 mm long, obovate or broadly ellipsoid, slightly compressed, enclosed in a loose, reticulate pericarp, reddish-brown.

Fl. & Fr. : September-December.

Common in moist clayey soils, particularly along dam-sides, irrigation channels etc.

Selected specimens : Ajmer : *Lourie* 52382-A (DD) ; Alwar : *Sharma* Acc. No. 8048 (RUBL) ; Bikaner : *Roy* 2148 (RUBL) ; Jaipur : *Galta, Sharma* 5799 (RUBL) ; Kota : *Shahabad, Majumdar* 13150 (BSA) ; Pali : *Hemawas Dam, Shetty* 1364 (BSJO).

Notes : This taxon is quite similar to *Sporobolus piliferus* (Trin.) Kunth, but the latter can be identified by having contracted, subverticillate panicles and the lower glume upto two-third as long as the spikelet. It is mostly found in temperate hilly regions.

3. *Sporobolus diander* (Retz.) P. Beauv. Ess. Agrost. 26, 147, 178. 1821 ; Hook. f. Fl. Brit. India 7 : 247. 1896 ; Blatt. & McC. Bombay Grasses 221. pl. 148. 1935 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 629. 1960. *Agrostis diander* Retz. Obs. Bot. 5 : 19. 1789.

Tufted, erect or ascending, rhizomatous perennials, 10-70 cm high. Leaves upto 25.0×0.35 cm, convolute, narrowly linear, acute. Panicles 5-15 cm long, pyramidal, loose. Spikelets 1.25-1.5 mm long. Lower glume upto 0.5 mm long; upper one upto 1 mm long. Lemma narrowly ovate, equal to the size of spikelet, acute. Stamens mostly 2. Caryopsis c. 0.75 mm long, elliptic-oblong, truncate at the top, reddish-brown.

Fl. & Fr. : August-October.

Common in low-lying areas and other moist situations.

Selected specimens : Alwar : *Naryanji, Parmar* 9785 (BSJO) ; Banswara : *Kanodia* 75124-A (BSA), *Majumdar* 10234 (BSA) ; Jaipur :

Ramgarh, *Sharma* 2049 (RUBL) ; Kota : Barabag, *Agrawal* 439 (DD) ; Sirohi : Mt. Abu, *Mehta* 1290 (JAC).

4. *Sporobolus fertilis* (Steud.) W.D. Clayton in Kew Bull. 19 : 291. 1965. *Agrostis fertilis* Steud. Syn. Pl. Glum. 1 : 170. 1854. *Sporobolus indicus auct. plur.* non (L.) R. Br. 1810 ; Hook. f. Fl. Brit. India 7 : 247. 1896 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 630. f. 76. 1960.

Perennial grass. Leaves with slightly infolded margins. Panicles subspiciform. Upper glume shorter than the lemma. Lemmas 1 to 3 nerved. Stamens 3. Caryopsis truncate above, with pitted pericarp.

Fl. & Fr. : July - October.

Rare, found in moist and low - lying areas.

Selected specimens : Banswara : Ghatol, *Kanodia* 75124-B (BSI), *Majumdar* 10298-B (BSA) ; Sirohi : Mt. Abu, *Narayan* 22659 (BSA) ; Udaipur ; *Puri* 56953 (BSI).

5. *Sporobolus helvolus* (Trin.) Th. Duranti & Schinz, Consp. Fl. Africa 5 : 820. 1895 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 629. 1960 *Vilfa helvola* Trin. in Mem. Acad. Sci. Petersb. ser. 6. 5 : 252. 1840. *V. glaucifolia* Hochst. ex Steud. Syn. Pl. Glum. 1 : 154. 1854. *Sporobolus glaucifolius* (Hochst. ex Steud.) Th. Duranti & Schinz, *l.c.* 5 : 820. 1895 ; Hook. f. Fl. Brit India 7 : 250. 1896 ; Blatt. & McC. Bombay Grasses 224. pl. 150. 1935.

Tufted, stoloniferous perennials, 15 - 50 cm high, with glabrous nodes. Leaves upto 12.5 × 0.5 cm, lanceolate, acuminate, base rounded, glaucous ; ligule hairy. Panicles upto 15 cm long, interrupted. Spikelets 1.5 - 2.0 mm long, crowded, pale greenish - yellow, shining. Glumes as long as the spikelets, narrowly lanceolate, lower one little shorter, acuminate, smooth, 1 nerved, hyaline. Lemma *c.* 1.5 mm long, narrowly ovate, acute, 1 nerved. Stamens 3. Caryopsis *c.* 0.5 mm long, ellipsoid.

Fl. & Fr. : August - November.

Common in moist, sandy to clayey situations.

Selected specimens : Ajmer : *Tiagi* 15 (DD) ; Bikaner : *Kolayat. Roy* 2379 (BSJO) ; Ganganagar : *Hanumangarb, Roy* 5035 (BSJO) ; Pali : *Guru Pratap Singh Guda, Shetty* 1986 (BSJO) ; Tonk : *Kakor, Shetty* 1281 (BSJO).

6. *Sporobolus ioclados* (Nees ex Trin.) Nees, Fl. Afr. Austr. 161. 1841; Blatt. & McC. Bombay Grasses 224. 1935. *Vilfa ioclados* Nees ex Trin. in Mem. Acad. Sci. Petersb. ser. 6. 4 : 65. 1840. *Sporobolus marginatus* Hischt. ex A. Rich. Tent. Fl. Abyss. 2 : 397. 1851; Bor, Grass. Burm. Ceyl. Ind. Pak. 632. 1960; Mahesh. Illus. Fl. Delhi f. 277. 1966.

Tufted, caespitose, spreading perennials, 20-70 cm high; rootlets usually covered with sand particles. Leaves upto 25.0 × 0.5 cm, flat or convolute, linear-lanceolate, acute, margins cartilaginous, finely ciliate serrulate; sheaths glabrous, smooth; ligule a pubescent ridge. Panicles upto 20 cm long, pyramidal, spreading; lower branches in whorls. Spikelets upto 21.5 mm long, pale-greenish purple, shining. Lower glume 0.75 mm long, oblong, hyaline; upper one as long as the spikelet, oblong elliptic, acute, 1 nerved. Lemma similar to upper glume. Stamens 3. Caryopsis 0.5-1.0 mm long, ellipsoid or linear-oblong.

Fl. & Fr. : September-December.

Common in saline habitats; sometimes found in moist, sandy-clayey soils.

Selected specimens : Ajmer *Raizada* 13/56 (DD); Barmer : Pachpadra, *Shetty* 2253 (BSJO); Ganganagar : Azmal Khera, *Roy* 3831 (BSJO); Jaipur : Chaksu, *Sharma* 1715 (RUBL); Pali : Mandali, *Shetty* 1369 (BSJO).

7. *Sporobolus maderaspatanus* Bor in Kew Bull. 1957 : 234. 1957 & Grass. Burm. Ceyl. Ind. Pak. 632. 1960. *S. orientalis* Kunth, Enum. Pl. 1 : 211. 1833, *nom. illegit.*; Hook. f. Fl. Brit. India 7 : 251. 1896.

Stoloniferous perennial grass. Leaves 5-10 × 0.25-0.35 cm, linear-lanceolate, acute, margins spinulose. Panicles narrowly oblong, suberect, contracted. Spikelets c. 2 mm long. Lower glume c. 0.5 mm long, rounded at the tip, 1 nerved, shorter than the lemma. Stamens 3. Caryopsis c. 0.75 × 0.35 mm, lenticulate.

Fl. & Fr. : August-December.

Commonly found in moist, clayey soils.

Selected specimens : Ajmer : *Lourie* 200/126 (DD); Banswara : *Majumdar* 10222 (BSA); Barmer : *Blatter* 4858 (BLAT); Jaipur : *Phulera*, *Wadhwa* 8256 (BSA); Jaisalmer : *Blatter* 4821, 4834 (BLAT); Jodhpur : *Blatter* 4495-A (BLAT).

8. *Sporobolus nervosus* Hochst. in Flora Jena 38 : 202. 1855. *Vilfa nervosa* (Hochst.) Schweinf Beitr. Fl. Aethiop. 303. 1867. *Sporobolus ioclados sensu* Hook. f. Fl. Brit. India 7 : 249. 1896, non (Nees ex Trin.) Nees 1841. *S. stocksii* Bor, in Kew Bull. 3 : 45. 1948 & Grass. Burm. Ceyl. Ind. Pak. 633. 1960.

Caespitose, rhizomatous perennials, upto 50 cm high. Leaves upto 10.0 × 0.35 cm, filiform. Panicles upto 15 cm long. Spikelets c. 1.75 mm long, greenish pallid. Lower glume c. 1 mm long, lanceolate, acute; upper one c. 1.5 mm long, narrowly ovate, acute. Lemma narrowly ovate, equal to the spikelet. Stamens 3. Caryopsis c. 5 mm long, ellipsoid.

Fl. & Fr. : August - November.

Rare, found in wastelands. Probably a native of Africa.

Selected specimen : Ajmer : *Lourie* 5239 (DD).

9. *Sporobolus tenuissimus* (Schrank) O. Ktze. Rev. Gen. Pl. 3 : 369. 1893; Bor, Grass. Burm. Ceyl. Ind. Pak. 633. 1960. *Panicum tenuissimum* Schrank in Denkschr. Bot. Ges. Regensb. 2 : 26. 1822. *Vilfa minutiflora* Trin. Diss. Bot. 158. 1824. *Sporobolus minutiflorus* (Trin.) Link, Hort. Berol. 1 : 88. 1827; Hook. f. Fl. Brit. India 7 : 248. 1896.

Delicate annuals, 10-70 cm high. Leaves upto 15.0 × 0.45 cm, flat, linear, acute. Panicles upto 30 cm long, diffuse. Spikelets 0.75-1.0 mm long. Lower glume 0.25 mm long, oblong, truncate; upper one upto 0.5 mm long, ovate-oblong, subacute. Lemmas equal to the size of spikelets. Stamens 3. Caryopsis upto 0.5 mm long, obovoid, truncate, pericarp adherent.

Fl. & Fr. : August - December.

Common in open wastelands, chiefly near moist places.

Selected specimens : Alwar : *Kanakwari*, *Parmar* 9406 (BSJO); Banswara : *Paloda*, *Singh* 2835 (BSJO); Chittorgarh : *Majumdar* 10414 (BSA); Jodhpur : *Wadhwa* 4919 (BSA); Kota : *Shahabad*, *Verma* 652 (BSA); Udaipur : *Majumdar* 12202 (BSA).

10. *Sporobolus tourneuxii* Cosson in Bull. Soc. Bot. Fr. 36 : 250. 1889. *S. indicus* Stapf ex T. Cooke, Fl. Bombay 2 : 1018. 1908; Blatt. & McC. Bombay Grasses 222. 1955; Bor. Grass. Burm. Ceyl. Ind. Pak. 632. 1960.

Low, caespitose, tufted perennials, 5-10 cm high, often forming dense cushions; roots wiry. Leaves upto 2.0×0.25 cm, pungent, ovate lanceolate to lanceolate, with spinulose margins, acuminate; sheaths ribbed; ligule a narrow, ciliate membrane. Panicles 1-3 cm long, open or contracted. Spikelets c. 1.75 mm long, crowded, ovate, acute. Glumes subequal, hyaline; lower glume c. 1 mm long, ovate, acute; upper one c. 1.25 mm long, oblong or narrowly elliptic, acute. Lemmas ovate, obtuse, 1 nerved. Stamens 3. Caryopsis 0.5-0.75 mm long, obovoid, compressed, reddish brown.

Fl. & Fr. : October - March.

Rare, found in sandy desert. Included on the authority of Sankhala (1951) from N.W. Rajasthan

11. *Sporobolus tremulus* (Willd.) Kunth, Rev. Gram. 1 : 67. 1829; Hook. f. Fl. Brit. India 7 : 250. 1896; Bor, Grass. Burm. Ceyl. Ind. Pak. 633. 1960. *Agrostis tremula* Willd. Sp. Pl. 1 : 372. 1797.

Tufted, erect or prostrate perennials, upto 30 cm high, swollen and knotted at the base. Leaves convolute or flat, rigid, upto 3.0×0.2 cm, distichous, filiform, acute, margins smooth; ligule hairy. Panicles 2-10 cm long, narrow, spiciform. Spikelets 1.5-2.0 mm long, crowded, articulated on very short pedicels. Lower glume upto 1.5 mm long, lanceolate, acute, 1 nerved; upper one ovate-elliptic, acute, 1 nerved. Lemma as long as the upper glume. Stamens 3. Caryopsis 0.65-0.9 mm long, broadly oblong.

Fl. & Fr. : August - November.

Occasionally found in moist-clayey places.

Selected specimens : Jaipur : Phulera, Wadhwa 8255 (BSA); Jaisalmer : Rao 67122 (BSI); Tonk : Deoli - Kota road, Patil 408 (DD). Also reported from Alwar (Vyas, 1967).

12. *Sporobolus wallichii* Munro ex Trin. in Journ. Bot. 27 : 171. 1889; Bor, Grass. Burm. Ceyl. Ind. Pak. 634. 1960. 'Naphli' (Hindi).

Tufted, erect grass, 30-50 cm high, with long leaves. Leaf-sheaths terete, ciliate on the edges of the mouth. Panicles upto 30 cm long, spreading, with very scattered spikelets. Lower glume very short, obtuse. Stamens 3. Caryopsis c. 1 mm long, compressed, oblong, truncate, coarsely pitted.

Fl. & Fr. : August - December.

Common in S.E. Rajasthan, particularly in sandy to clayey soils and in rock crevices. It resembles closely to *S. diander* (Retz.) P. Beauv., which, however, bears caryopsis upto 0.6 mm long, *i.e.* smaller than *S. wallichii*.

Selected specimens : Jhalawar : Eklera, Singh 83690 (LWG) ; Kota : Darah, Singh 74868 (LWG) ; Kathoon, Singh 90585 (LWG).

92. STIPAGROSTIS Nees

- | | | |
|---|-----|--------------------------|
| 1a. Lowest sheath and internodes covered with a thick, flocculent, fugacious wool. | ... | 3. <i>S. plumosa</i> |
| 1b. Lowest sheath and internodes not lanate : | | |
| 2a. Glumes hirsute or pilose. Lemma tuberculate - scabrid all over. | ... | 1. <i>S. hirtigluma</i> |
| 2b. Glumes glabrous. Lemma smooth or papillose - scabrid in the upper part only : | | |
| 3a. Lower glume distinctly longer than the upper one. Column upto 18 mm long, without a beard above and below the knee. | ... | 2. <i>S. paradisea</i> |
| 3b. Lower glume shorter or equal to the upper one. Column c. 8 mm long and long - bearded above and below the knee. | ... | 4. <i>S. poganoptila</i> |

1. *Stipagrostis hirtigluma* (Steud. ex Trin. & Rupr.) De Winter in *Kirkia* 3 : 136. 1963 & in *Bothalia* 8 : 361. 1965. *Aristida hirtigluma* Steud. ex Trin. & Rupr. *Sp. Gram. Stip.* 171. 1842 & in *Mem. Acad. Sci. Petersb.* ser. 6. 7 (2) : 171. 1843 ; *Hook. f. Fl. Brit. India* 7 : 227. 1896, *pro parte* ; *Blatt. & McC. Bombay Grasses* 213. pl. 141. 1935 ; *Bor. Grass. Burm. Ceyl. Ind. Pak.* 410. 1960. '*Dholio - Lampro*' (Hindi).

Tufted, erect, delicate perennials, 20 - 70 cm high. Leaves 3.75 - 15.0 × 0.1 - 0.25 cm, filiform or convolute ; ligule a densely ciliate membrane. Panicles upto 15 cm long, contracted or loose. Spikelets green with a tinge of purple. Lower glume 6 - 10 mm long ; the upper one 8 - 12 mm long, linear - oblong, scarious, acute. Lemma 3 - 4 mm long, awned ; callus 0.5 - 0.75 mm long, pointed, bearded, column c. 5 mm long, plumose in the upper half ; central branch of the awn 3 - 5 cm

long, silvery plumose excepting the tip; lateral branches naked. 8-12 mm long.

Fl. & Fr. : August-October.

Common in rocky habitats in western Rajasthan desert; often forming pure formation and giving silvery-white appearance to the ground.

Selected specimens : Barmer : *Bhandari* 1879 (JAC); Bikaner : *Bhikampur*, *Roy* 2020 (BSJO); Jaisalmer; Bada Bag, *Tiwari* 808 (BSJO); Jodhpur : *Osian*, *Singh* 3251 (BSJO).

2. *Stipagrostis paradisea* (Edgew.) De Winter in *Kirkia* 3 : 135. 1963. *Aristida paradisea* Edgew. in *Journ. Asiat. Soc. Bengal* 16 (2) : 1219. 1848; Hook. f. *Fl. Brit. India* 7 : 228. 1896, *pro parte* under *A. hirtigluma*; Bor, *Grass. Burm. Ceyl. Ind. Pak.* 411. 1960. *Arthratherum caloptilum* Jaub. & Spach. *Illus. Pl. Or.* 4 : 54. t. 336. 1851.

Tufted, caespitose, perennial grass, c. 50 cm high. Leaf-blade 5-15 × 0.15-0.25 cm, convolute, filiform, pungent. Panicles c. 10 cm long, contracted. Spikelets greenish. Lower glume 15-18 mm long, acuminate; the upper one upto 15 mm long. Lemma c. 3.5 mm long, awned, articulation between lemma and awn present; callus c. 0.5 mm long, pointed, bearded; column 10-15 mm long, twisted, glabrous. Central awn 4-7 cm long, feathery throughout but tip naked; the lateral awn c. 2.5 cm long, glabrous.

Fl. & Fr. : August-October.

Rare, found in mixed habitats. So far reported from Jhunjhunu (Nair, 1956) and Jodhpur districts (Sarup, 1951), but the specimens are not available in any of the Indian herbarium.

3. *Stipagrostis plumosa* (L.) Munro ex T. Anders. in *Journ. Linn. Soc. Bot.* 5. Suppl. 1 : 40. 1860. *Aristida plumosa* L. *Sp. Pl.* ed. 2. 2 : 1666. 1763; Hook. f. *Fl. Brit. India* 7 : 228. 1896; Bor, *Grass. Burm. Ceyl. Ind. Pak.* 411. 1960.

Densely tufted, erect perennials. Leaf-sheaths and internodes woolly. Leaves 5-10 × 0.1-0.25 cm, convolute, filiform, curved, smooth. Panicles 5-12 cm long, contracted. Spikelets pale green or straw-coloured. Lower glume 8-14 mm long; the upper one 9-15 mm long, glabrous. Lemma upto 4.5 mm long, smooth, awned; callus c. 1.25 mm long, pungent, bearded; column c. 1 cm long, glabrous. Central

awn 2-5 cm long, plumose, with an excurrent naked tip; lateral awns upto 2.5 cm long, glabrous.

Fl. & Fr. : August - October.

Rare, found in rocky as well as sandy habitats in W. Rajasthan.

Selected specimens : Ganganagar : Madeer, Roy 3957 (BSJO) ; Jaisalmer : Phalari, Pandey 7826 (BSJO).

4. *Stipagrostis pogonoptila* (Jaub. & Spach.) De Winter in Kirkia 3 : 135. 1963. *Arthratherum pogonoptilum* Jaub. & Spach. Illus. Pl. Or. 4 : 56. t. 337. 1851. *Aristida pogonoptila* (Jaub. & Spach.) Boiss. Fl. Orient. 5 : 496. 1884 ; Hook. f. Fl. Brit. India 7 : 228. 1896, *pro parte*, under *A. hirtigluma* ; Bor, Grass. Burm. Ceyl. Ind. Pak. 411. 1960.

Erect or geniculately ascending perennials, 20 - 50 cm high, with glabrous nodes. Leaves c. 7.5 × 0.25 cm, flexuous, the lower leaves much longer ; ligule absent. Panicles 5 - 10 cm long, lax or contracted. Spikelets green with purplish tinge. Lower glume 7-10 mm long ; upper one 8 - 12 mm long, awnless. Lemma 3 - 4 mm long, scabrid, awned ; callus c. 0.5 mm long, pungent, hairy ; column c. 4 mm long. Central awn plumose, the lateral glabrous.

Fl. & Fr. : August - October.

Occasionally found in open, rocky - gravelly habitats in W. Rajasthan desert.

