

**FLORA OF INDIA**  
**Series 2**

# **Flora of Saurashtra**

**PART III**

**(HYDROCHARITACEAE TO POACEAE)**

**P. V. BOLE & J. M. PATHAK**



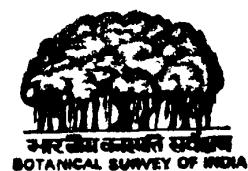
## **FLORA OF SAURASHTRA**

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**(HYDROCHARITACEAE TO POACEAE)**

**P. V. BOLE & J. M. PATHAK**



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*Cover photo : A view of the deciduous vegetation.*

*Courtesy : Shri Sanjay Monga*

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Dedicated to the memory of the late  
**Rev. Father H. Santapau, S. J.**  
who initiated this work.

## HYDROCHARITACEAE

Stems branching, leafy ; leaves small, spathes small, sessile :

Leaves whorled ; styles undivided ; ovules anatropous *Hydrilla*

Leaves scattered ; styles notched ; ovules orthotropous *Nechamandra*

Stems 0, or with stolons only, or a creeping root-stock :

Leaves all along the narrow, sessile ; male scapes many flowered :

Perianth single *Vallisneria*

Perianth double *Blyxa*

Leaves mostly or all petiolate ; flowers solitary *Ottelia*

### *Blyxa* Noronha ex Du Petit-Thouars

*Blyxa octandra* (Roxb.) Planch. ex Thw. Enum. Pl. Zeyl. 332. 1859 1864 ; Santapau, Pl. Saur. 777. 1953 ; Santapau & Jan. 47. 1967. *Vallisneria octandra* Roxb. Pl. Cor. 2. : 34, t. 165. 1798. *Blyxa roxburghii* Rich. in Mem. Inst. Fr. 77, t. 5. 1811 ; FBI 5 : 660 ; Cooke 3 : 172.

A gregarious herb. Leaves 20–60 × 0.6–1.2 cm radicle, linear, broad at the base, finely acuminate at the apex. Flowers dioecious, white. Male flowers : Scape straight, as long as or rather longer than the leaves. Stamens 8, filaments of unequal lengths, shorter than the petals. Female flowers : Scape shorter and thicker than in the male. Fruit 5–10 × 0.4 cm, seeds small, 0.1 cm long, distinctly tuberculate, shortly tailed.

*Flowers* : February.

*Occurrence* : Gondal, Irrigation Lakes.

### *HYDRILLA* L. Richard.

*Hydrilla verticillata* (Linn. f.) Royle. Ill. Bot. Him. t. 376. 1839; FBI 5 : 659 ; Cooke 3 : 170 ; Santapau, Pl. Saur. 778. 1953 ; Santapau & Jan 47. 1967. *Serpicula verticillata* Linn. f. Suppl. 416. 1781.

Fresh water plants forming large masses, stem slender, 30 cm and more long, with fibrous roots, much branched flaccid with long or short internodes, often rooting from the nodes; branches with short sheathing leaf at the base. Leaves 0.6–0.9 × 0.2–0.3 cm, sessile, 4–8 in a whorl (the lowest often opposite), linear or linear-oblong, apiculate, entire or serrulate; midrib strong. Flowers 0.4–0.6 cm long, perianth segments very variable. Fruit smooth or muricate.

*Flowers* : August to December.

*Occurrence* : Rajkot, Pradumna Park and Joupur Vidi.

#### NECHAMANDRA Planch.

*Nechamandra alternifolia* (Roxb.) Thw. Enum. 332. 1864; Santapau & Jan. 47. 1967. *Vallisneria alternifolia* Roxb. Pl. Cor. 2 : t. 165. 1802. *Lagarosiphon alternifolius* Druce in Rep. Bot. Exch. Club. Brit. Isl. 1916. 630. 1917; Santapau in RBSI 16(1) : 233. 1960. *L. roxburghii* Benth. in Gen. Pl. 3 : 452. 1883; FBI 5 : 659; Cooke 2 : 170.