Selected specimens : Barmer : Bhandari 1880 (JAC) ; Bikaner : Gajner, Roy 1690 (BSJO) ; Jaisalmer : Jain 40474 (BSJ) ; Jodhpur : Kailana. Singh 61 (BSJO).

93. TETRAPOGON Desf.

Lowest lemma broadly cuneiform, obscurely ciliate or subglabrous.	...	1. <i>T. tenellus</i>
Lowest lemma ovoid, hirsute all over.	...	2. <i>T. villosa</i>

1. *Tetrapogon tenellus* (Koen. ex Roxb.) Chiov. in Ann. R. Ist. Bot. Roma 8 : 352. 1908 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 475. 1960. *Chloris tenella* Koen. ex Roxb. Fl. Ind. 1 : 330. 1820 ; Hook. f. Fl. Brit. India 7 : 290. 1896 ; Blatt. & McC. Bombay Grasses 254. pl. 169. 1935.

Tufted, erect or geniculately ascending annual grass upto 50 cm high. Leaves 6-15 × 0.25-0.5 cm, linear-lanceolate, acuminate, ciliate. Spikes 2.5-7.0 cm long, solitary or paired. Spikelets 5-6 mm long, 4 to 6 (8) flowered, bifarious, 3 awned. Glumes unequal 1 nerved, hyaline, broadly cuneate, acute. Lowest lemma c. 5.5 mm long, obovate, awned. Grains 1-2 mm long, oblong, brownish.

Fl. & Fr. : July - November.

Fairly common throughout Rajasthan in sandy habitats.

Selected specimens : Ajmer : *Lourie* 4944 (DD) ; Bharatpur : *Raizada* 3/55 (DD) ; Bikaner : *Gajner, Roy* 2065 (BSJO) ; Jaipur : Jhalana hills, *Jain* 1701 (RUBL) ; Kota : Kishanganj, *Verma* 738 (BSA) ; Udaipur : *Majumdar* 11671 (BSI).

2. *Tetrapogon villosus* Desf. *Fl. Atlant.* 2 : 389, t. 255. 1799 ; *Bor, Grass. Burm. Ceyl. Ind. Pak.* 475. 1960. *Chloris villosa* (Desf.) Pers. *Syn. Pl.* 1 : 87. 1805 ; *Hook. f. Fl. Brit. India* 7 : 291. 1896.

Tufted, erect perennials, 20-50 cm high, with woody base. Leaves 3-10 × 0.25-0.5 cm, convolute, linear, acute, often twisted. Spikes 1-3, 3-6 cm long. Spikelets 2-3 mm long, pale yellow, 4 to 6 flowered, with 4 awns. Glumes 5, unequal, hyaline, shortly awned. Lowest lemma c. 3.5 mm long, ovate-elliptic, awned, hirsute. Grains linear-oblong, brownish.

Fl. & Fr. : August - October.

Found in rocky gravelly habitats viz. fringes of forests, open wastelands etc.

Selected specimens : Banswara : *Wadita, Singh* 2879 (BSJO) ; Barmer : *Tiwari* 976 (BSJO) ; Jodhpur : *Osian, Singh* 4419 (BSJO). Also reported from Alwar (*Vyas*, 1967).

94. THELEPOGON Roth ex Roem. & Schult.

Thelepodon elegans Roth ex Roem. & Schult. *Syst. Veg.* 2 : 788. 1817 ; *Hook. f. Fl. Brit. India* 7 : 148. 1896 ; *Blatt. & McC. Bombay Grasses* 27. t. 18. 1935 ; *Bor, Grass. Burm. Ceyl. Ind. Pak.* 247. 1960 ; *Raizada et al. in Ind. For. Rec. (n.s.) Bot.* 4 : 202. pl. 5. f. 2. 1961.

Annual grass ; culms erect or geniculate ascending, upto 1.25 m high, often with prop - roots. Leaves upto 25 × 3 cm, lanceolate, base cordate and amplexicaul, margins spinulose ciliate ; ligule ciliolate. Racemes upto 15, each upto 10 cm long, very fragile ; callus 5 - 7 mm long, annuliform. Sessile spikelets upto 1.25 cm long. Glumes subequal ; lower glume 2 - toothed, narrowly ovate, prominently rugose, 9 - nerved ; upper one rugose on the back. Upper lemma hermaphrodite, with a long, twisted awn. Pedicelled spikelets glabrous, slightly longer than the sessile ones. Caryopsis deep purple.

Fl. & Fr. : August - September.

Rare, found as a weed in cultivated fields and near the dam sides. Included on the authority of Majumdar *et al.* (1969) from Dungarpur and Chittorgarh districts.

95. THEMEDA Forsk.

- | | | |
|--|-----|---------------------------|
| 1a. Panicle of congested heads. Involucral spikelets over 7.5 mm long, inserted at different levels, glabrous or sparsely with tubercle - based hairs. Awns upto 6 cm long. | ... | 3. <i>T. triandra</i> |
| 1b. Panicle of loosely arranged verticillate clusters. Involucral spikelets less than 6 mm long, inserted at the same level, sparsely to densely strigose. Awns much shorter : | | |
| 2a. Panicle leafy, loose. | ... | 1. <i>T. laxa</i> |
| 2b. Panicle not leafy, more or less densely congested. | ... | 2. <i>T. quadrivalvis</i> |

1. *Themeda laxa* (Anders.) A. Camus in Bull. Mus. Hist. Nat. Paris 26 : 423. 1920 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 251. 1960. *Anthistiria laxa* Anders. in Nov. Act. Sci. Upsal. ser. 3. 2 : 243. 1856 ; Hook. f. Fl. Brit. India 7 : 213. 1896.

Tufted, erect perennials. Panicles leafy, of few small heads, loosely arranged in verticillate clusters on filiform branches. Outer spathe 1.5 - 2.5 cm long. Pairs of involucral spikelets glabrous, inserted at the same level.

Fl. & Fr. : September - November.

Commonly found on deep black loamy soils, particularly in S.E. Rajasthan.

Selected specimens : Jhalawar : Ghatoli, *Wadhwa* 7597 (BSA); Kota : Kishanganj Puraniya, *Verma* 706, 754 (CAL).

2. *Themeda quadrivalvis* (L.) O. Ktze. Rev. Gen. Pl. 2 : 794. 1891 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 252. 1960 ; Raizada *et al.* in Ind. For. Rec. (n.s.) Bot. 4 : 251. pl. 12. f. 1. 1961. *Andropogon quadrivalvis* L. in Murr. Syst. Veg. ed. 13. 758. 1774. *Anthistiria cillata* L. f. Suppl. 113. 1781 ; Hook. f. Fl. Brit. India 7 : 213. 1896.

Tall, erect or basally geniculately branched perennial grass, 1.0 - 1.5 m high. Leaves upto 30.0 × 0.5 cm, linear, acute ; sheaths glabrous except mouth ; ligule c. 2 mm long, membranous. Panicles dense ; spathe linear to subulate, 1.5 - 2.5 cm long. Involucral spikelets seated at the same level, sessile, persistent, c. 5 mm long, linear lanceolate. Sessile spikelets hermaphrodite, solitary, c. 4.5 mm long, linear lanceolate. Pedicelled spikelets similar to involucral ones.

Fl. & Fr. : September - November.

Common along the banks of rivers, streams, at the foot of hills and in open grassy plains.

Selected specimens : Ajmer : *Lourie* 4933 (DD) ; Alwar : Pandupole, *Parmar* 9459 (BSJO) ; Banswara : *Raizada* 6/55 (DD) ; Jhalawar : Kokauda, *Wadhwa* 5411 (BSA) ; Sawaimadhapur : Ranthambhore, *Sharma* 3146 (RUBL) ; Sirohi : Mt. Abu, *Duthie* 6767 (DD).

3. *Themeda triandra* Forsk. Fl. Aegypt. Arab. 123, 178. 1775 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 254. f. 27. 1960. *Anthistiria imberbis* Retz. Obs. Bot. 3 : 11. 1783 ; Hook. f. Fl. Brit. India 7 : 211. 1896.

Erect, perennial, unbranched grass. Leaves upto 25.0 × 0.5 cm, linear, acute ; ligule short, ciliolate. Spikes in globose or in small, racemose clusters. Spathes glabrous or sparsely hairy. Involucral spikelets oblong - lanceolate, acute, inserted at different levels. Hermaphrodite spikelets cylindrical, obtuse, hairy. Pedicelled spikelets very narrow.

Fl. & Fr. : October - December.

Rare, found in rocky habitats.

Selected specimens : Banswara : Ghatol, *Kanodia* 75164 (BSI) ; Sirohi : Mt. Abu, *Jain* 60190, 60491 (BSI), *Rao* 66631 (BSI).

96. TRAGUS A. Haller *nom. cons.*

Tragus roxburghii Panigrahi in Kew Bull. 29 : 495. 1974. *Lappago biflora sensu* Roxb. Fl. Ind. 1 : 284. 1820, *quoad descript.*, *excl. typo*. *Tragus biflorus sensu* Schult. Syst. Veg. Mant. 2 : 205. 1824, *quoad descript.* ; Bor, Grass. Burm. Ceyl. Ind. Pak. 682. 1960. *T. racemosus sensu* Hook. f. Fl. Brit. India 7 : 97. 1896, non Scop. 1777. *Nazia racemosa auct.* non O. Ktze. 1891 ; Blatt. & McC. Bombay Grasses 217. pl. 144. 1935.

Geniculately ascending or prostrate annuals, often rooting at lower nodes. Leaves 0.5 - 5.0 × 0.25 - 0.5 cm, linear - lanceolate, acuminate, margins undulate, with tubercle based bristles ; ligule a ciliate rim. Inflorescence upto 6.5 cm long, cylindrical, loose, spike like panicle ; rachis pubescent. Spikelets in pairs, 2.5 - 3.25 mm long, pedicellate, acute. Lower glume very minute, hyaline ; upper one c. 3 mm long, coriaceous, 5 nerved, with rows of stout, hooked spines. Lemma solitary, shorter, oblong lanceolate, apiculate. Caryopsis upto 1.5 mm long, compressed, oblong elliptic.

Fl. & Fr. : August - November.

Fairly common throughout Rajasthan in plains. Usually grazed by the cattle.

Selected specimens : Ajmer : *Lourie* 5244-A (DD) ; Banswara : Paloda, *Singh* 2801 (BSJO) ; Bharatpur : *Khisti* 59989 (BSI) ; Bikaner : Bhikampur, *Roy* 2022 (BSJO) ; Jaipur : Gujar ki Dhani, *Sharma* 527 (RUBL) ; Udaipur : *Kanodia* 82289 (BSI).

97. TRIPOGON Roem. & Schult.

1a. Lemmas cleft at the apex into 2 lobes, awned in the cleft ; lobes awned or not :

2a. Median awn as long or longer than lemma. ... 5. *T. capillatus*

2b. Median awn absent or shorter than lemma :

3a. Leaves glabrous :

4a. Leaves and culms glaucous. Leaves upto 20 cm long, filiform, convolute ; ligule short, ciliate. ... 2. *T. Jacquemontii*

- 4b. Leaves and culms green, not glaucous.
Leaves more than 25 cm long, 4 - 8 mm
wide, flat ; ligule absent. ... 3. *T. lisboae*
- 3b. Leaves covered with a mass of matted
white hairs. ... 4. *T. purpurascens*
- 1b. Lemmas cleft at the apex into 4 lobes or with a
definite lobe between each lateral awn and the
median. ... 1. *T. bromoides*

1. *Tripogon bromoides* Roem. & Schult. Syst. Veg. 2 : 600. 1817 ;
Hook. f. Fl. Brit. India 7 : 287. 1896 ; Blatt. & McC. Bombay Grasses
269. pl. 182. 1935 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 521. 1960.

Tufted, stout, annual grass, upto 40 cm high. Leaves flat or
convolute and filiform, longer or shorter than the culms. Spikes 5 - 18 cm
long. Spikelets very variable, 3.5 - 12.0 mm long. Lower glume
membranous, ovate to lanceolate, deeply notched ; upper one oblong-
lanceolate, deeply bifid, awned. Lower lemma bearded at the base, 4 - fid
at the top, awned.

Fl. & Fr. : September - October.

Occasionally found in neglected corners of gardens, cultivated fields,
on the hills and in wastelands. Highly polymorphic species as regards to
its habit, shape and size of spikelets.

Selected specimens : Chittorgarh : Jain 58709 (BSI) ; Dungarpur :
Kanodia 82040 (BSI) ; Kota : Kishanganj, Verma 721 (CAL) ; Sirohi :
Mt. Abu, Raizada 20574 (DD).

2. *Tripogon jacquemontii* Stapf in Kew Bull. 1892 : 85. 1892 ;
Hook. f. Fl. Brit. India 7 : 286. 1896 ; Blatt. & McC. Bombay Grasses
268. pl. 181. 1935 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 522. 1960.

Tufted perennials, upto 50 cm high. Leaves upto 25.0 × 0.25 cm,
filiform, glabrous ; ligule a scarious rim. Spikes upto 20 cm long, slender,
solitary. Spikelets upto 20 cm long, narrowly oblong, appressed. Glumes
subcoriaceous. Lower glume c. 3.25 mm long, acute, lobed ; upper one
c. 4 mm long, acute. Lemma c. 4 mm long, 2 - fid at the apex and with
a median awn. Caryopsis upto 5 mm long, oblong, terete, glabrous.

Fl. & Fr. : September - December.

Common along river beds, streams, open wastelands and in rocky
habitats.

Selected specimens : Banswara : Danpur, Singh 3728 (BSJO) ; Bharatpur : Sikandra, Parmar 8746-A (BSJO) ; Jaipur : Ramgarh, Sharma Acc. No. 8194 (RUBL) ; Jhalawar : Mishroli, Wadhwa 7654 (CAL) ; Jodhpur : Bhandari 1658 (JAC) ; Udaipur : Nal, Kanodia 82474 (BSI).

3. *Tripogon lisboae* Stapf in Kew Bull. 1892 : 84. 1892 ; Hook. f. Fl. Brit. India 7 : 286. 1896 ; Blatt. & McC. Bombay Grasses 267. pl. 180. 1935 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 522. 1960.

Stout, slender perennials, 40 - 80 cm high. Leaves 20 - 50 × 0.35 - 0.75 cm, flat or convolute, quite smooth. Spikes 10 - 25 cm long. Spikelets 3.5 - 12.5 mm long, densely crowded. Glumes coriaceous, unequal ; lower glume c. 2 mm long, lanceolate, acute ; upper one c. 5 mm long, toothed at the top. Lemma shortly 2 - toothed at the top. Caryopsis narrowly oblong, terete, glabrous.

Fl. & Fr. : September - November.

Occasionally found near moist habitats.

Selected specimens : Ajmer : Bhim, Duthie 4961 (DD) ; Sitohi : Mt. Abu, Rao 66643 (BSI), Jain 46606-A (BSI).

4. *Tripogon purpurascens* Duthie in Ann. Roy. Bot. Gard. Calcutta 9 : 75. t. 92. 1901 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 522. 1960. *T. abyssinicus sensu* Stapf *apud* Hook. f. Fl. Brit. India 7 : 287. 1896, non Nees ex Steud. 1854. *jacquemontii* Stapf var. *submuticus* Hook. f. l.c. 7 : 287. 1896.

Tufted, erect perennials, upto 50 cm high, often with fibrous roots. Leaves filiform, upto 15 cm long. Spikes upto 15 cm long. Spikelets 3 - 7 mm long, narrow. Lower glume 1.5 - 2.5 mm long, 1 nerved ; upper one 2.5 - 4.5 mm long, lanceolate, 1 nerved. Lowest lemma with a minute median awn.

Fl. & Fr. : May - August.

Occasionally found in dry habitats.

Selected specimens : Banswara : Wadita, Singh 2873-B (BSJO) ; Bharatpur : Sikandra, Parmar 8748-A (BSJO) ; Churu : Gopalpura, Roy 2679 (BSJO).

5. *Tripogon capillatus* Jaub. & Spach. Ill. Fl. Or. 4 : 47. t. 332. 1851 ; Hook. f. Fl. Brit. India 7 : 285. 1896 ; Bor, Grass, Burm. Ceyl. Ind. Pak. 521. 1960.

Densely tufted, erect or geniculately ascending grass, 15-40 cm high. Leaves 15-24 × 0.5 cm, linear, finely pointed, convolute, green; sheaths glabrous, striate; ligule reduced to a ridge. Spikes 12-30 cm long, filiform, capillary, flexuous. Spikelets 3 to 4 flowered, distant along the rachis of spikes, long awned. Involucral glumes lanceolate, thinly membranous; lower ones cuspidate-acuminate; upper ones bigger than lower. Palea as long as glume, narrow, oblanceolate-oblong, hyaline.

Fl. & Fr. : September - November.

Rare, growing on rocks, old walls, in the axils of leaf-scars on *Phoenix sylvestris* (L.) Roxb. etc.

Selected specimens : Sirohi : Mt. Abu, Mehta 1728, 1936 (JAC), Blatter 2592 (BLAT).

98. UROCHLOA P. Beauv.

- | | |
|---|---|
| 1a. Lower lemma with a very conspicuous fringe of bristles : | |
| 2a. Annual grass. Spikelet densely covered with a velvety pubescence. Lower glume upto half as long as the spikelet. | ... 3. <i>U. panicoides</i>
var. <i>velutina</i> |
| 2b. Perennial rhizomatous grass. Spikelet almost glabrous. Lower glume over two third as long as the spikelet and with 1 or 1-3, stiff, tubercle based hairs. | ... 1. <i>U. mosambicensis</i> |
| 1b. Lower lemma without fringe of bristles. | ... 2. <i>U. panicoides</i>
var. <i>panicoides</i> |

1. *Urochloa mosambicensis* (Hack.) Dandy in Journ. Bot. 69 : 54, 1931; Bor, Grass Burm. Ceyl. Ind. Pak. 372. 1960; Ved. & Uniyal in Bull. Bot. Surv. India 22 : 210-212. f. A 1. 1980. *Panicum mosambicense* Hack. in Bolet. Soc. Brot. 6 : 140. 1888. *P. notabile* Hook. f. Fl. Brit. India 7 : 32. 1896.

Perennial grass, c. 3/4 m tall, often rooting at the lower nodes. Leaves 5-10 × 0.75-1.0 cm, lanceolate, acute, rounded at the base, glabrous or hirsute. Ligule 1.0-1.5 mm long. Inflorescence upto 15 cm long with 3-angled or flattened rachis. Spikelets 3-5 mm long, ovate, acuminate or shortly awned, glabrescent, solitary or in pairs. Lower glume 2.5-4.0 mm long, ovate-lanceolate, obtuse, 3-nerved, usually

with 1-3, stiff, tubercle based hairs on the middle nerve; upper glume equal to the size of spikelet, 5 nerved, with fringe of hairs near margins. Lower floret male; stamens 3. Upper floret hermaphrodite.

Fl. & Fr. : August - November.

Occasionally found along the water courses in sandy habitats. It is a recently introduced grass from East Africa and Burma.

Selected specimen : Jaipur : Ramgarh, Sharma 717 (CAL).

2. *Urochloa panicoides* P. Beauv. Ess. Agrost. 53. t. 11. f. 1. 1812; Bor, Grass. Burm. Ceyl. Ind. Pak, 372. 1960; Raizada & Jain in Ind. For. Rec. (n.s.) Bot. 5 : 177. pl. 4. f. 4. 1965. *Panicum javanicum* Poir. in Lam. Encycl. Math. Bot. Suppl. 4 : t. 274. 1816; Hook. f. Fl. Brit. India 7 : 35. 1896. *Urochloa pubescens* Kunth, Rev. Gram. 1 : 31. 1829. *U. panicoides* P. Beauv. var. *pubescens* (Kunth) Bor, l.c. 372. 1960.

var. *panicoides*

Tufted, prostrate or geniculately ascending grass, often rooting at the lower nodes. Leaves upto 12.5 × 2.5 cm, linear lanceolate, acute, with semi amplexicaul base, margins crisped undulate, ciliate; sheaths striated, densely ciliated pubescent; ligule a ciliate rim. Racemes 2-8, subsessile, erect or spreading, secund, each upto 5.5 cm long, rachis flexuous, winged. Spikelets 3.75-5.0 mm long, biseriate, ovate or elliptic-oblong, acute, glabrous or pubescent. Lower glume about half as long as the spikelet, 5 nerved; upper one equal to the size of spikelet, more than 7 nerved. Upper lemma hermaphrodite, mucronate, finely transversely rugulose or granular. Caryopsis upto 2.5 mm long, rotundate-elliptic, compressed, yellowish-brown.

Fl. & Fr. : August - November.

Common on low hillocks and as a weed in cultivated and fallow fields.

Selected specimens : Alwar : Pandupole, Parmar 9460 (BSJO); Banswara : Khamera, Singh 2908 (BSJO); Jhalawar : Aklera, Wadhwa 7603 (BSA); Nagaur : Agrawal 568 (DD); Sirohi : Mt. Abu, Blatter 2576 (BLAT); Udaipur : Agrawal 436 (DD).

Notes : On the basis of pubescent nature of spikelets, Bor (l.c.) described a variety viz. var. *pubescens* ((Kunth) Bor, under *Urochloa panicoides* P. Beauv., but in most of the floras the character of spikelets

is mentioned as glabrous or pubescent. The author noted glabrous and pubescent spikelets in the same raceme in the above mentioned specimens. Therefore, var. *pubescens* has been merged under *U. panicoides* proper. This concept also finds support from the works of many other authors.

The above species is also very similar to *Brachiaria ramosa* (L.) Stapf, but the latter can be identified by having smaller spikelets upto 3.5 mm long and the mucro of the upper lemma almost suppressed.

3. var. *velutina* (Henr.) Bor, Grass. Burm. Ceyl. Ind. Pak. 373. 1960. *U. marathensis* Henr. var. *velutina* Henr. in Meded. Rijks. Herb. Leiden. 43 : 2. 1922.

This variety is very similar to *U. panicoides* P. Beauv. proper, but can be distinguished by spikelets being densely covered with a velvety pubescence.

Fl. & Fr. : August November.

Occasionally found as a forest undergrowth in moist and shaded localities.

Selected specimens : Jhalawar : Hathikhedi block, Wadhwa 7668 (CAL) ; Kota : Shahabad, Majumdar 10810 (BSA). Also reported from Sikar (Nair & Nathawat, 1957).

99. UROCHONDRA C.E. Hubb.

Urochondra setulosa (Trin.) C.E. Hubb. in Hook. Icon. Pl. 35. t. 3457. 1947 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 634. 1960 ; Pandey *et al.* in Bull. Bot. Surv. India 24 : 144. 1982. *Vilfa setulosa* Trin. in Mem. Acad. Sci. Petersb, ser. 6. 6 (2) : 55. 1840. *Crypsis dura* Boiss. Diagn. ser. 2. 4 : 125. 1859. *Heleochloa dura* (Boiss.) Boiss. Fl. Orient. 5 : 477. 1884 ; Hook. f. Fl. Brit. India 7 : 236. 1896. *H. setulosa* (Trin.) Blatt. & McC. Bombay Grasses 205. pl. 134. 1935.

Caespitose, erect or geniculately ascending, rhizomatous perennials, 20 - 80 cm high. Leaves upto 25.0 × 0.75 cm, convolute, rigid, pungent. Inflorescence upto 15 cm long, spike-like, cylindrical, solitary, densely pubescent at the base. Spikelets c. 2.5 mm long, densely imbricate, oblong. Glumes linear-lanceolate or oblong, acutish on the keel ; lower one upto 2.5 mm long, upper one upto 3 mm long. Lemma 2.5 - 3.0 mm long, ciliate on the keel.

Fl. & Fr. : November - March.

Common in moist, saline habitats, particularly in W. Rajasthan desert.

Selected specimen : Barmer : Sajyali salt bed, *Tiwari* 987 (BSJO). Also reported by Sankhala (1951) from N.W. Rajasthan.

100. VETIVERIA Lem. - Lisanc.

Aromatic grass. Sessile spikelets awnless ; joints and pedicels glabrous. Lower glume spinulosely muriculate. ... 2. *V. zizanioides*

Grass not aromatic. Sessile spikelets distinctly awned ; joints and pedicels with a basal tuft of silky hairs. Lower glume with a row or upwardly directed, white, transparent, marginal tubercles which become spinulose at the tip. ... 1. *V. lawsonii*

1. *Vetiveria lawsonii* (Hook. f.) Blatt. & McC. in Journ. Bombay Nat. Hist. Soc. 32 : 409. 1928 & Bombay Grasses 64. 1935 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 258. 1960. *Andropogon lawsonii* Hook. f. Fl. Brit. India 7 : 187. 1896.

Tufted, erect perennials, 0.5 - 2.0 m high, with stout, root - stock. Leaves 10 - 40 × 0.25 - 0.65 cm, linear, acute, margins ciliate ; ligule a ridge of hairs. Panicles upto 25 cm long. Sessile spikelets 4 - 5 mm long ; callus bearded with silky hairs. Pedicellate spikelets male, awned, longer and narrower than the sessile ; callus naked. Pedicels nearly equalling the spikelets.

Fl. & Fr. : September - March.

Rare, found in moist, sandy places. It is a good fodder grass.

Selected specimen : Tonk : Bisalpura R.F., *Shetty* 1310 (BSJO).

2. *Vetiveria zizanioides* (L.) Nash in Small, Fl. South - East U.S. 67. 1903 ; Blatt. & McC. Bombay Grasses 65. pl. 40. 1935 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 258. 1960 ; Raizada *et al.* in Ind. For. Rec. (n.s.) Bot. 4 : 220. pl. 7. f. 2. 1961. *Phalaris zizanioides* L. Mant. Pl. 2 : 183. 1771. *Andropogon squarrosus sensu* Hook. f. Fl. Brit. India 7 : 186. 1896, non L. f. 1781.

Tufted, erect perennials, 0.5 - 1.25 m high. Leaves c. 35.0 × 1.5 cm, linear, glaucous. Panicles 10 - 30 cm long, contracted. Sessile spikelets 3.0 - 3.5 mm long, with distinct hairless callus. Lower and upper glumes 3 nerved, spinulose. Lower lemma retrorsely ciliate; upper notched. Pedicellate spikelets 3 - 4 mm long, male.

Fl. & Fr. : August - March.

Common in moist habitats; also grown in forest nurseries.

Selected specimens : Ajmer : *Duthie* 4923 (DD); Alwar : *Algal, Sharma* 3971 (RUBL); Banswara; *Singh* 3004 (BSJO); Ganganagar : Hanumangarh, *Roy* 5039 (BSJO); Jaipur : *Digotha, Sharma* 3746 (RUBL); Jhalawar : *Bijlia Bhadok, Wadhwa* 7489 (BSA); Tonk : *Banatha, Shetty* 1042 (BSJO).

DOUBTFUL TAXA

Chloris roxburghiana Schult. Syst. Veg. Mant. 2 : 339. 1827; *Bor, Grass. Burm. Ceyl. Ind. Pak.* 468. 1960. *C. polystachya* Roxb. Fl. Ind. 1 : 332. 1820, non *Lagasca* 1816; *Hook. f. Fl. Brit. India* 7 : 292. 1896.

Blatter and Hallberg (1918 - 21) reported from Jodhpur and Jaisalmer districts, but no specimen available. This species is denizen of East Africa and Tamil Nadu (*Bor, l.c.*). Hence, presence of this taxon in Rajasthan is rather doubtful, probably a case of misidentification.

Chrysopogon polyphyllus (Hack. ex *Hook. f.*) *Blatt. & McC.* in *Journ. Bombay Nat. Hist. Soc.* 32 : 416. 1928. & *Bombay Grasses* 72. pl. 43. 1935; *Bor, Grass. Burm. Ceyl. Ind. Pak.* 118, 1960. *Andropogon polyphyllus* *Hack. ex Hook. f. Fl. Brit. India* 7 : 194. 1896.

This species was collected by *Blatter* from Mt. Abu (Collection No. 2250, BLAT). But, the herbarium specimen is not traceable. Subsequently Mt. Abu has been explored by a number of workers, but no one could report its occurrence there. This species finds its distribution in hotter parts of Central India, Bombay and Madras, and there are possibilities of its invasion in Rajasthan.

Digitaria tomentosa (Koenig ex *Willd.*) *Henr.* in *Blumea* 1 : 100. 1934; *Bor, Grass. Ceyl. Ind. Pak.* 306. 1960. *Milium tomentosum* *Koenig ex Willd.* in *Ges. Naturf. Freund. Berlin Neue Schr.* 4 : 220. 1803. *Panicum nubeghume* *Trin.* in *Mem. Acad. Sci. Petersb. ser. 6.* 3 : 292. 1834; *Hook. f. Fl. Brit. India* 7 : 51. 1896.

This species is so far reported by Sankhala (1951) from N.W. Rajasthan without specific locality. According to Bor (*l.c.*) this taxon is endemic to Madras state. So, presence of this species in the Rajasthan is doubtful. The herbarium specimens from Rajasthan are not traceable in any Indian herbarium.

Jansenella griffithiana (C. Muell) Bor, in Kew Bull. 1955 : 98. 1955 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 426. f. 45. 1960. *Danthonia griffithiana* C. Muell. in Bot. Z. 14, 347. 1856. *Arundinella avenacea* Munro ex Thw. Enum. Pl. Zeyl. 362. 1864 ; Hook. f. Fl. Brit. India 7 : 69. 1896.

Reported by Sankhala (1951) from N.W. Rajasthan. No herbarium specimens are available in any of the Indian herbarium. The distribution (Bor, *l.c.*) of species is in Eastern India (Assam), Bombay, Madras and Ceylon. The identity of this species is doubtful.

Leersia hexandra Swartz, Prodr. Veg. Ind. Occ. 21. 1788 ; Hook. f. Fl. Brit. India 7 : 94. 1896 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 599. 1960.

Panicles less than 10 cm long. Spikelets closely imbricate, 2.5-4.0 mm long, oblong, plano-convex, smooth on the sides. Lower florets suppressed. Glumes represented by an entire or 2-lobed rim ; lemmas awnless.

This taxon finds distribution in the east of Bengal from Nepal eastwards to Burma and southwards to Malay peninsula and Sri Lanka. Mehta has included this taxon in his thesis on the flora of Mt. Abu based on NKS 1134 (JAC). The author could not see this specimen and consider its occurrence doubtful.

Sporobolus piliferus (Trin.) Kunth, Enum. Pl. 1 : 211. 1833 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 632. 1960. *Vilfa piliferus* Trin. Diss. Bot. 157. 1824. *Sporobolus ciliatus* Munro ex Hook. f. Fl. Brit. India 7 : 251. 1896.

Reported by Sankhala (1951) from N.W. Rajasthan. As per distribution, this species occurs in temperate hilly areas of India. The author considers its presence in Rajasthan as doubtful. No herbarium specimen from Rajasthan could be seen.

CULTIVATED SPECIES

Hordeum vulgare L. *Jao*, (Hindi). An erect, glabrous annual. Spikes emerging from leaf sheaths, 2-ranked. Cultivated as a rabi crop for grains and straw.

***Oryza sativa* L.** Rice, Chaval (Hindi). Tall, annual grass. Panicles lax, at length drooping. Spikelets persistent, pale-brown at maturity. Cultivated in ponds and low - lying areas for its grains and hay.

***Panicum coloratum* L.** Erect or geniculately ascending, caespitose, glabrescent, dwarf grass. Panicles open or contracted. Spikelets c. 2 mm long, acutish. Lower glume upto 5 nerved. Native of tropical and subtropical Africa ; introduced in India as a fodder grass.

***Pennisetum americanum* (L.) Lecke** [*P. typhoides* (Burm. f.) Staf & C.E. Hubb.] Pearl millet, Bajra (Hindi). Tall, robust annuals, with terminal long panicles with villous or woolly rachis. Each involucre with 2 to many spikelets. Lemmas pubescent on the margins. Anther cells bearded. A very common rainy - season crop cultivated for grains and fodder throughout Rajasthan.

***Saccharum officinarum* L.** Sugar cane, Gana, Ikh (Hindi). Tall, perennial, rhizomatous plant, with leaves wide and laminate right to the base. Spikelets awnless ; glumes glabrous. Cultivated extensively for cane - sugar.

***Sorghum bicolor* (L.) Moench.** (*Holcus saccharatus* L.) Sorghum, Jawar, Jowar (Hindi). Tall, annuals, with decompound, large, terminal panicles and persistent sessile spikelets. Grains white, exposed by the gaping glumes. Commonly cultivated during the rainy season.

***Triticum aestivum* L.** Wheat, Kanak, Gehu (Hindi). Medium - sized annuals, with flat leaves. Inflorescence a terminal, distichous spike. Spikelets solitary, awned. Glumes with a compressed keel in the upper half only. Grains usually elliptic to oblong. Widely grown for its grains and straw. Many varieties are grown in the area.

***Zey mays* L.** Maize, Makki (Hindi). - A monoecious grass. The male spikelets usually in terminal racemes, while the solitary female inflorescence consists of many female spikelets seated on a spongy axis. Cultivated during rainy season for its grains. Stalks serve good fodder.

FLORISTIC ANALYSIS

(R.P. Pandey)

The present work enumerates 1911 indigenous and naturalised plant species belonging to 780 genera under 154 families. Besides this, 274 cultivated plant species have also been included in the present work.

Table 1 : Statistical synopsis of the indigenous and naturalised flora in Rajasthan state.

<i>Taxonomic groups</i>	<i>Families</i>		<i>Genera</i>		<i>Species</i>	
	<i>No.</i>	<i>%</i>	<i>No.</i>	<i>%</i>	<i>No.</i>	<i>%</i>
Angiosperms						
Dicotyledons	122	79.22	602	77.15	1395	72.98
Monocotyledons	31	20.13	177	22.72	515	26.97
Gymnosperm	1	0.65	1	0.13	1	0.05
TOTAL	154	100.00	780	100.00	1911	100.00

The families with 20 or more species and more than 3 genera are as follows :

<i>Families</i>	<i>Species</i>	<i>Genera</i>
Poaceae (Gramineae)	296	102
Fabaceae (Papilionaceae)	173	49
Asteraceae (Compositae)	125	62
Cyperaceae	100	15
Acanthaceae	85	30
Euphorbiaceae	59	17
Convolvulaceae	58	12
Scrophulariaceae	54	26
Lamiaceae (Labiatae)	43	15
Malvaceae	53	11
Rubiaceae	38	23
Cucurbitaceae	37	14
Mimosaceae	31	8
Amaranthaceae	30	9
Boraginaceae	27	8
Tiliaceae	27	3
Caesalpiniaceae	26	10
Asclepiadaceae	25	16
Solanaceae	24	7
Brassicaceae (Cruciferae)	20	11

The genera with 10 or more species are : *Cyperus* (33), *Ipomoea* (28), *Indigofera* (27), *Eragrostis* (23), *Crotalaria* (20), *Euphorbia* (19), *Fimbristylis* (19), *Acacia* (17), *Heliotropium* (15), *Grewia* (14), *Poligonum* (14), *Ficus* (14), *Panicum* (14), *Justicia* (13), *Leucas* (13), *Alysicarpus* (16), *Cassia* (12), *Sporobolus* (12), *Abutilon* (11), *Convolvulus* (11), *Amaranthus* (11), *Commelina* (11), *Brachiaria* (11), *Digitaria* (11), *Desmodium* (10), *Tephrosia* (10), *Lindernia* (10), *Aristida* (10).

Even if the *Fabaceae s.l.* (Leguminosae) is taken as one family comprising 67 genera and 230 species, yet the family *Poaceae* occupies the first place, the second and third positions are occupied by *Leguminosae* and *Asteraceae* respectively.

Except for *Poaceae* (296 species) and *Cyperaceae* (100 species), the monocotyledons are very poorly represented. The remaining 118 species belong to 29 different families. The families represented by single genus and single species are : *Burmanniaceae*, *Cannaceae*, *Musaceae*, *Iridaceae*, *Ruscaceae*, *Smilacaceae*, *Juncaceae*, *Pandanaceae*, *Butomaceae*, *Aponogonaceae* and *Zannichelliaceae*.

Among the dicotyledons, the class Polypetalae is dominant and represented by 624 species belonging to 257 genera and 68 families. The families represented by single genus and single species are : *Magnoliaceae*, *Berberidaceae*, *Nelumbonaceae*, *Resedaceae*, *Cochlospermaceae*, *Bixaceae*, *Averrhoaceae*, *Simaroubaceae*, *Balanitaceae*, *Vahliaceae*, *Haloragaceae*, *Barringtoniaceae*, *Punicaceae*, *Trapaceae*, *Passifloraceae*, *Caricaceae*, *Begoniaceae* and *Alangiaceae*. The largest family of this group is *Fabaceae* which comprises 173 species belonging to 49 genera.

The class Gamopetalae finds second place and it is represented by 34 families having 276 genera and 594 species. The families represented by single genus and single species are : *Sphenocleaceae*, *Spigeliaceae*, *Hydrophyllaceae*, *Gesneriaceae* and *Martyniaceae*. The largest family of this group is *Asteraceae* having 125 species and 62 genera.

The class Monochlamydeae is represented by 177 species belonging to 69 genera and 20 families. It is interesting to note that Monochlamydeae is lowest among Monocotyledons and Dicotyledons. The families represented by single genus and single species are : *Basellaceae*, *Phytollacaceae*, *Piperaceae*, *Lauraceae*, *Proteaceae*, *Santalaceae*, *Cannabinaceae*, *Casuarinaceae*, and *Ceratophyllaceae*. The largest family of this group is *Euphorbiaceae* having 59 species belonging to 17 genera.

The ratio of species belonging to Monocotyledons to Dicotyledons is 1 : 2.7 of genera 1 : 3.4 and of families 1 : 3.9.

The ratio of total number of genera to species is 1 : 2.4. which is rather low in comparison to the corresponding ratio for whole of India which is estimated to be about 1 : 7, but it is more or less comparable to the ratio for Flora of Rajasthan Desert - 1 : 2.01 (Shetty & Pandey, 1979), Gangetic Plain region 1 : 2.2 (Maheshwari, 1963) and for Gujarat state 1 : 2.4 (Shah, 1978). This shows that the ratio is quite identical with the ratio of Gujarat state. This also shows the small proportion of species to the number of genera and families in this region. It further confirms to the general rule that, within the same floral region, the smaller the flora, the smaller the species genus ratio.

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Fig. 1 : *Cleome gynandra* Linn.



Fig. 2 : *Capparis decidua* (Forsk.) Edgew.
A. Flowering twig. B. Flower. C. Fruits.

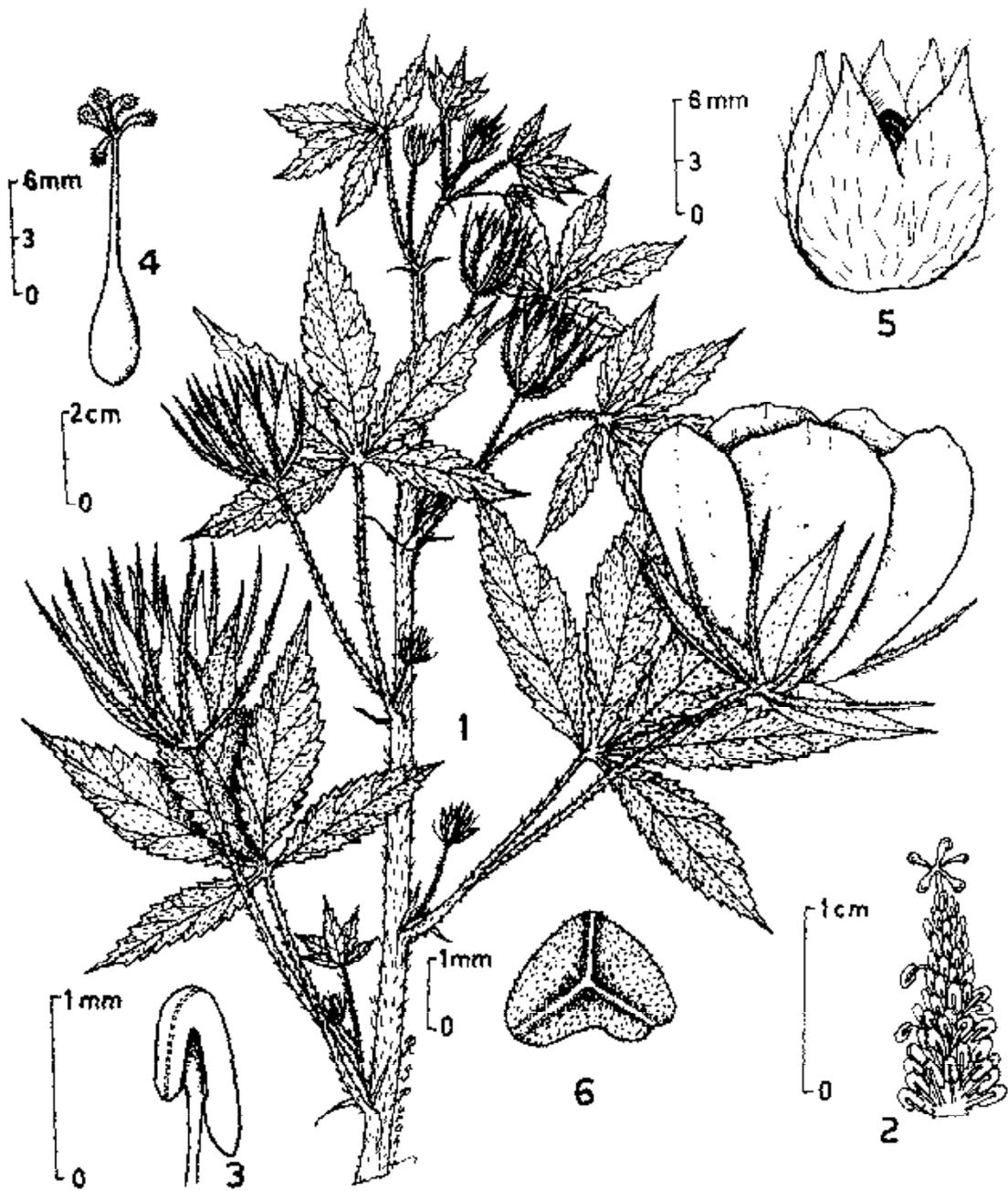


Fig. 3 : *Hibiscus caesius* Garck
 Habit. 2. Androecium. 3. Anther. 4. Gynoecium. 5. Dehiscent fruit. 6. Seed.