Stem 60–90 cm long, filiform, roots fibrous; upper branches floating. Leaves 7.5–10 × 0.6 cm, alternate and opposite, sessile, oblong-lanceolate, acute, minutely serrulate. Male flowers: Spathe ovoid, at length 2-valved, enclosing many minute, shortly pedicellate flowers. Sepals broadly oblong, pink petals as long as the sepals or nearly so, white. Stamens 2, anthers dehiscing transversely. Female flowers: Spathe 0.4 cm long, tubular, 2-fid. Ovary lanceolate; produced into a filiform flexuous beak 5–7.5 cm long.

*Flowers* : April to May.

*Occurrence* : This plant is given here on the authority of H. Santapau & Janardhanan.

#### OTTELIA Persoon

*Ottelia alismoides* (Linn.) Pers., Syn. I : 400. 1807; FBI 5 : 662; Cooke 3 : 173; Santapau, Pl. Saur. 779. 1953; Santapau & Jan. 47. 1967. *Stratiotes alismoides* Linn. Sp. Pl. 535. 1753.

A succulent flaccid herb; roots fibrous. Leaves usually submerged, very variable, 5–15 × 2.5–7.5 cm, oblong or orbicular, cordate, membranous, undulate, 7–11 nerved, petioles 3-gonous, their length depending on the depth of the water. Flowers solitary. Spathe 2.5–3.6 cm

long, 5 - 6 winged ; peduncles varying in length with the depth of water ; wings of spathe undulate, unequal, mouth 5 - 6 toothed. Sepals small, oblong, green. Petals nearly orbicular, 2.5 cm broad, white with a yellow base, reticulated veined. Ovary narrowly oblong. Fruit 2.5 - 3.6 cm long, ellipsoid, crowned by the withered perianth.

*Flowers* : August to October.

*Occurrence* : Gir Forest, Sanan Gir to Junwania, Jamnagar and Junagadh. Plant was found submerged in stream at Sasan.

*Uses* : The leaves and petioles possess an excellent flavour and are used as vegetables. The fruit is eaten by children. The plant is said to possess rubefacient properties. Leaves are used to cure haemorrhoids ; they are also applied as poultices on arms and legs in fever. (WI)

#### VALLISNERIA Linnaeus

**Vallisneria spiralis** Linn. Sp. Pl. 1015. 1753; FBI 5 : 660 ; Cooke 3 : 171 ; Indraji 651. 1910 ; Santapau, Pl. Saur. 780. 1953 ; Santapau & Jan. 47. 1967.

Leaves radical, narrow, linear, varying in length with the depth of the water, reaching sometimes  $37.5 \times 1.2$  cm, green, translucent, entire or the tips serrulate. Male flowers numerous minute. Spathe shortly pedunculate, 0.6 cm long, breaking off at the base when the flowers emerge and float on the surface of the water. Stamens 1 - 3. Female flowers solitary. Spathe 3 toothed carried to the surface of the water in flower by the uncoiling of the filiform spiral scape, which after fertilization again coils close and brings the ovary down to ripen under water. Fruit linear, included in the spathe, many-seeded.

*Local name* : Jalsarpolia, Prangawat.

*Flowers* : April to November.

*Occurrence* : Ranjit Sagar and Talao, Jamnagar ; growing submerged in water in a pond, Dwarka.

#### ORCHIDACEAE

Leaves stalked, blade green, sometimes with dark purplish blotches

*Nervilia*

Leaves unstalked with narrow grassy blade

*Zeuxine*

## NERVILIA Comm. ex Gaudich. (nom. cons.)

**Nervilia aragoana** Gaud. Freyc. Voy. Bot. 422, t. 35. 1826. *Pogonia flabelliformis* Lindl., Gen. et. Sp. Orch 415, 1840. FBI 5 : 121 ; Blatter in JBNHS 35 : 729. 1931-32.

Leaf-stalk about 15-20 cm long, blade green, sometimes, with dark purplish blotches, not hairy, 12 cm long and 16 cm wide, very broadly heart shaped, shortly tipped, edge slightly wavy, the basal lobes more or less overlapping; inflorescence about 30 cm long, narrow, reflexed; sepals and petals narrow, spreading, 2-2.5 cm long, pale green; lip shorter than sepals, white with purplish or green veins, side lobes small, triangular, erect with tips spreading just beyond the top of the column, midlobe ovate with incurved edges, hairy on the veins.

*Flowers* : October.

*Occurrence* : Sasan Gir to Junvania, it was found abundant in dense clumps in very shady moist sloping undergrowth.