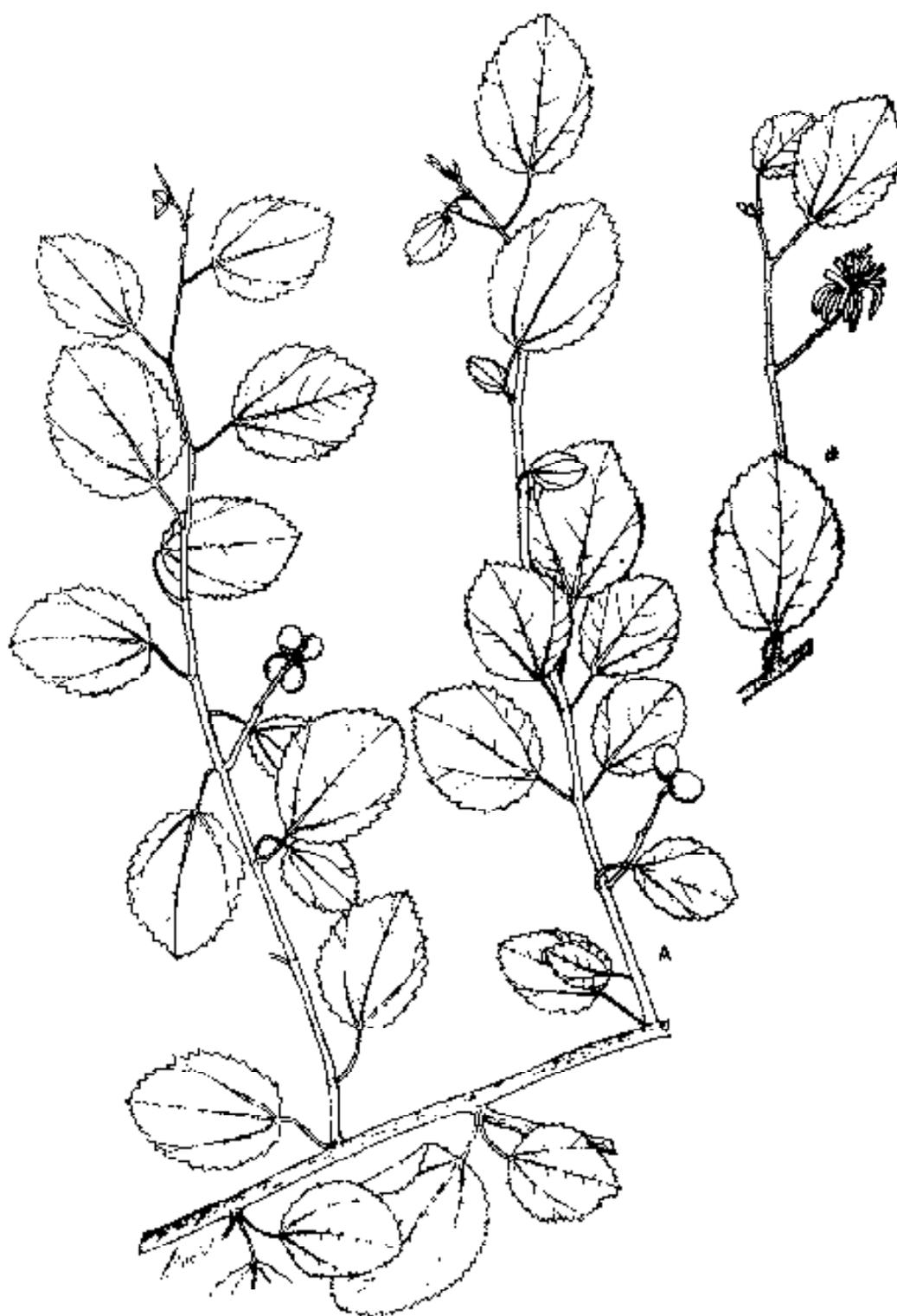


Fig. 4 : *Grewia tenax* (Forsk.) Fiori
A. Fruiting twig. B. Flowering twig.

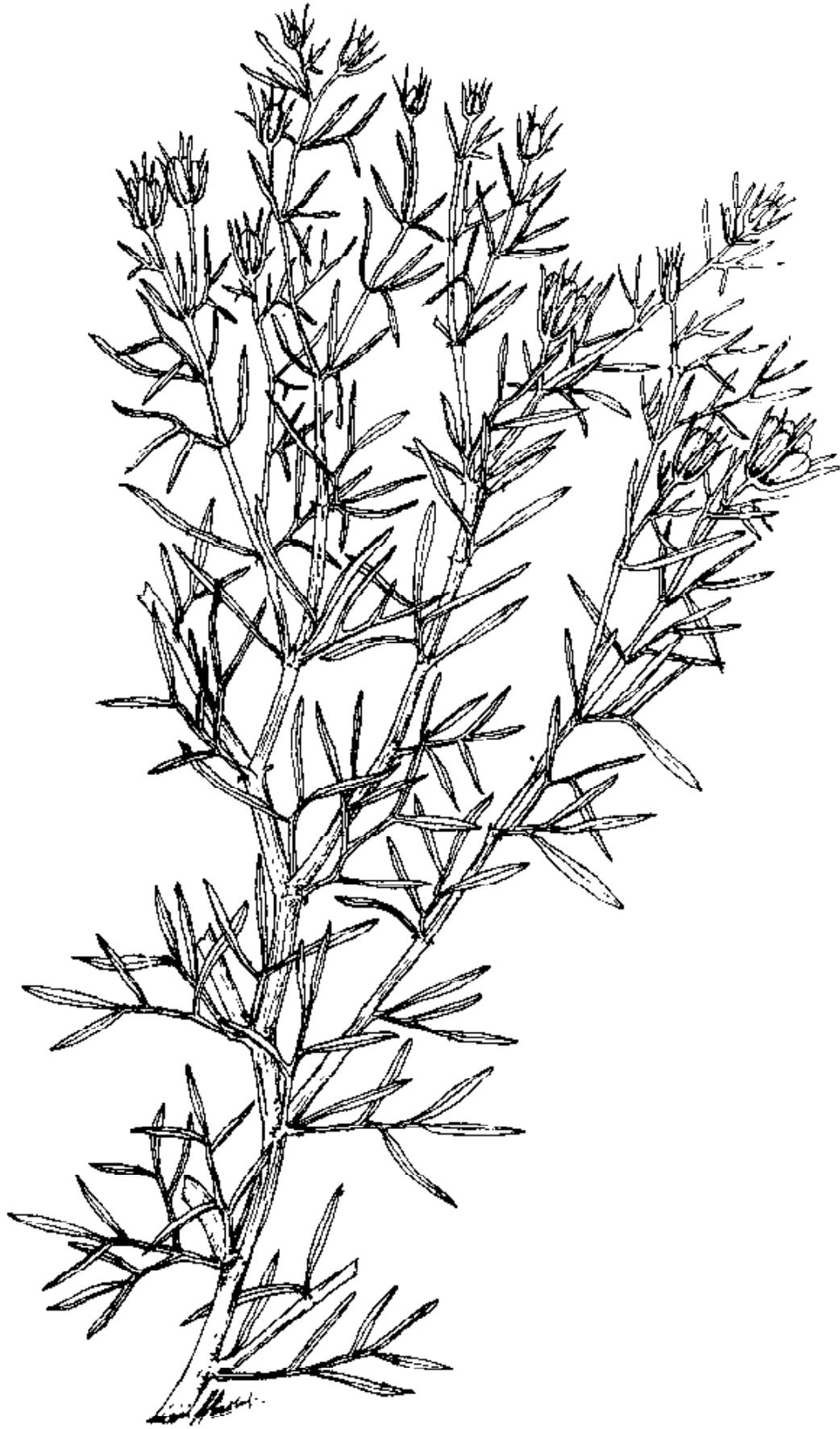


Fig. 5 : *Peganum harmala* Linn.

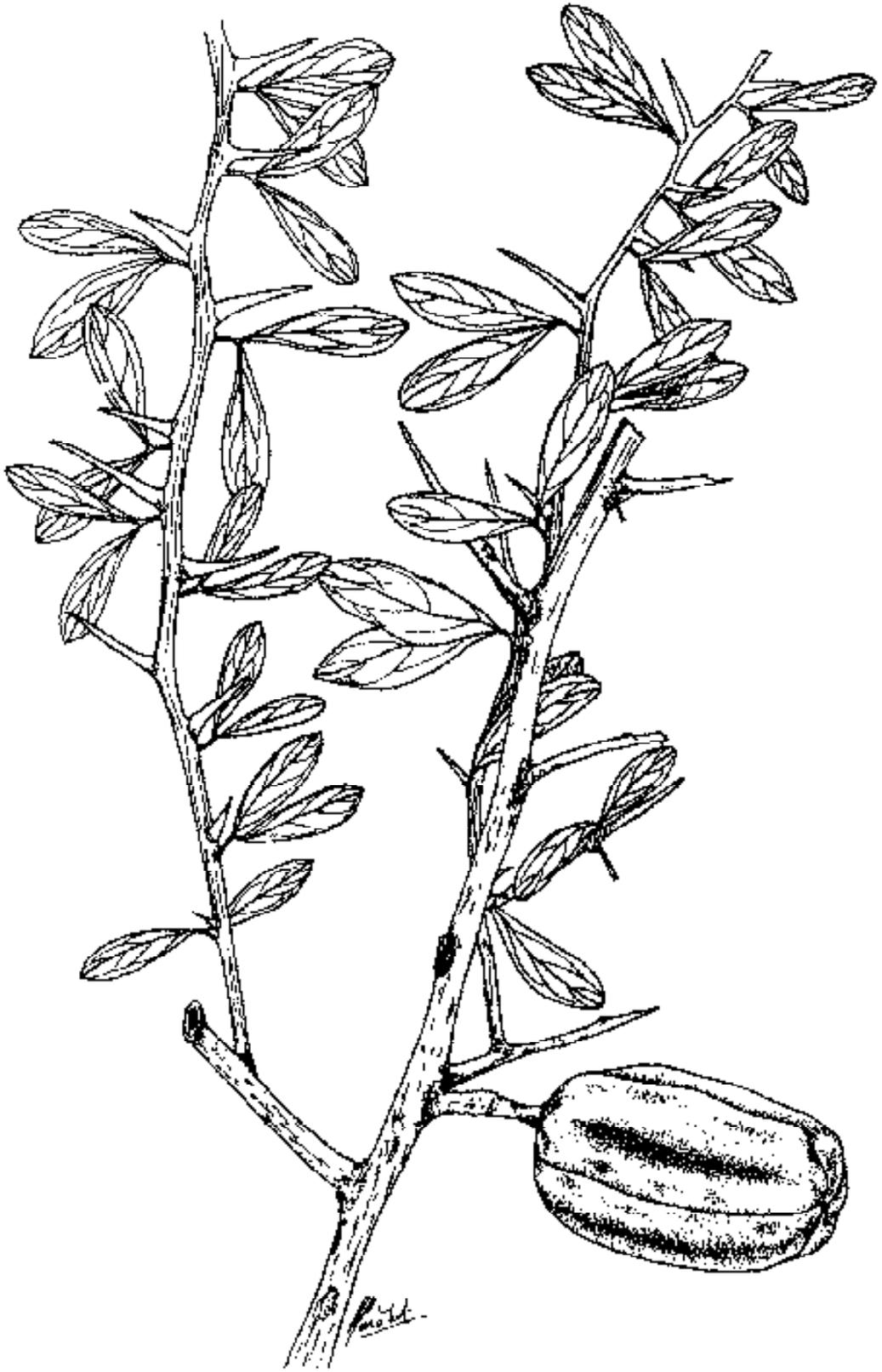


Fig. 6 : *Balanites aegyptiaca* (L.) Delile

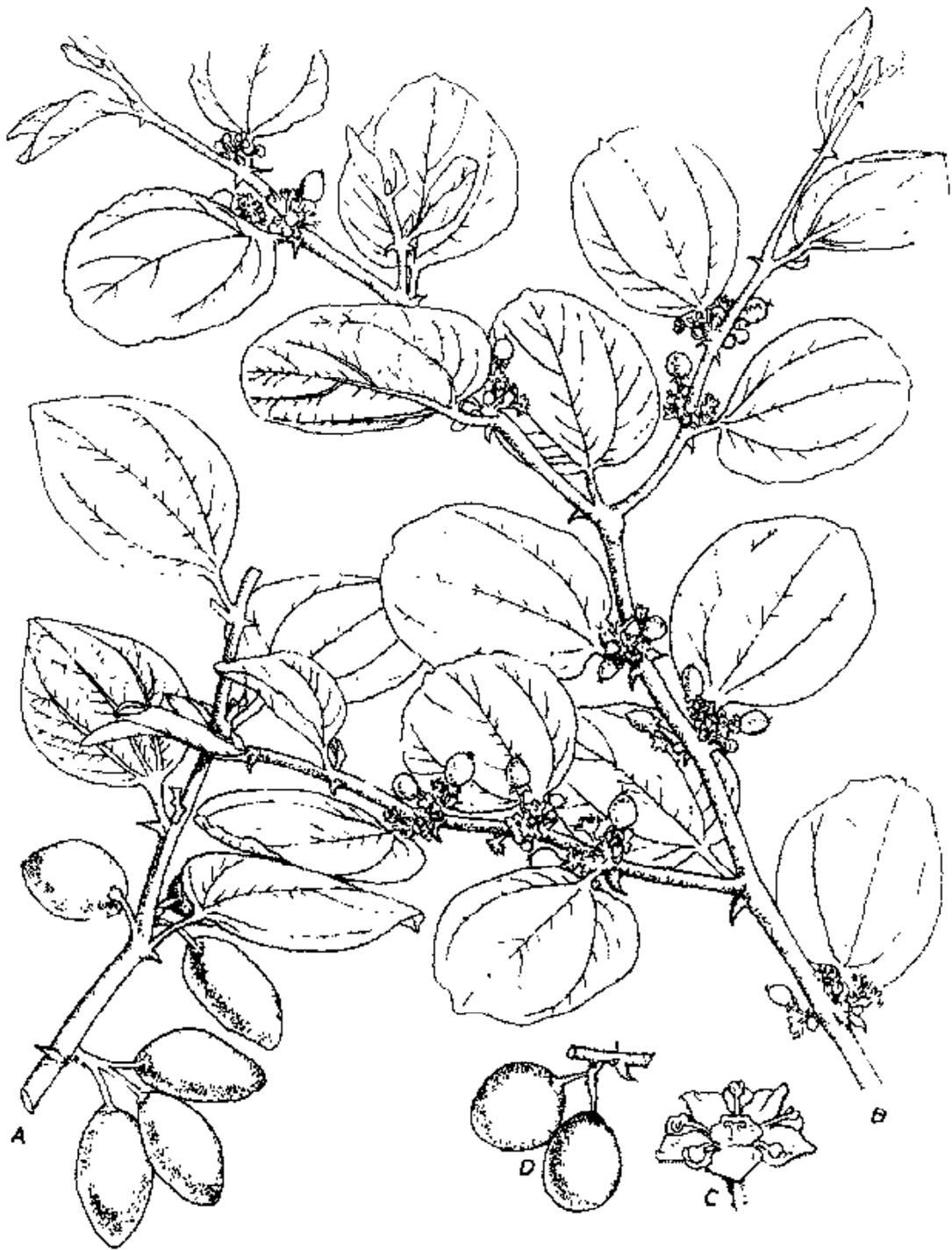


Fig. 7 : *Zizyphus mauritiana* Lamk.
A. Fruiting twig. B. Flowering twig. C. Flower. D. Drupes.

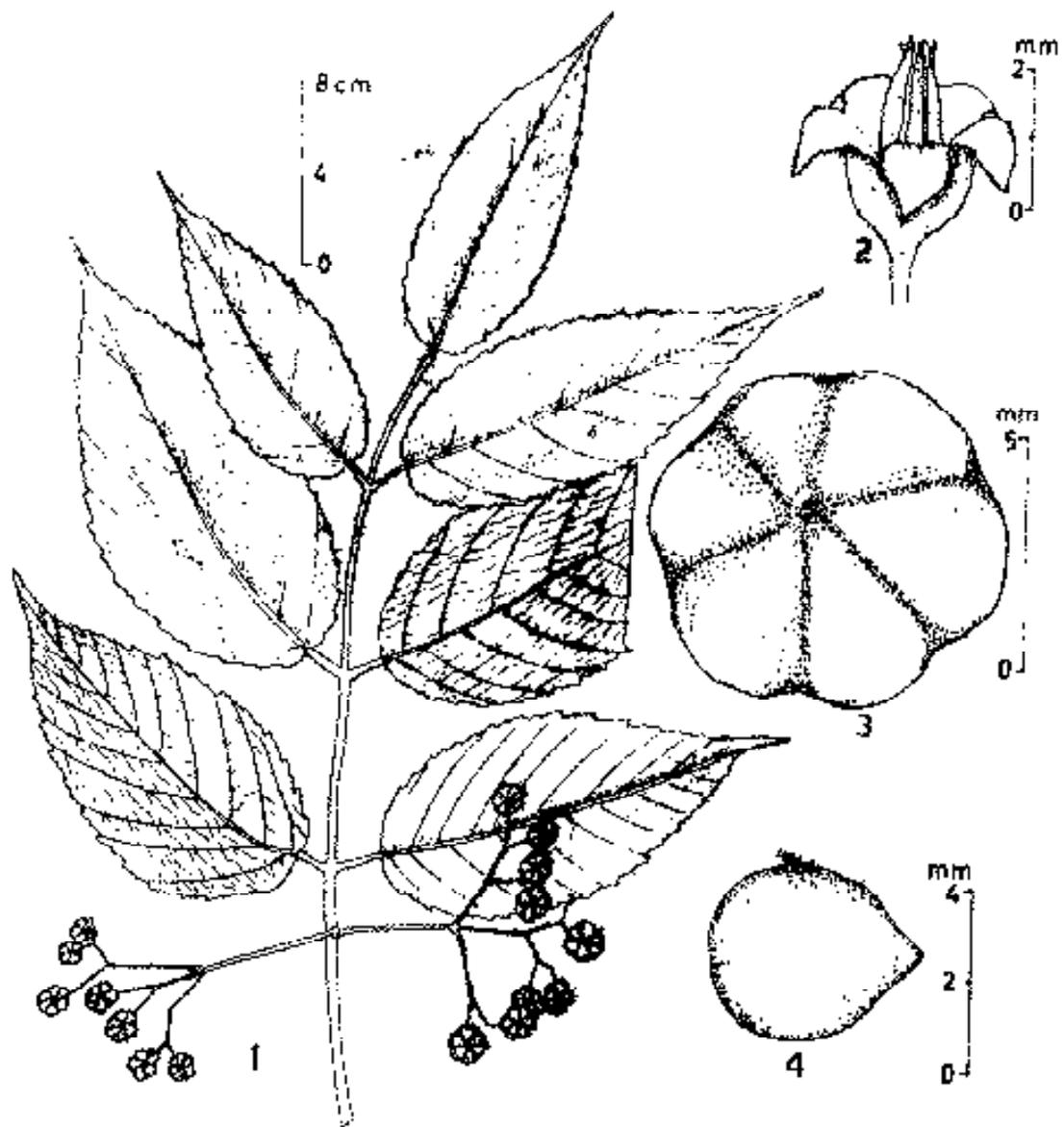


Fig. 8 : *Leea edgeworthii* Sant.
1. Habit. 2. Flower. 3. Fruit. 4. Seed.

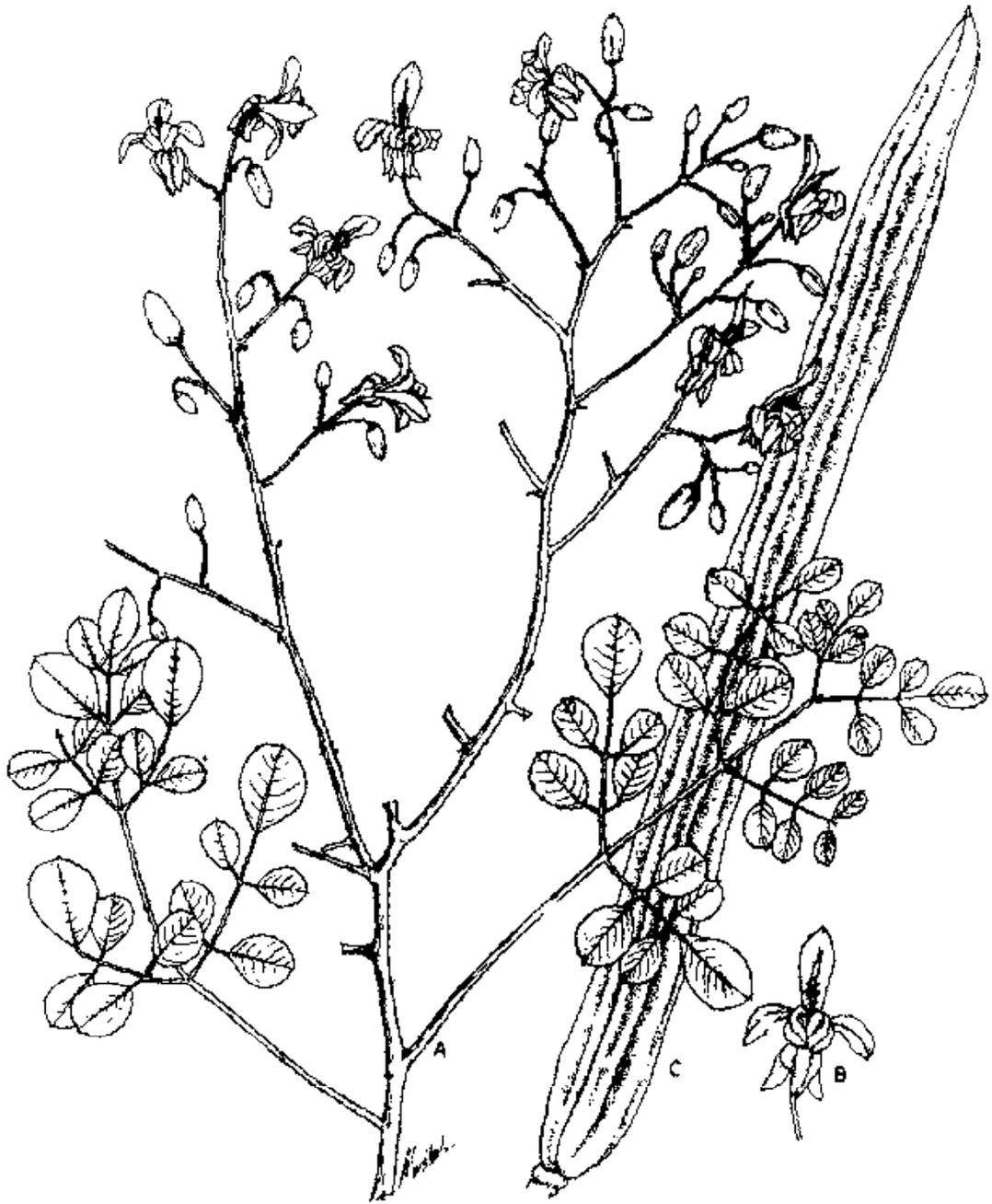


Fig. 9 : *Moringa oleifera* Lamk.
A. Flowering twig. B. Flower. C. Fruit.

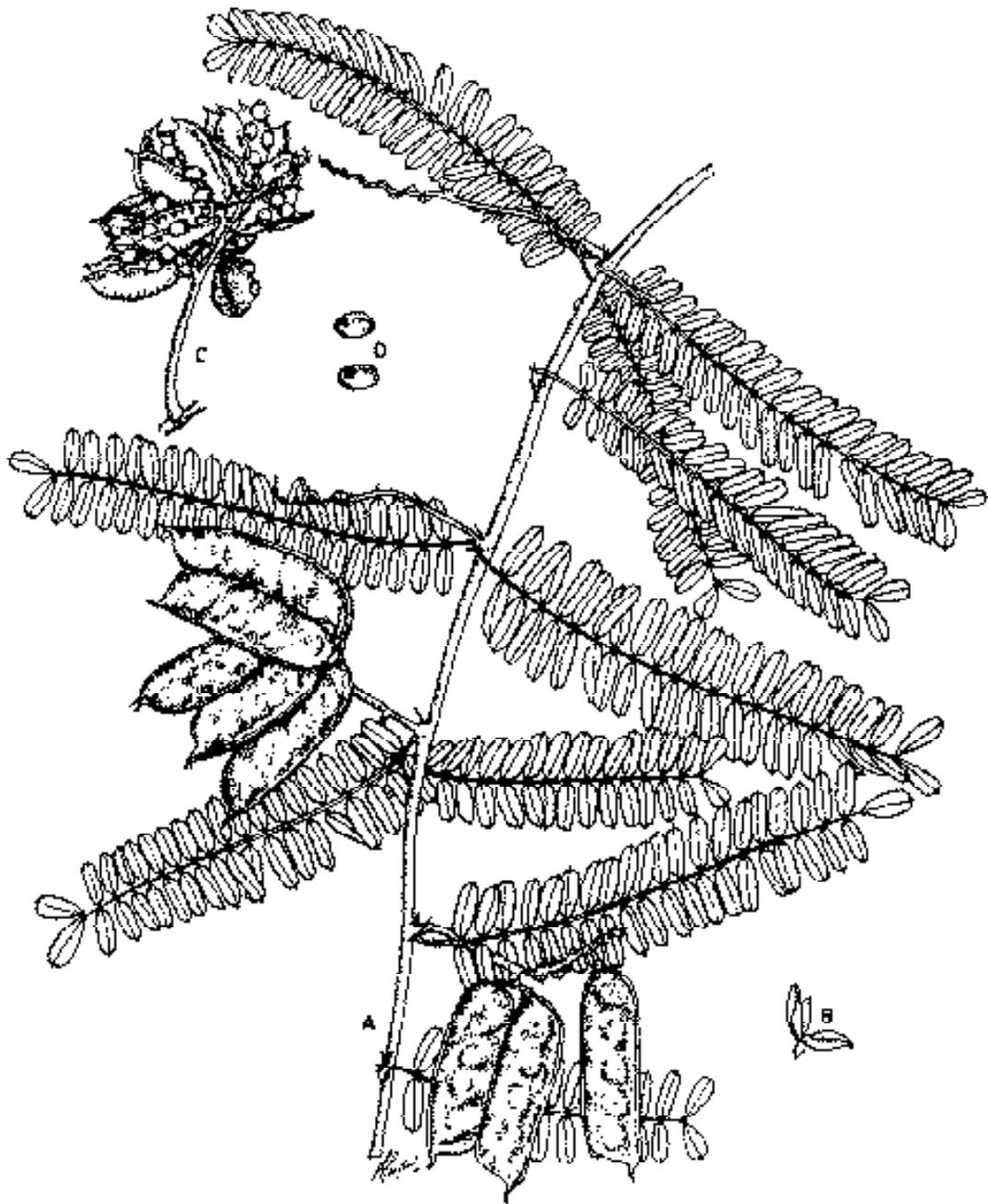


Fig. 10 : *Abrus precatorius* Linn.
A. Fruiting twig. B. Calyx. C. Pods. D. Seeds.

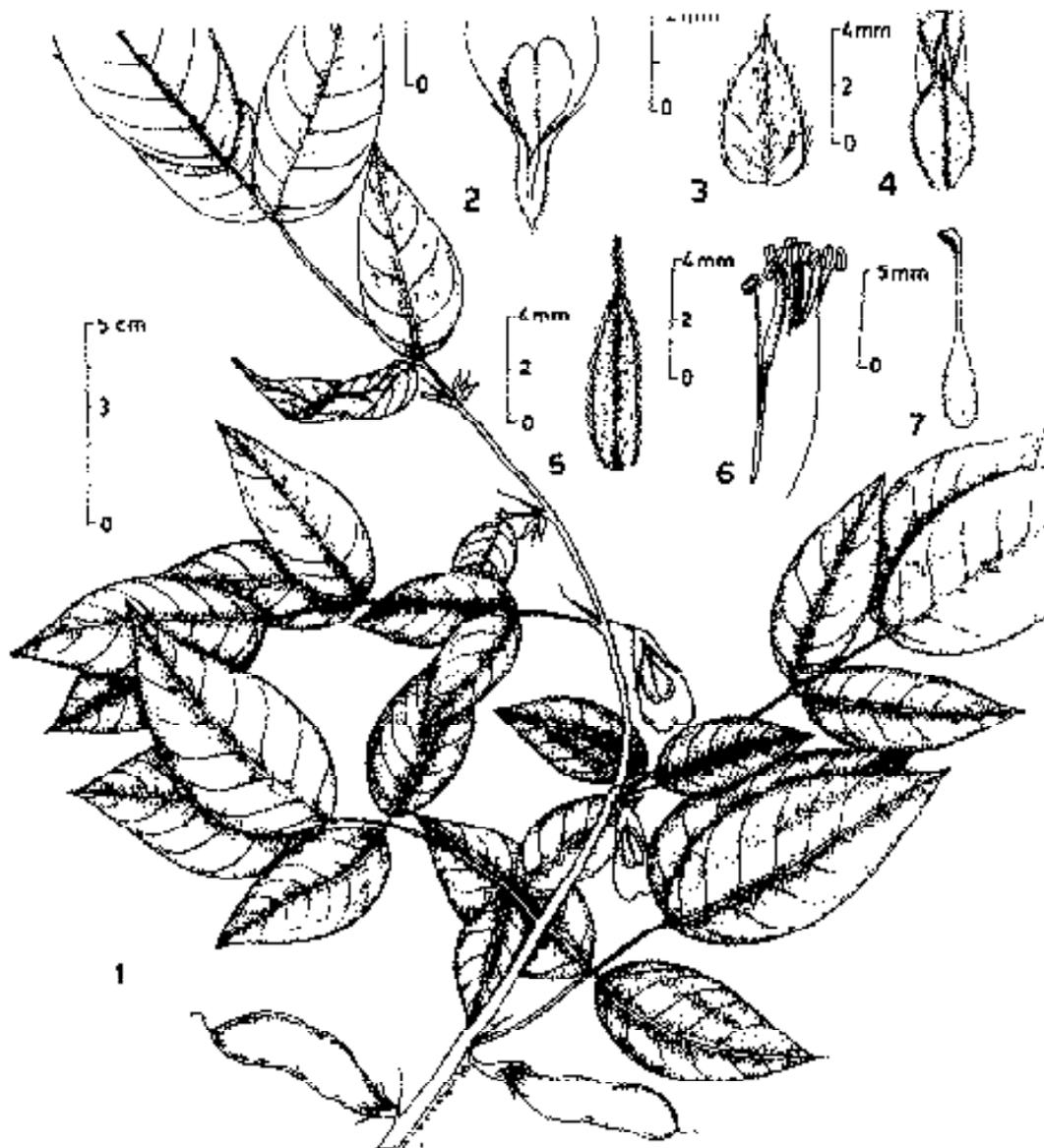


Fig. 11 : *Clitoria biflora* Dalz.
 1. Habit. 2. Flower. 3. Bracteole. 4. Flower bud with bracteole.
 5. Sepal. 6. Androecium. 7. Gynoecium.

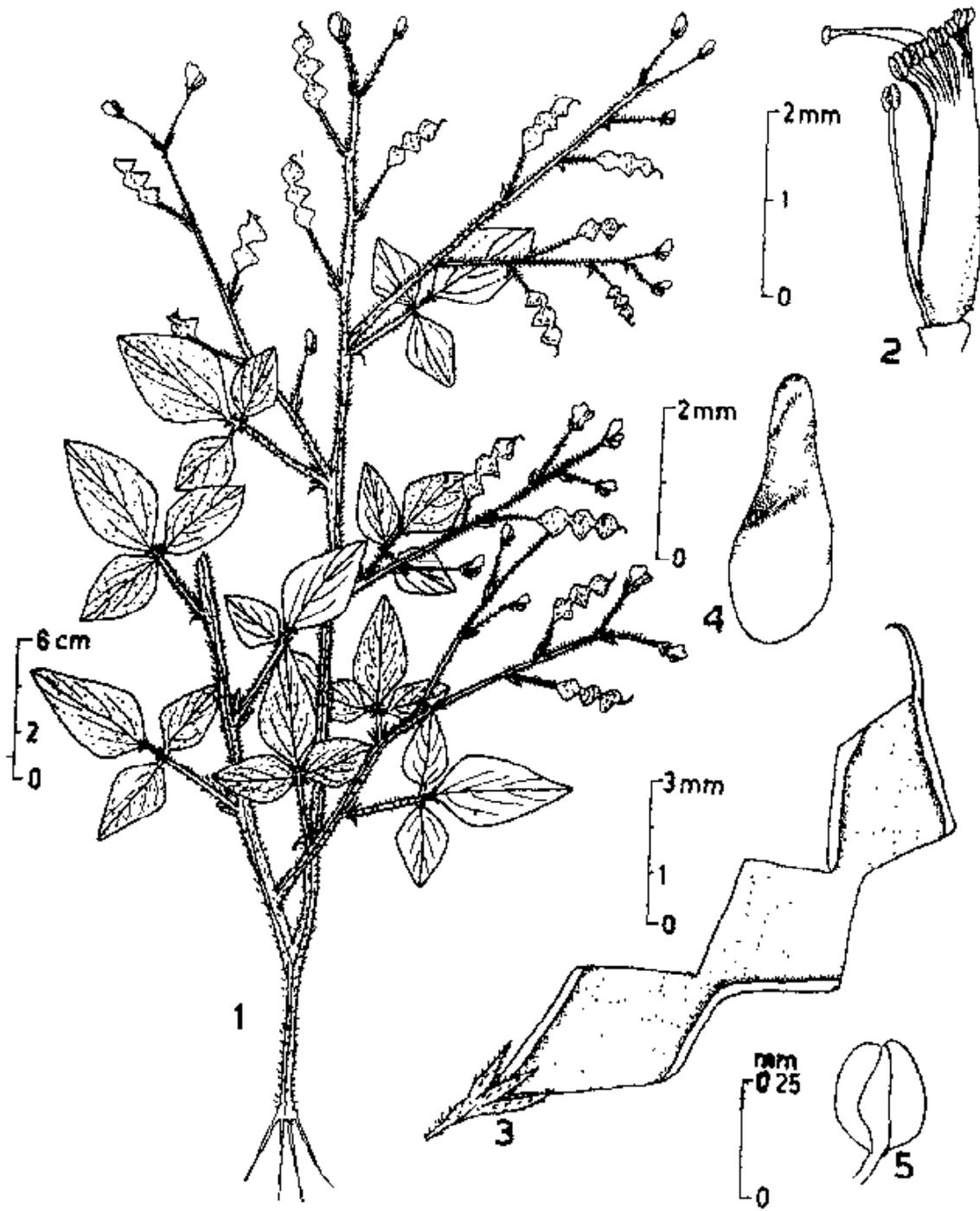


Fig. 12 : *Desmodium procumbens* (Mill.) Hitchc.
 1. Habit. 2. Androecium. 3. Fruit. 4. Seed. 5. Anther.