## ZEUXINE Lindley (nom. cons.)

**Zeuxine strateumatica** (Linn.) Schlech. Orch. Deutsch. N. Guin. 77. 1911 ; Santapau, Pl. Saur. 781. 1953 ; Santapau & Jan. 47. 1967. *Orchis strateumatica* Linn., Sp. Pl. 943. 1753. *Zeuxine sulcata* Lindl. Gen. et. Sp. Orch. 485. 1840 ; FBI 6 : 106 ; Cooke 3 : 213 : Indraji 652. 1910.

Plant 12-20 cm tall ; leaves several, unstalked, with narrow grassy blade to 4×0.4 cm, the edges turned back, scape above leaves very short ; rachis to about 4 cm long, with many small white flowers ; lower bracts are little longer than the flowers, upper ones shorter ; sepals about 3 mm long, greenish at base, petals white ; lip with shorter succate base containing 2-curved glands, the narrow part between base and blade fleshy and warty, grooved, the blade small, blunt, concave, yellow green, column short and broad, with broad rostellum deeply cleft.

*Local name* : Zinkudrammu.

*Flowers* : January.

*Occurrence* : Recorded on the authority of Indraji. He states that was shown by Mr. Chester McCnotun at Rajkot near Mr. Buth's talao in 1895, and after that it was seen in Torania forest near the edges of Baravan near Porbander.

## CANNACEAE

## CANNA Linn.

Leaves 15-45 × 10 - 20 cm, elliptic-lanceolate, caudate-acuminate *indica*

Leaves 20 - 45 × 11 cm, ovate-lanceolate, acuminate, glaucous beneath *flaccida*

**Canna indica** Linn. Sp. Pl. 1. 1753 ; Bot. Mag. t. 454 ; FBI 6 : 260 ; Cooke 3 : 251 ; Indraji 653, 1910 ; Kraenzlin in Pfreich. 56 : 59. Santapau, Pl. Saur. 783. 1953 ; Santapau & Jan. 47. 1967.

Rootstock tuberous with many fibres ; stem 90 - 120 cm high. Leaves 15 - 45 × 10 - 20 cm, oblong or elliptic-lanceolate, caudate-acuminate. Flowers rather distant, 5 - 6 cm long, scarlet or yellow. Fruit erect, 1.2 - 2.5 cm long, subglobose or oblong, obscurely 3-lobed. Seeds the size of a pea, spherical.

*Local name* : Akalber, Devkel (Indraji).

*Flowers* : Throughout the year.

*Occurrence* : Grown in the gardens in Saurashtra.

*Uses* : Root is given as a demulcent and stimulant ; used as a diaphoretic in fevers and dropsy. When the cattle have eaten any poisonous grass resulting in swelling of abdomen, root-stocks are administered. They are broken in small pieces, boiled in rice water with pepper and given to cattle to drink. Seed is cordial and vulnerary. [Gaz. A (1) : 50. 1953].

*Note* : Kraenzlin l.c. writes that this name is cited in most of the floras of the tropical regions at times correctly, but mostly incorrectly. The common Indian cultivated plants go under this name, but in fact represent the original or hybrids of *Canna flaccida* Salisb.

**Canna flaccida** Salisb. Icon. Stirp. Rar. t. 2. 1791 ; Santapau, Pl. Saur. 782. 1953 ; B. Rukmini Bai P. Syst. Stud. Monocot. Bombay 205. 1957 ; Santapau & Jan. 1967.

Perennial herb, up to 2 m high, from a creeping rhizome. Leaves ovate-lanceolate, acuminate, petiolate, 20 - 45 × 11 cm, glaucous beneath. Flowers terminal, racemose, few ; each flower supported by one bract, which is lanceolate, about 3.5 cm long. Sepals lanceolate, acuminate, a little longer than the ovary, about half as long as the corolla tube. Petals

broadly linear-lanceolate, acute, 2 larger, up to 8 cm long, 1.5 cm broad, reflexed at anthesis. Staminodes 3, very large, obovate, slightly crenulate at the margins, up to 7 cm long, 3-4 or more cm broad. Labellum shortly clawed; very broadly elliptic, waved at the margin, up to 8 cm long, 8-9 cm broad. The petaloid part of the stamen semiobovate, about equal to the labellum. Style short, elliptic. Capsule ellipsoid up to 6 cm long.