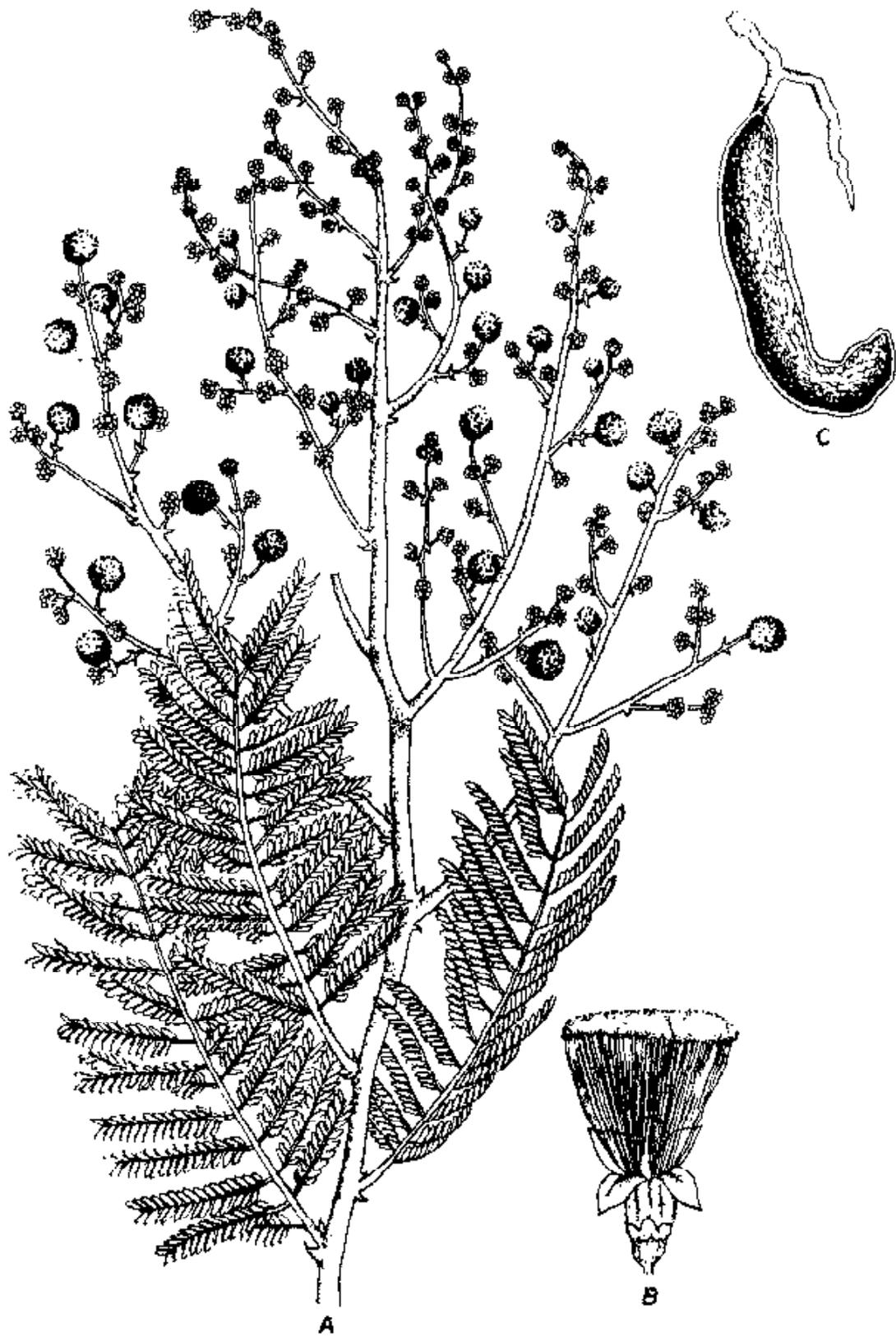


Fig. 13 : *Acacia leucophloea* Willd.
A. Flowering twig. B. Flower. C. Pod

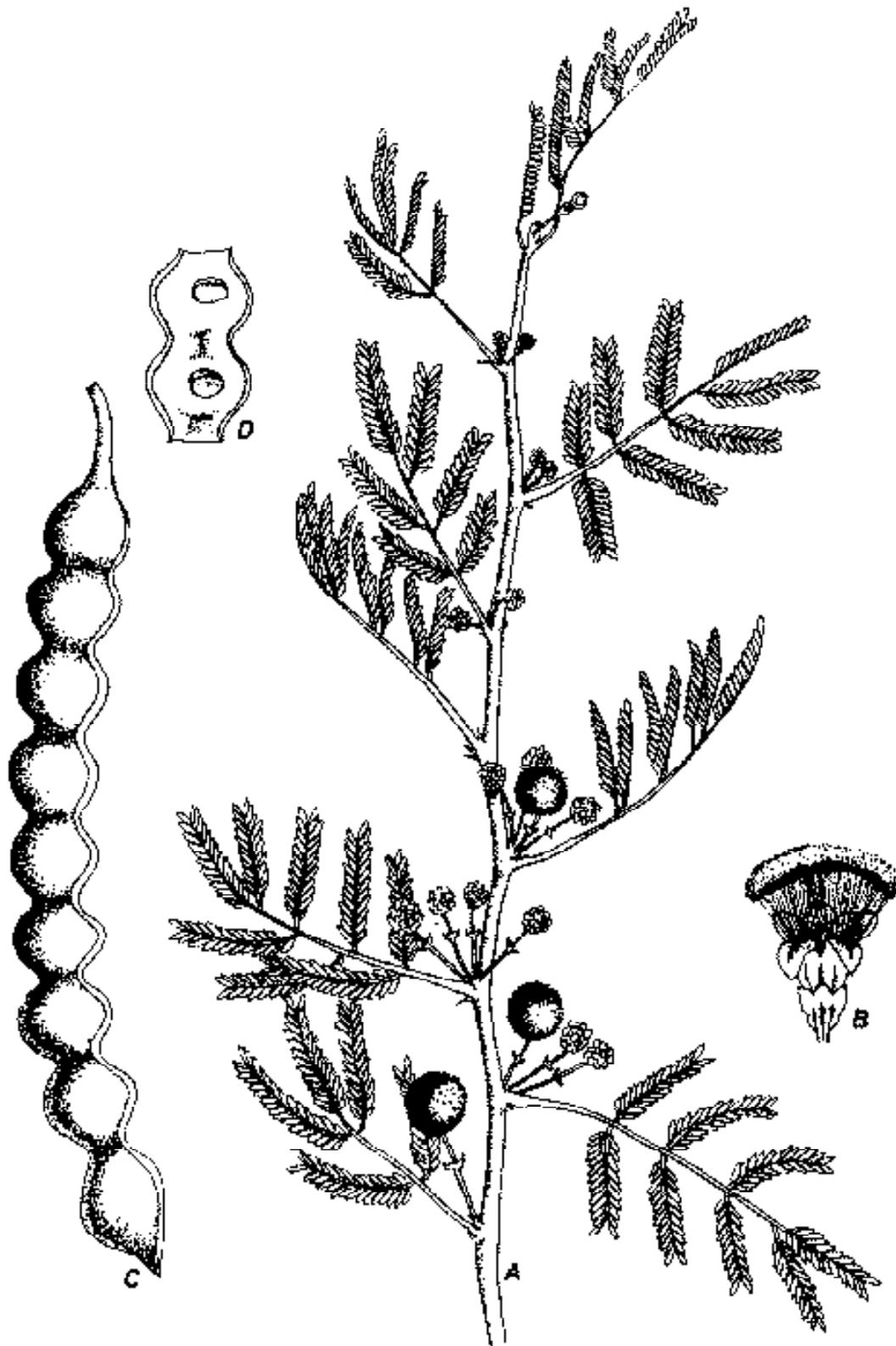


Fig. 14 : *Acacia nilotica* (Linn.) Willd. ex Del. subsp. *indica* (Benth.) Brenan.
A. Flowering twig. B. Flower. C. Pod. D. Portion of pod showing seeds.

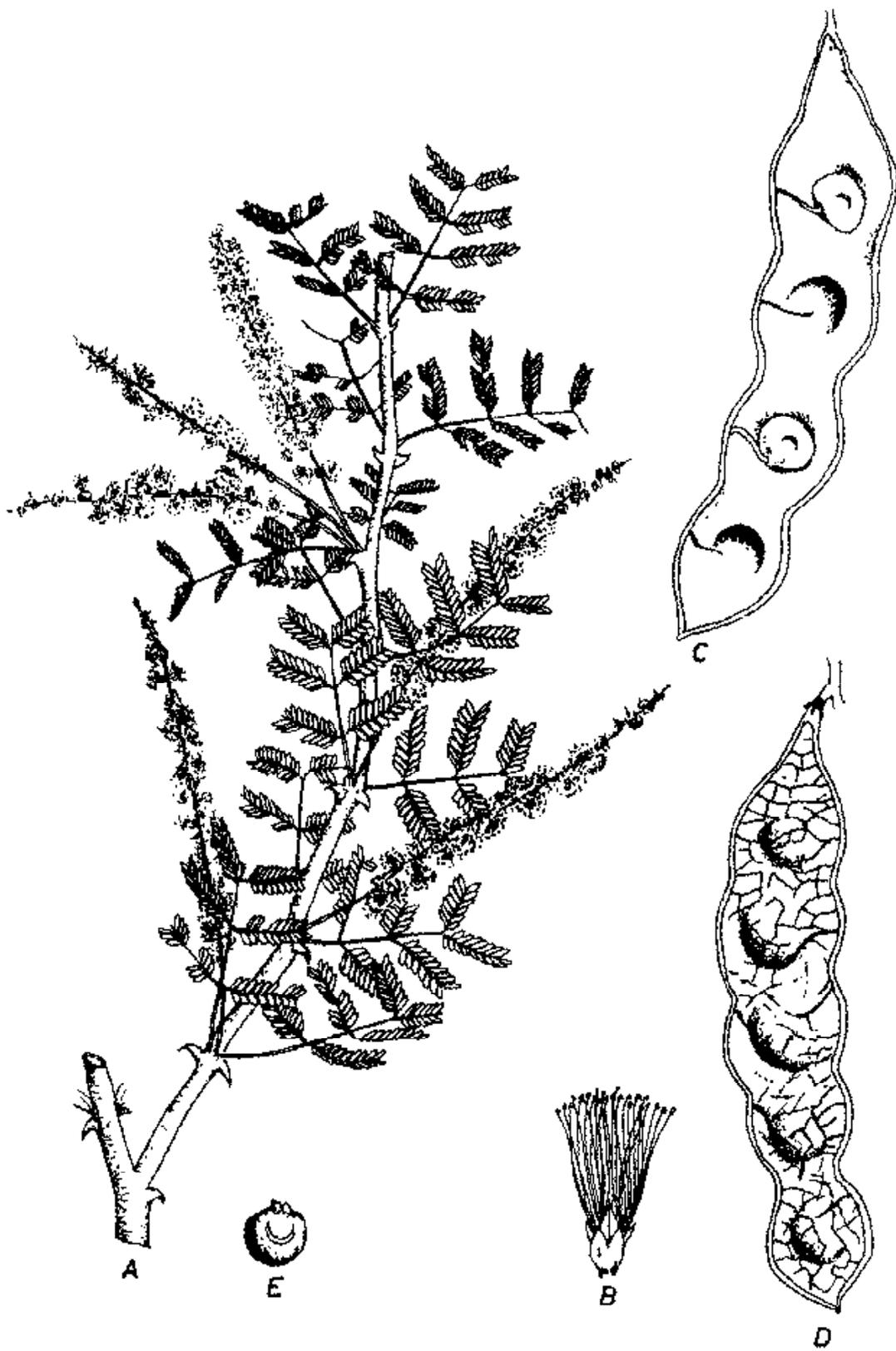


Fig. 15 : *Acacia senegal* Willd.
A. Flowering twig. B. Flower. C & D. Pods. E. Seed.

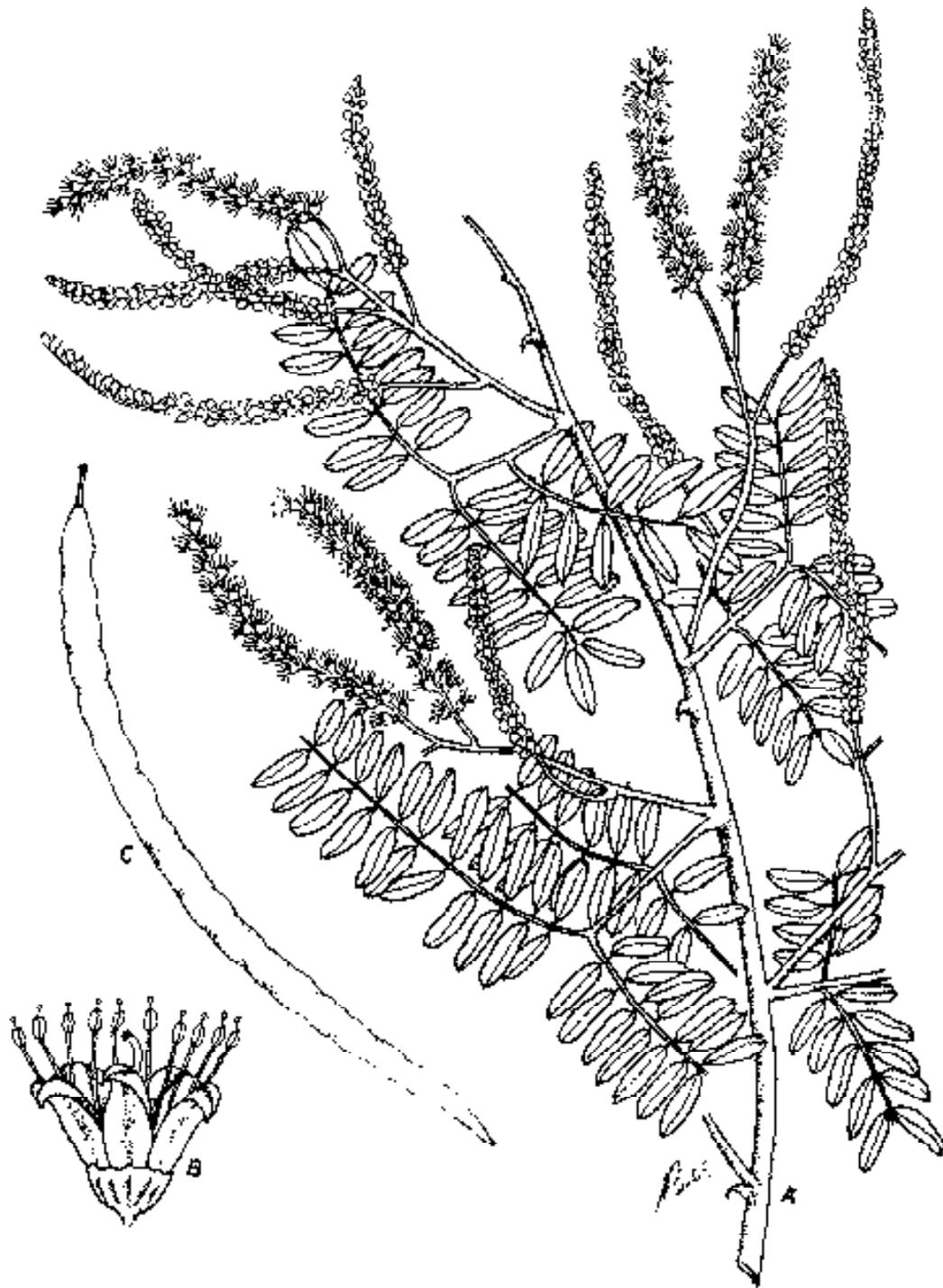


Fig. 16 . *Prosopis cineraria* (Linn.) Macbr.
A. Flowering twig. B. Flower. C. Pod.

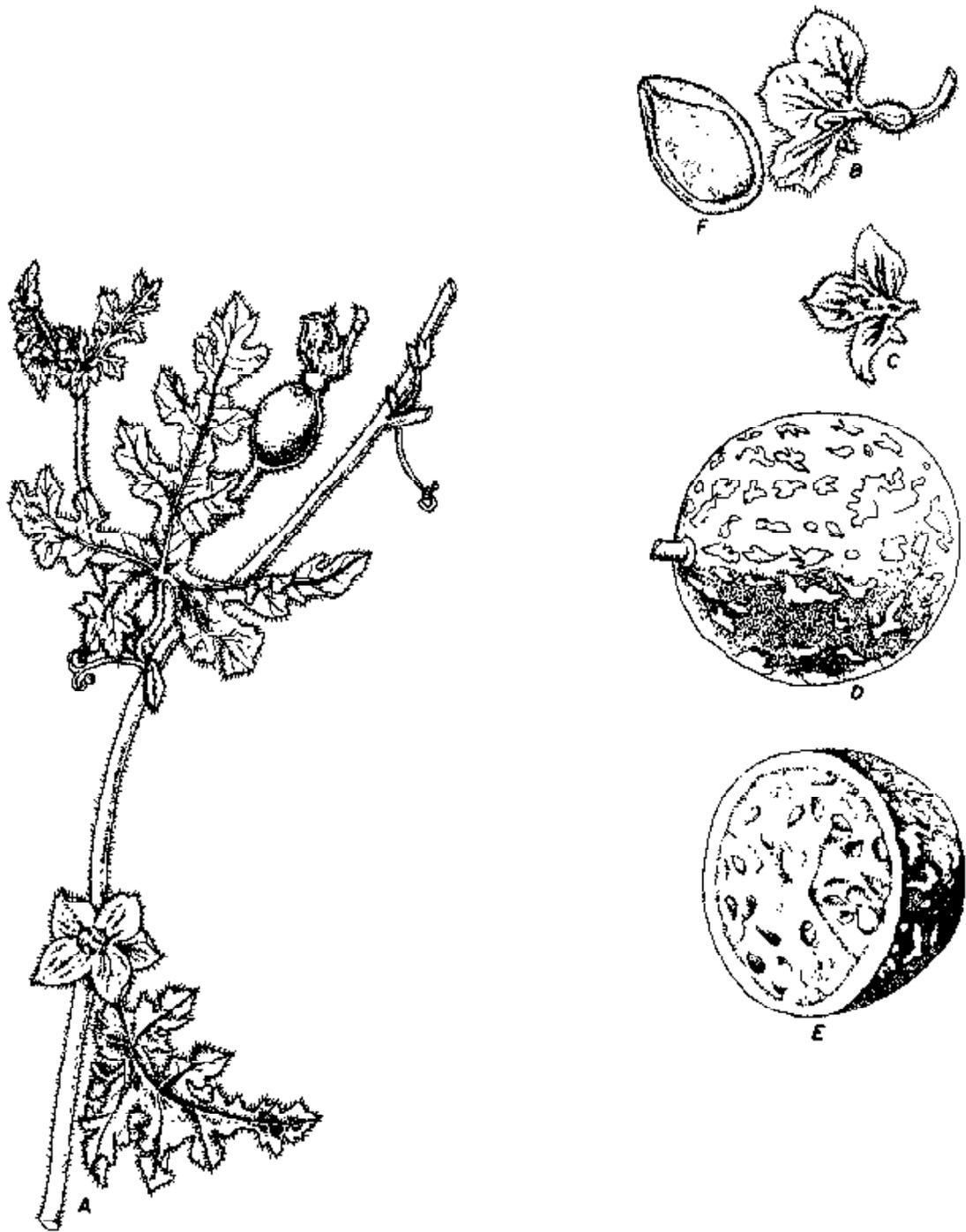


Fig. 17 : *Citrullus colocynthis* (Linn.) Schrad.
A. Flowering twig. B & C. Female & Male Flower. D. Fruit.
E. T.S. of fruit. F. Seed.

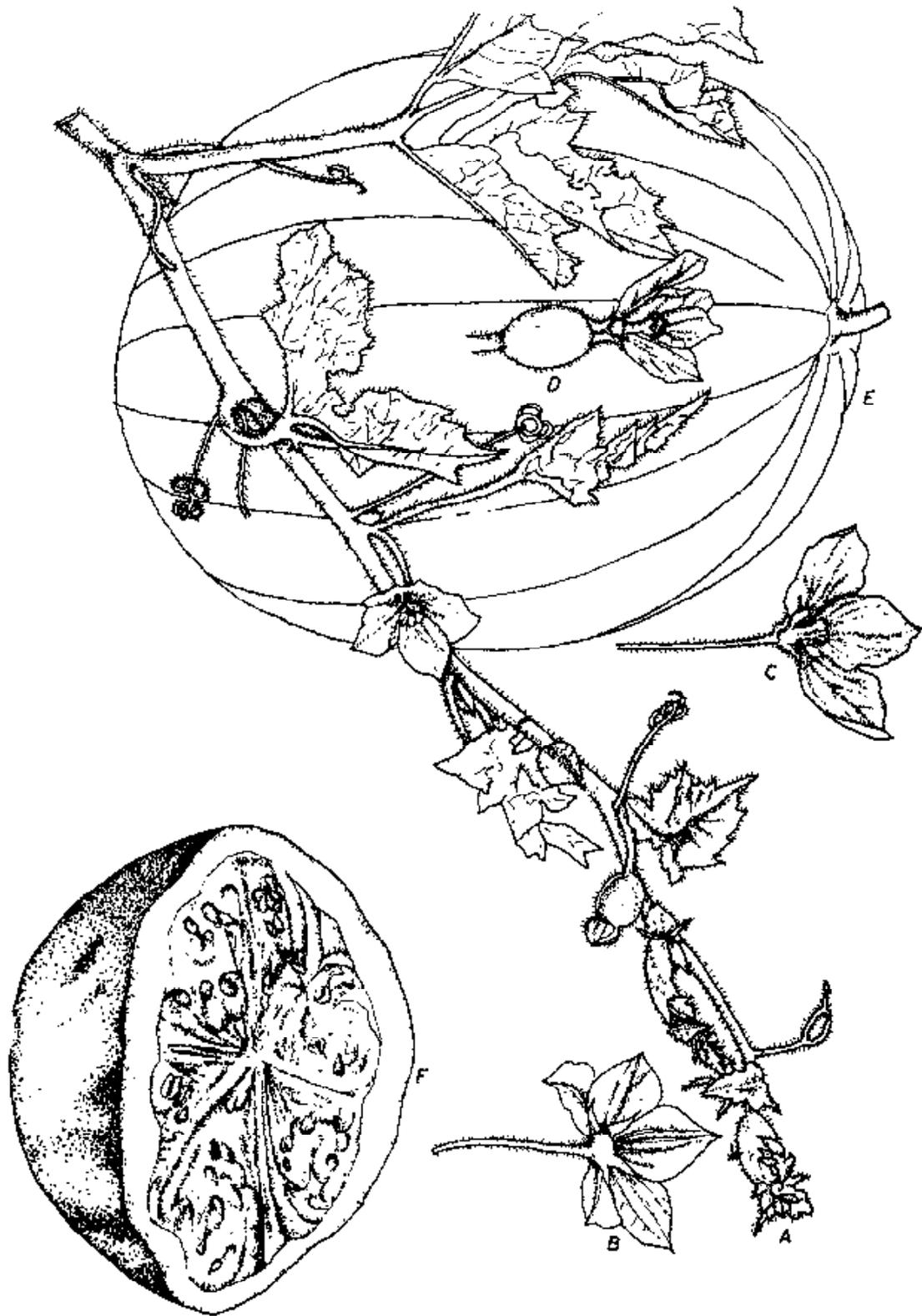


Fig. 18 : *Citrullus lanatus* (Thunb.) Mats. & Nakai
 A. Flowering twig. B & C. Male flower. D. Female flower.
 E. Fruit. F. T.S. of fruit.

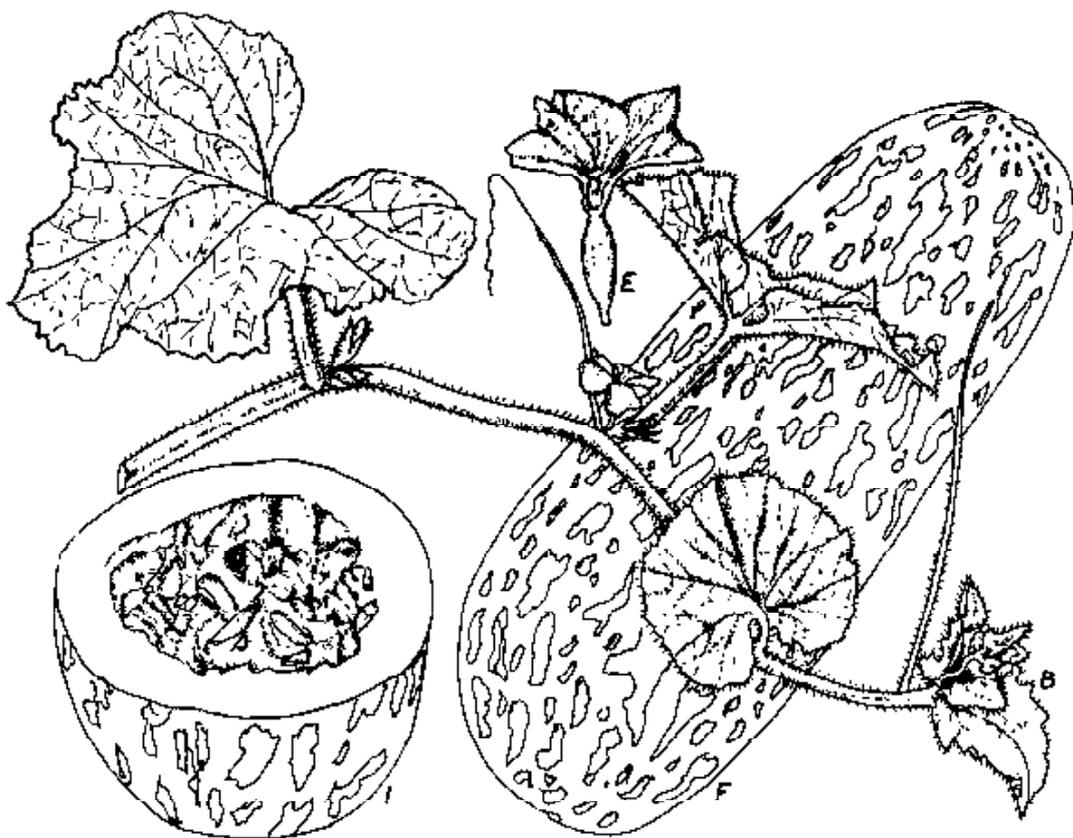
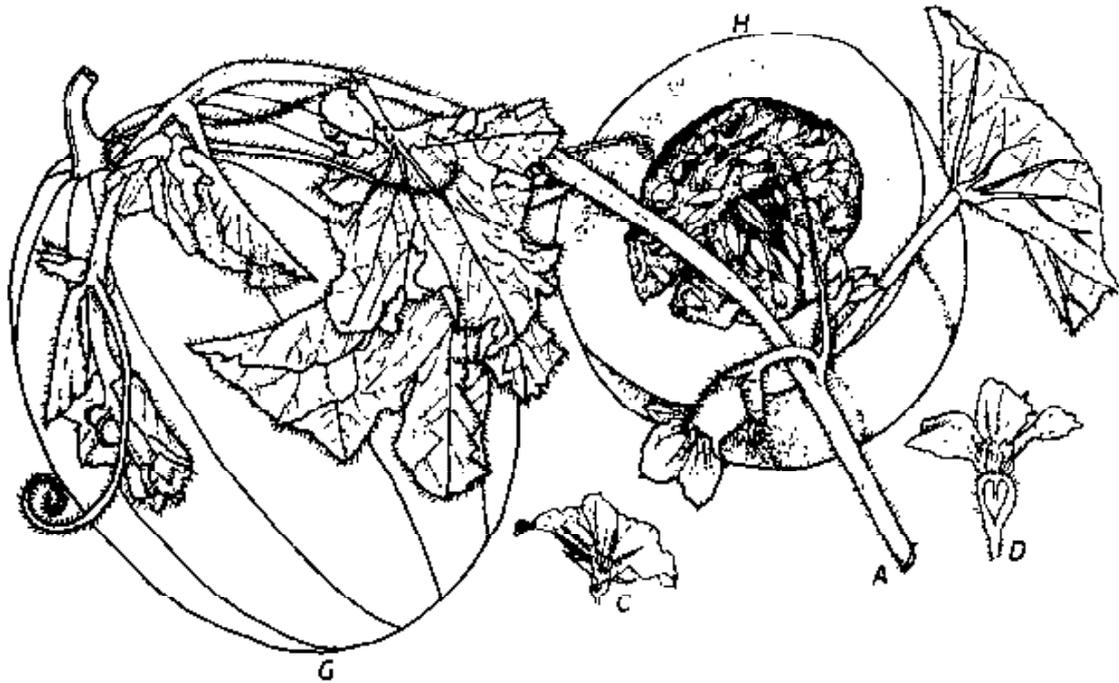


Fig. 19 : *Cucumis melo* Linn. var. *culta* Kurz.
 A & B. Flowering twig. C. Male flower. D, E & F. Female flower.
 F & G. Fruit. H & I. T.S. of fruit.

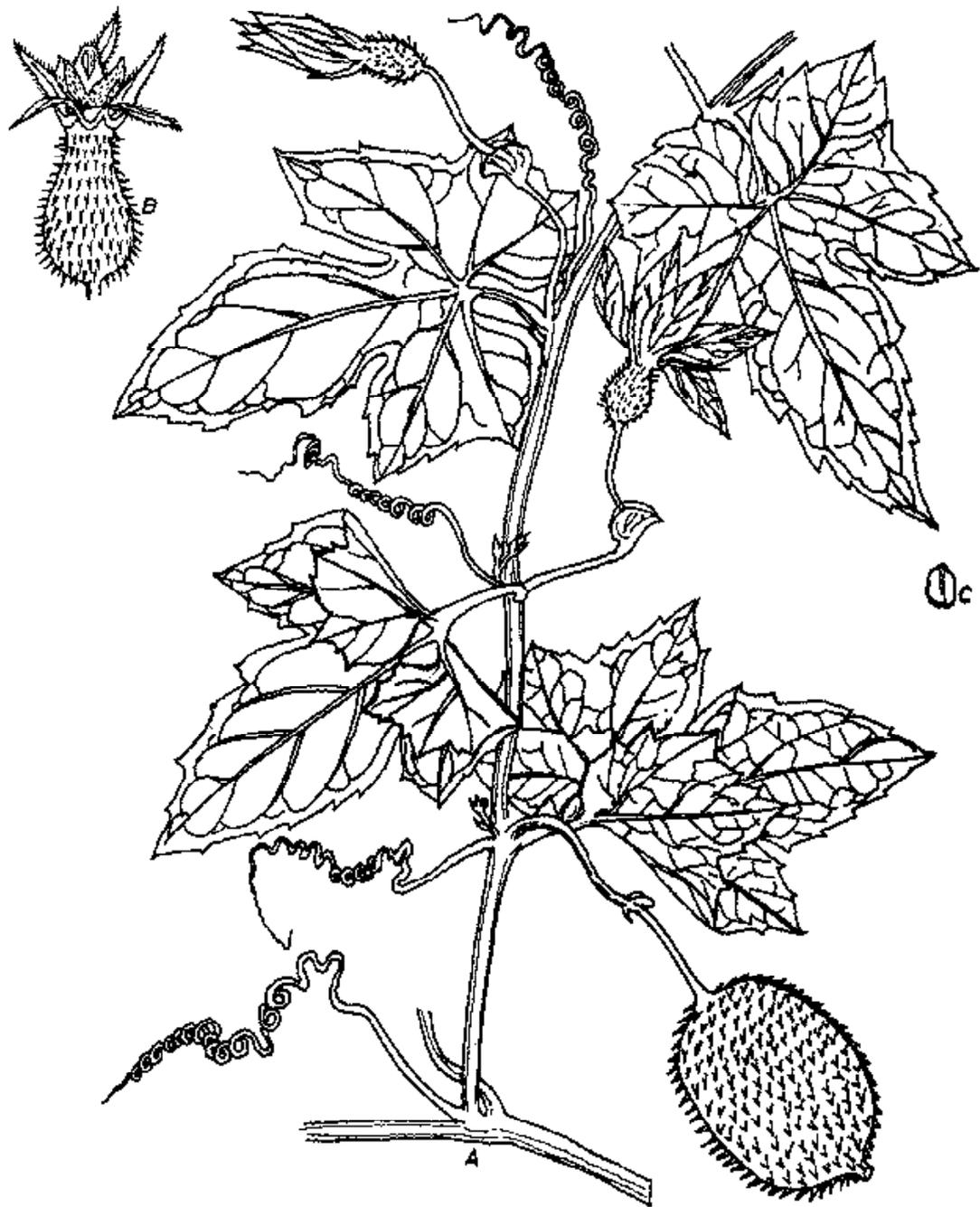


Fig. 20 : *Momordica dioica* Roxb. ex Willd.
A. Flowering twig. B. Flower. C. Seed.



Fig. 21 : *Trianthera portulacastrum* Linn.
A. Flowering twig. B. Flower. C. L. S. of ovary. D. Seed.

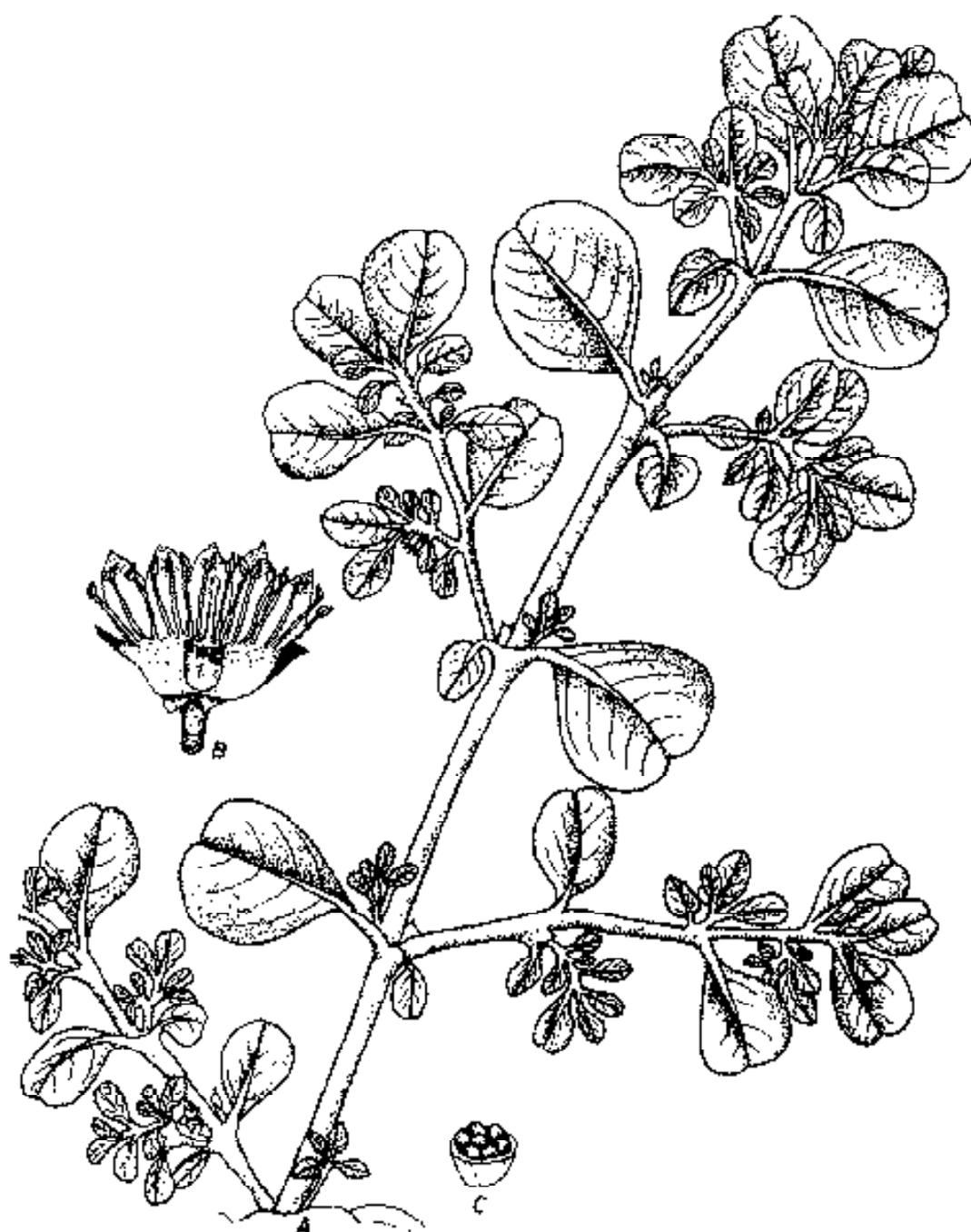


Fig. 22 : *Zaleya govindia* (Buch.-Ham. ex G. Don) Nair
A. Flowering twig. B. Flower. C. Portion of capsule with seeds.

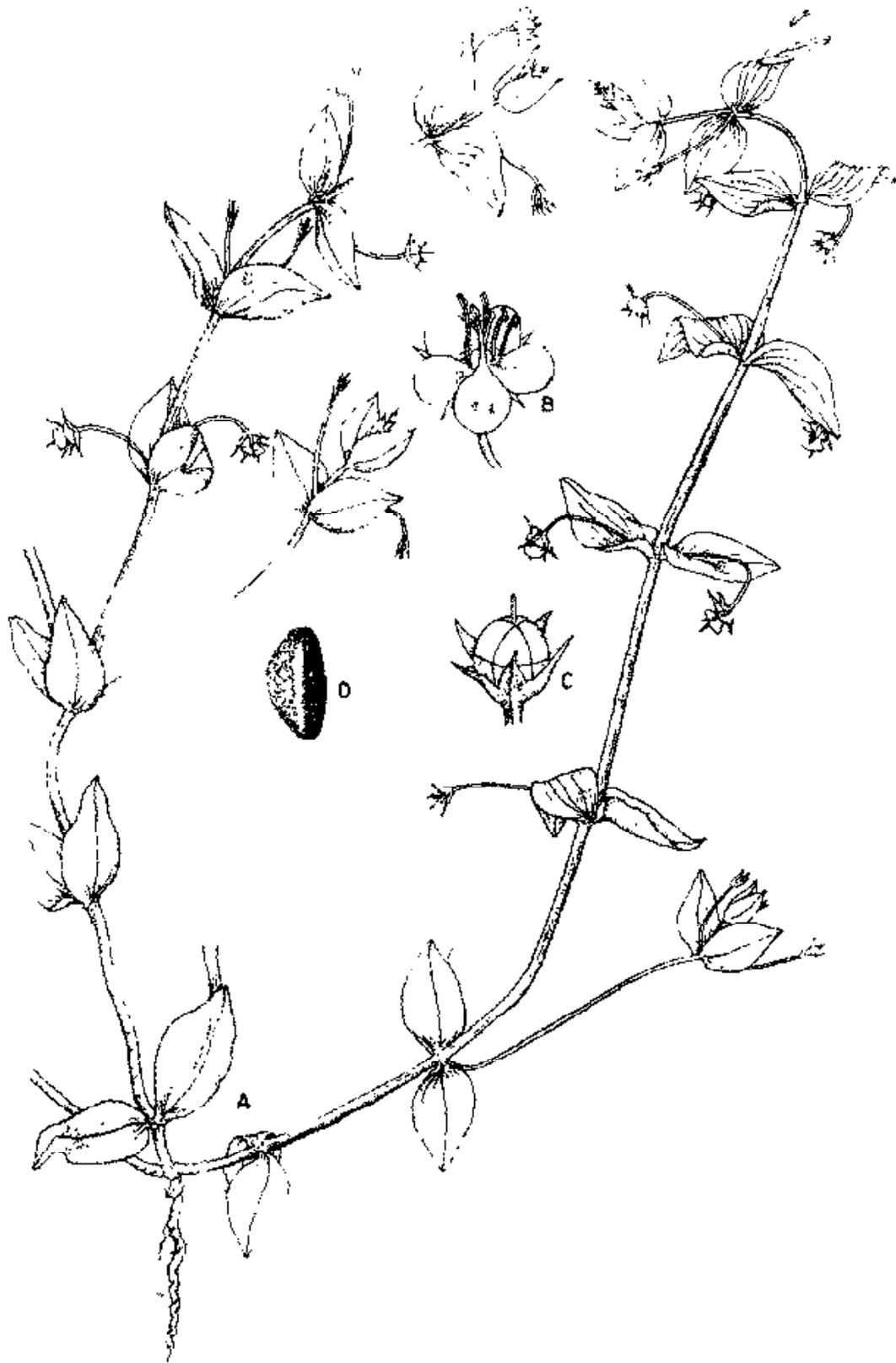


Fig. 23 : *Anagallis arvensis* Linn.
A. Flowering twig. B. Flower. C. Capsule. D. Seed.



Fig. 24 : *Salvadora oleoides* Decne.

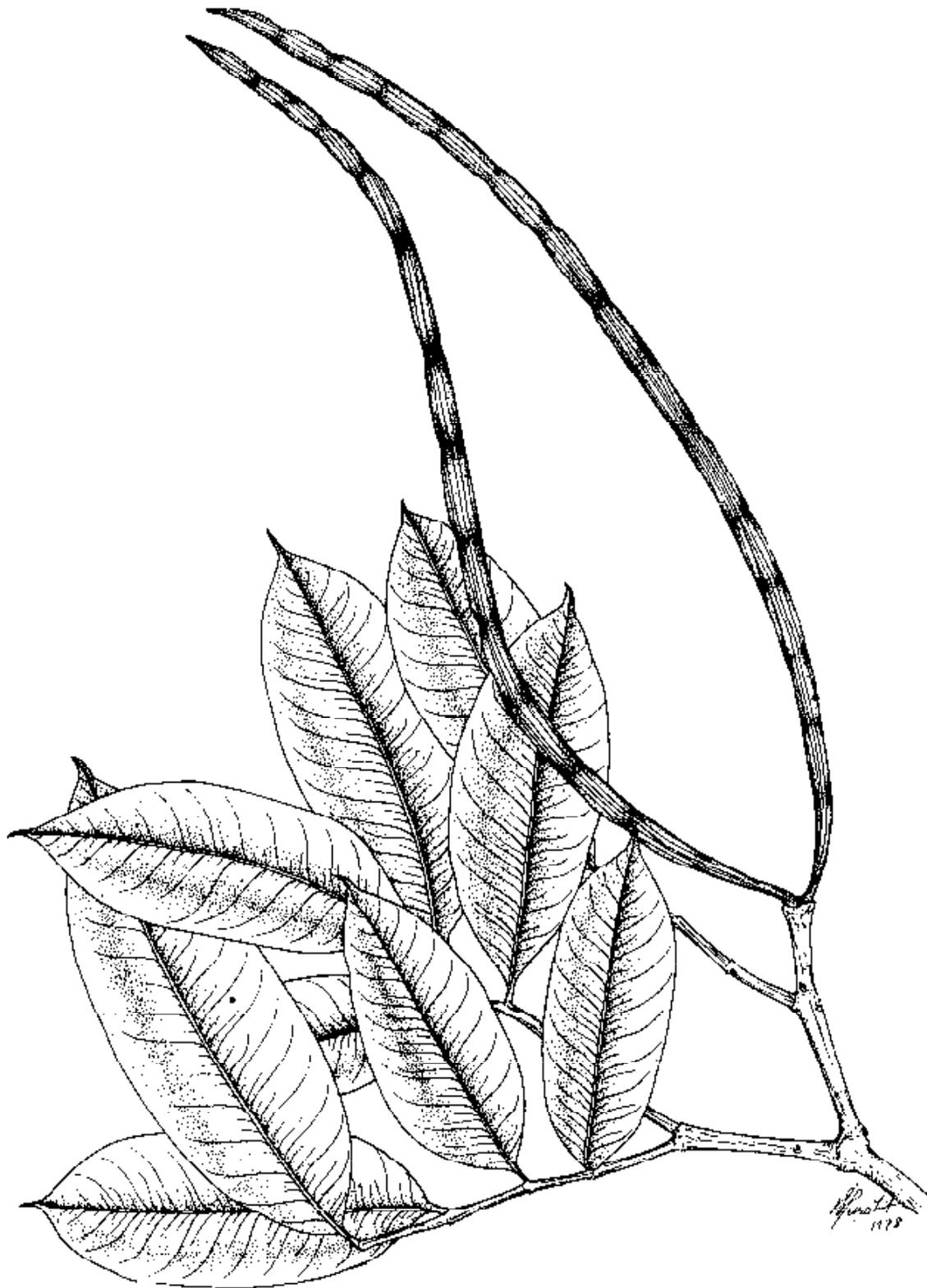


Fig. 25 : *Wrightia tinctoria* R. Br.