The colours of the various parts of the flower are pale yellow, sulphur yellow, and has many hybrids.

*Flowers* : All the year round.

*Occurrence* : Commonly cultivated in the gardens; found at Lalbaug, Motibaug, Junagadh.

### ZINGIBERACEAE

Leaves few, erect, oblong, acuminate, mottled green above and pale red-purple beneath; flowers of various shades of purple and white

*Kaempferia*

Leaves 3-4, oblong or elliptic; flowers pink with yellow throat

*Curcuma*

### CURCUMA Roxburgh (nom. cons. Prop.)

*Curcuma inodora* Blatt. in Journ. Asiatic Soc. Beng. (N.S.) 26(1) : 357 358. 1930; Santapau in JBNHS 51 : 135 139, t. 1; Phatak & Oza in JBNHS 56 : 368 369; Santapau, Pl. Saur. 784. 1953; Chavan & Oza Fl. Pavagadh 221. 1966; Santapau & Jan. 47. 1967.

Herb; 60 cm high. Leaves 3 to 4, oblong or elliptic narrowed at the base. Flowers pink with yellow throat.

*Flowers* : August onwards.

*Occurrence* ; Girnar Hill, Junagadh; Forest Road, Junagadh; Sasan Gir to Junwania.

### KAEMPFERIA Linn.

*Kaempferia rotunda* Linn., Sp. Pl. 3. 1753; FBI 6 : 222; Cooke 3 : 233; Indraji 653. 1910; Santapau, Pl. Saur. 785. 1953; Santapau & Jan. 47. 1967.

A stemless plant with a tuberous rootstock and many thick succulent root-fibres bearing oblong tubers. Leaves few, erect,  $30 \times 7.5 - 10$  cm, oblong, acuminate, mottled green above and pale red purple beneath. Flowers sweetly fragrant, of various shades of purple and white.

*Local name* : Bhuchampak.

*Flowers* : April.

*Occurrence* : On Barda Hills, in Hadiya forest.

*Uses* : The root, used in the form of poultice, promotes suppuration. It is useful in anasarcaous swellings. The belief that the tubers are useful in reducing swellings is universal in India. It is used as a popular local application in mumps. The whole plant, when reduced to powder and used in the form of an ointment, has wonderful efficacy in healing fresh wounds. [Caz. A(1) : 128. 1953]

## MUSACEAE

### MUSA Linn.

Male flowers and bracts subpersistent, fruit cylindric,  
generally yellowish or yellowish-green when ripe *paradisiaca*

Male flowers and bracts deciduous ; fruit oblong, yellow or  
reddish when ripe *sapientum*

**Musa paradisiaca** Linn. Sp. Pl. 1043. 1753 ; Cooke 3 : 249 ;  
Santapau, Pl Saur. 786. 1953 ; Santapau & Jan. 48. 1967. *M. paradisiaca*  
var. *nor. nalis* O. Kuntze, Revis. Gen. 2 : 692. 1891. *M. clifortiana* Linn.  
Sp. Pl. 1043, 1753. *M. sapientum* var. *paradisiaca* Baker in Ann. Bot. 7 :  
213. 1893 ; FBI 6 : 262.

Stoloniferous, trunk cylindric, reaching 9 m or more, with a diam., of 15 cm. Leaves oblong, green, reaching 2.5 m long and 60 cm broad. Inflorescence pendulous, reaching 1.5 m long, male flowers and bracts subpersistent. Fruit cylindric, up to 30 cm long, generally yellowish or yellowish-green when ripe, the pulp scarcely sweet, rather firm.

*Local name* : Kel.

*Flowers* : Throughout the year.

*Occurrence* : In a garden near temple at Kankai.

*Uses* : Extensively cultivated everywhere for its fruits.

**Musa sapientum** Linn., Syst. ed. 10, 1303. 1759 ; Cooke 3 : 249 ; Santapau & Jan. 48, 1967.

Male flowers and bracts deciduous ; fruit oblong, usually 3-gonous, yellow or reddish when ripe.

*Local name* : Kel, Elchikela, Sonerikela.

*Flowers* : Throughout the year.