Fig. 26 : *Cryptostegia grandiflora* R.Br.
A. Flowering twig. B. Fruit.

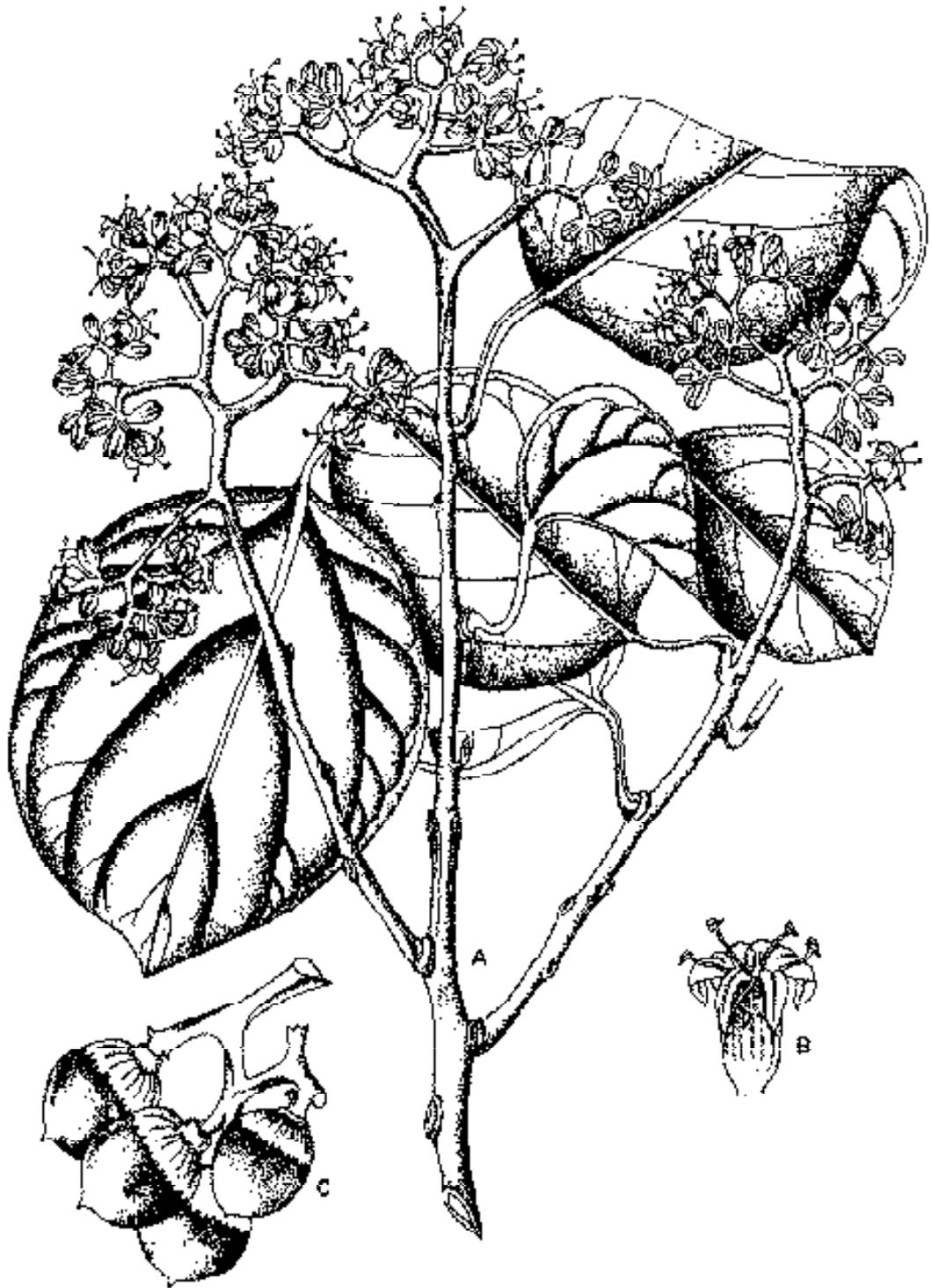


Fig. 27 : *Cordia dichotoma* Forst. F
A. Flowering twig. B. Flower. C. Fruits.

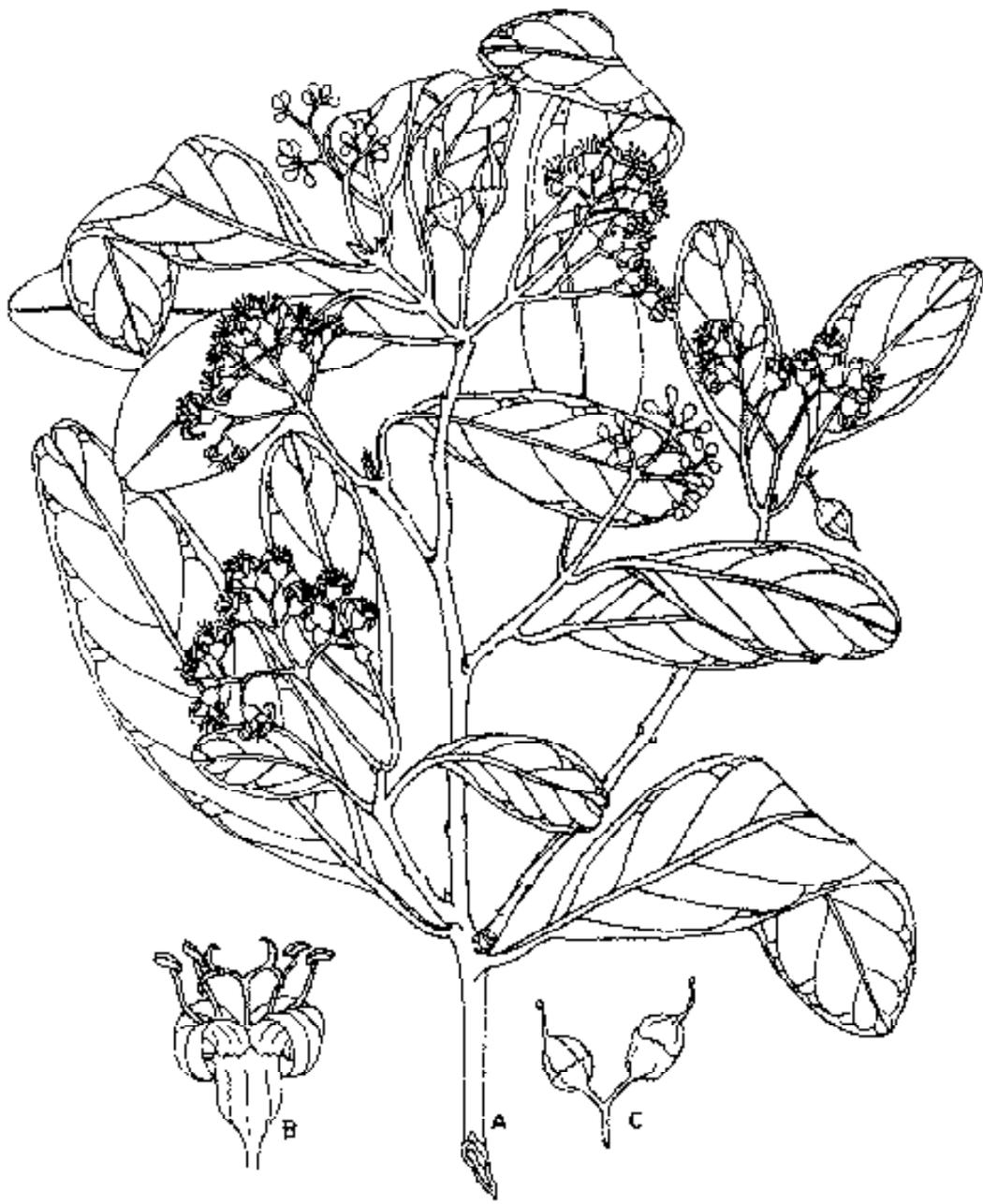


Fig. 28 : *Cordia rothii* Roem & Schult.
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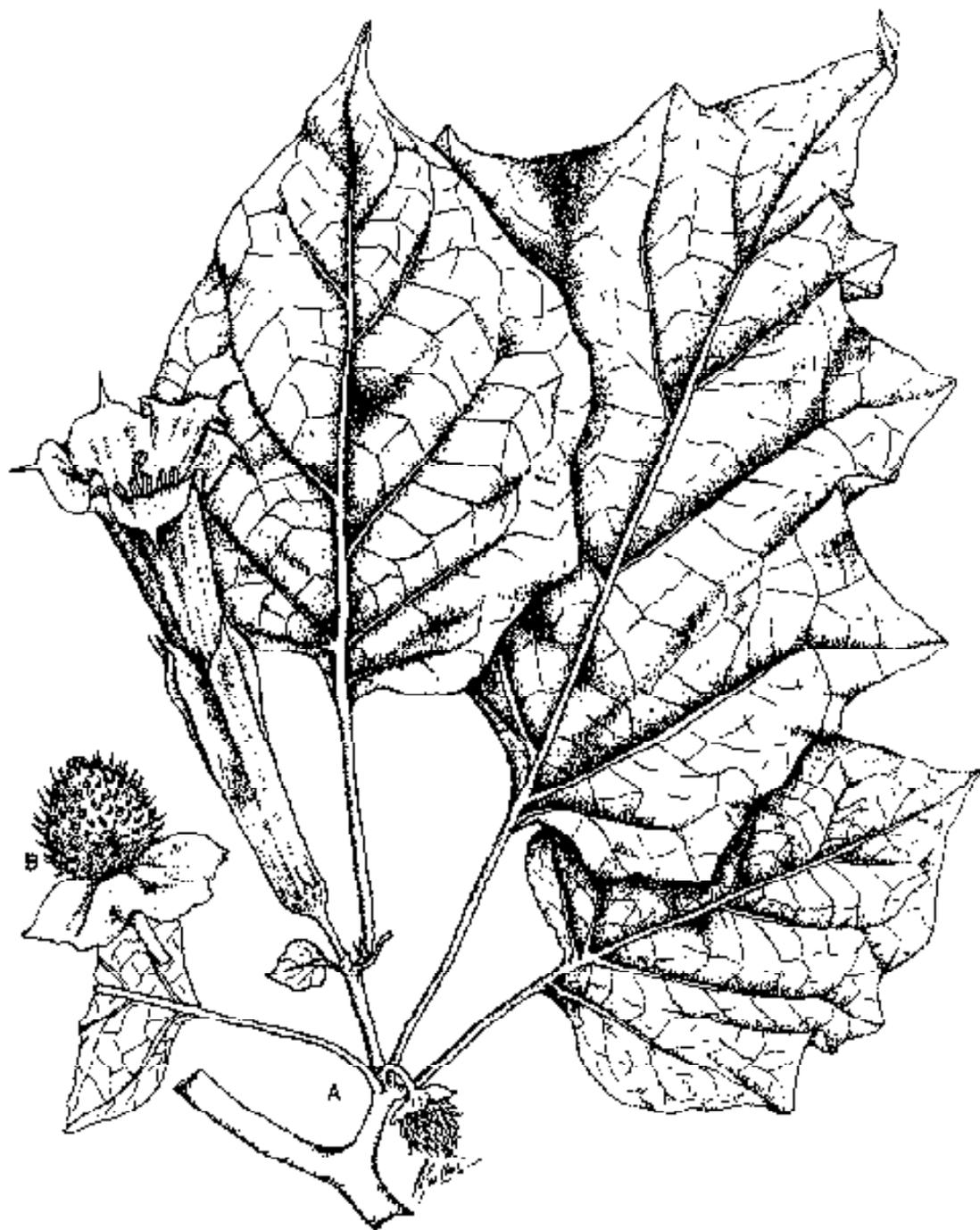


Fig. 29 : *Datura metel* Linn.
A. Flowering twig. B. Fruit.



Fig. 30 : *Physalis minima* Linn.

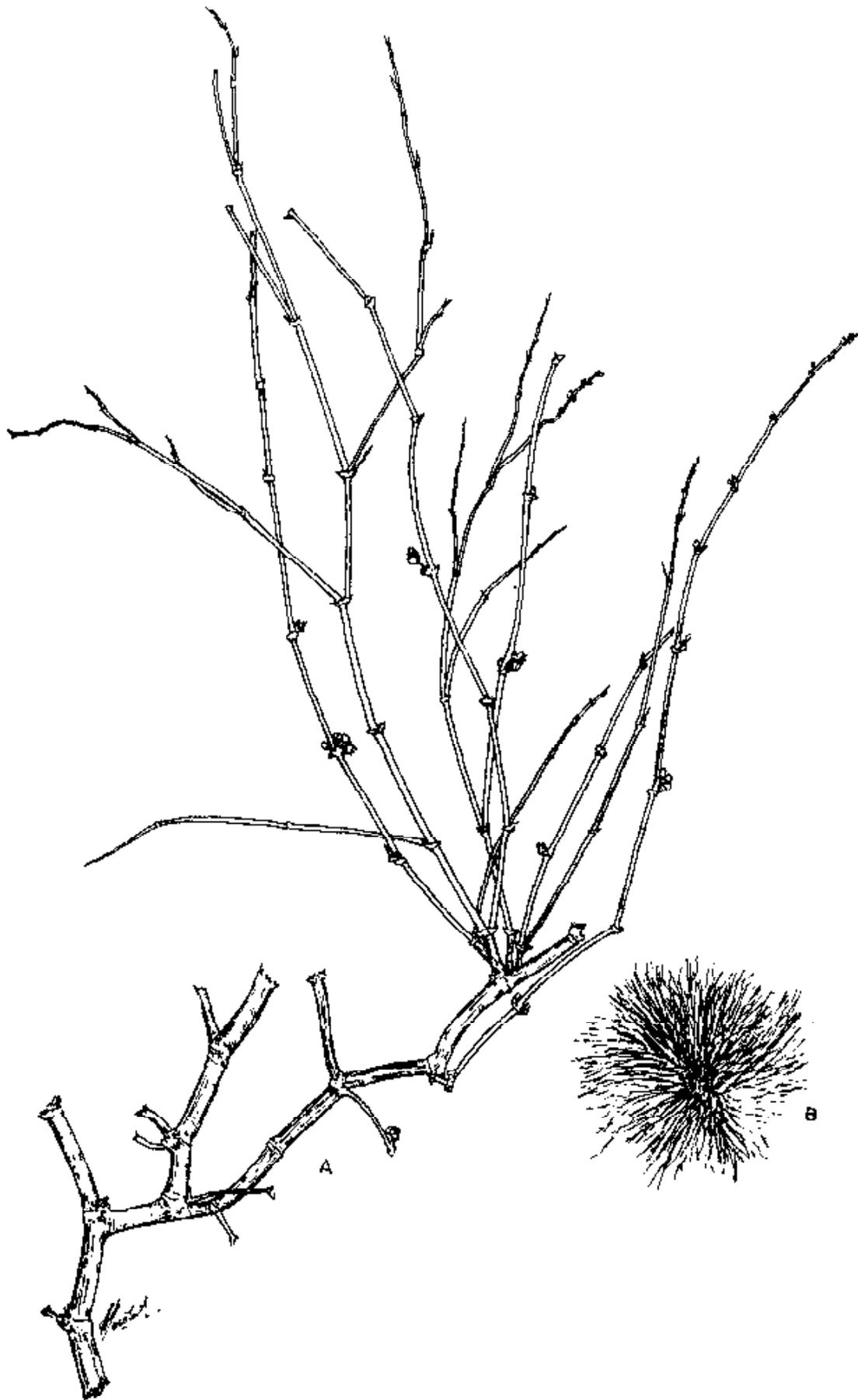


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Fig. 32 : *Cyperus rotundus* Linn.



Fig. 33 : *Cenchrus biflorus* Roxb.
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Fig. 34 : *Canchrus setigerus* Vahl
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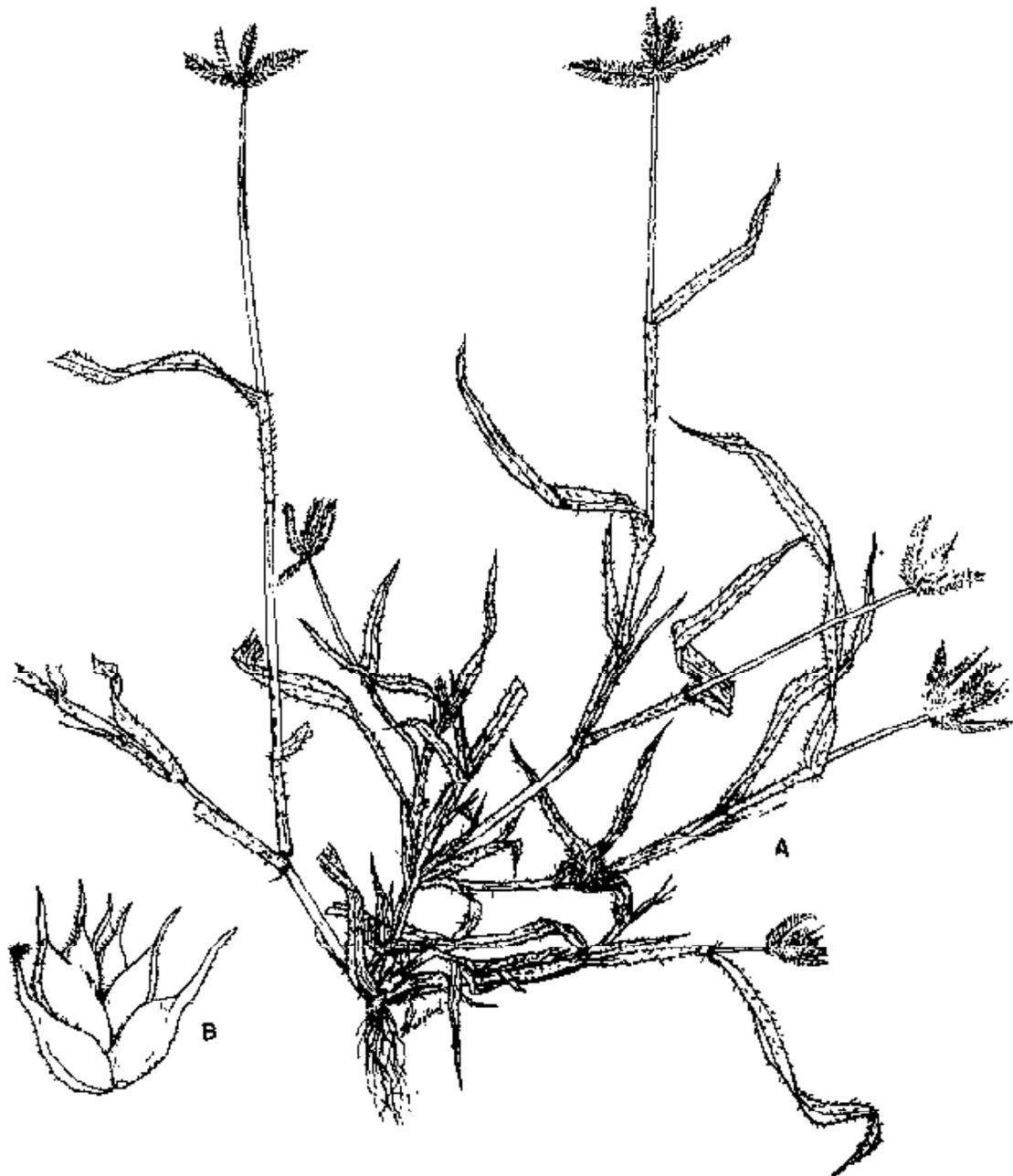


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Fig. 36 : *Dactyloctenium indicum* Boiss.
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