*Occurrence* : It was found cultivated in the gardens at various places in Saurashtra, Junagadh ; Rajkot, etc.

## HAEMODORACEAE

### SANSEVIERIA Thunb. (nom. cons.)

**Sansevieria zeylanica** Willd. Sp. Pl. 2 : 159. 1799 ; Cooke 3 : 252, Indraji 659. 1910 ; Santapau, Pl. Saur. 788. 1953 ; Santapau & Jan. 48. 1967. *S. roxburghiana* Schultz. f., Syst. 7 : 357. 1829 ; FBI 6 : 271.

Stem very short. Leaves about 8 or 9 in a tuft, 75–90 cm long and 2.5 cm broad towards the middle, sub-erect rigid, pale green with transverse bands of dark green, 0.6 cm thick, with a terete rigid spine-like tip 2.5–5 cm long. Flowers greenish-white tinged with violet, in fascicles of 3–6 on long racemes 30–60 cm long.

*Local name* : Nagfaniketaki.

*Flowers* : January.

*Occurrence* : Junagadh and Mithapur.

*Uses* : Fibres of the good quality are obtained from the leaves, and are used for making ropes and mats. Roots are used in the treatment of consumption and cough. (Indraji 660. 1910).

## AMARYLLIDACEAE

### CRINUM Linn.

**Crinum defixum** Ker.-Gawl. in Quart. J. Sci. 3 : 105. 1817 ; FBI 6 : 281 ; Cooke 3 : 257 ; Indraji 658. 1910 ; Santapau, Pl. Saur. 789. 1953 ; Santapau & Jan. 48. 1967. *Crinum ensifolium* Roxb. Hort. Beng. 23. 1814 ; FBI 6 : 281.

Bulb ovoid, 5-7.5 cm. in diam., with a fusiform stoloniferous base; neck 5-15 cm long, cylindric. Leaves 6-8 to a bulb, 60-90 cm by 0.18-2.5 cm, linear, deeply channelled down the face, obtuse or acute, concave, thick, dark-green, with slightly rough margins. Scapes from the axils of the lowest leaves 45-75 cm long, erect, cylindric, bracts 2, oblong lanceolate, subacute, 3.6-5 cm long, bracteoles filiform. Flowers white, fragrant at night, in 6-12 flowered umbels. Filaments shorter than the lobes of the perianth, spreading, bright-red. Style declinate, stigma simple; ovules many, 2 seriate. Fruit subglobose, 2.5-3.6 cm in diam., shortly pedicellate, beaked by the perianth-tube, 1 celled, 1 or more seeded. Seeds rugose.

*Local name* : Gavarikand.

*Flowers* : August to November.

*Occurrence* : On Barda Hills, near Kasvirda, Kileshwari and Krishna stream, Fodala Nes near Bileshwari and at Minsar river.

*Uses* : Leaves are tied up on the swellings of apoplexy and guineaworm. It is also cultivated as an ornamental plant for its beautiful flowers and leaves. (Indraji 659. 1910).

## HYPONIDACEAE

### CURCULIGO Gaertn.

*Curculigo orchoides* Gaertn., Fruct. 1 : 63, t. 16. 1788 ; FBI 6: 279 ; Cooke 3 : 255 ; Indraji 657. 1910 ; Santapau, Pl. Saur. 791. 1953 ; Santapau & Jan. 48. 1967.

Rootstock stout, short or elongate, with copious fleshy root-fibres. Leaves sessile or petiolate, 15-45 × 1.2-2.5 cm, linear or linear-lanceolate, membranous, plicate, glabrous or sparsely softly hairy, the tip sometimes rooting and reaching the ground, base sheathing. Scape very short, clavate, flattened, with the pedicels, bracts and ovary hidden among the leaf-sheaths. Flowers bright-yellow, distichous, the lowest in the raceme 2-sexual, the upper male; bracts lanceolate, membranous. Stamens small, filaments very short; anthers linear. Ovary lanceolate, the cells 6-8 ovulate; stigma 3-cleft. Capsule 1.2 cm long, hypogaeous, 1-4-seeded, with a slender beak; septa spongy. Seeds oblong.

*Local name* : Kali-musali.

*Flowers* : August onwards.

*Occurrence* : Recorded from Junagadh, Forest Road and Sasan

*Uses* : Roots boiled in milk and is taken as a tonic. (Indraji, 658 1910).

## AGAVACEAE

### AGAVE Linn.

Leaves radical in a rosette, long, narrow, thick ; flowers stalk born erect from the rosette of the leaves *wightii*

Leaves radical in a massive rosette, long, broad, thick ; flowers stalk born erect on many horizontal branches *americana*

**Agave americana** Linn. Sp. Pl. 323. 1753 ; FBI 6 : 277 ; Cooke 3 : 261 ; Indraji 654. 1910 ; Santapau, Pl. Saur. 793. 1953 ; Santapau & Jan. 48. 1967 ; Stewart, Fl. West Pakistan 60. 1972.

A large perennial herb. Leaves radical in a massive rosette, long, broad, thick, heavy, prickly at the margins, sharp-pointed. Flowers only once during life, at any time after many years, 3-6 m tall scape. With large scape, with large bracts, yellowish green, borne erect on many horizontal branches. Some flowers are modified into flower-bulbils. Perianth funnel-like with short tube, segments 6, stamens 6, filaments exserted, anthers versatile, ovary inferior 3 celled, ovules many, stigma 3 lobed. *Diploctenia oblonga*.

*Local name* : Ketaki, Vilayati Kumvar.

*Flowers* : January to June.

*Occurrence* : Veraval to Sasan.

*Uses* : Fibres are obtained from the leaves. Leaves are used as a fodder during scarcity. (Indraji 655. 1910).

**Agave wightii** Drumm. & Prain in Agri. Ledg. No. 7, 91. 1906 ; Cooke 3 : 261 ; Santapau, Pl. Saur. 792. 1953 ; Santapau & Jan. 48. 1967. *Agave vivipara* Wight, Icon. t. 2023, 1852 ; Indraji 654. 1910.

Perennial herb. Leaves radical in rosette, long, narrow, thick, prickly at the margins, stiff, smooth and whitish-green in colour. Flower stalk borne erect from the rosette of the leaves. 3-6 m tall ; flowers yellowish-green.

*Local name* . Adbauketaki.

*Flowers* : January to June.

*Occurrence* : Barda Hill, Bileshwar near Bileshwari river ; Kandorna ; Samaravadar Nes.

*Uses* : The plant grows well as a hedge and is useful in checking soil erosion. It is a fibre plant. (WI)

## DIOSCOREACEAE

### DIOSCOREA Linn.

Leaves 3-5-foliate :

Stamens 6, all antheriferous ; leaflets 3 } *hispida*

Stamens 3, antheriferous ; leaflets usually 5, sometimes 3,  
rarely 7 *pentaphylla*

Leaves simple *bulbifera*

**Dioscorea hispida** Dennst., Schluss. Hort. Mal. 15. 1818 ; Santapau, Pl. Saur. 796. 1953 ; Santapau & Jan. 48. 1967. *D. daemona* Roxb. Hort. Beng. 72, nom. nud. 1814 & Fl. Ind. 3 : 805. 1832 ; FBI 6 : 289 ; Cooke 3 : 264.

Root tuberous, lobed biennial ; stems twining, more or less prickly. Leaves 3 foliate ; common petiole 10-20 cm long, usually prickly ; leaflets 10-20 × 5-12.5 cm, all petiolate, broadly cuneate-obovate, cuspidately caudate acuminate, villous when young, glabrous in age, sometimes reticulately veined, base tapering, 3-5 nerved ; lateral leaflets very oblique ; petiolules 0.3-1.5 cm long. Male flowers in dense cylindric pedunculate spikes 0.6-0.8 cm long, arranged in clusters along the more or less prickly, pubescent or villous rhachis or a raceme 15-45 cm long. Stamens 6 ; all antheriferous ; anthers sub-sessile. Pistillade very low, broad. Female flowers. Spikes solitary, distant. Capsules 50 × 25 mm quadrately oblong, truncately rounded at the ends, smooth and polished ; pedicles very short. Seeds 2.5 cm long, membranous, oblong, obtuse, broader than the flat oblique nucleus.

*Flowers* : October.

*Occurrence* : Shirvan, Junwania Nes, Sasan near forest nursery, Sasan across the river, Junagadh forest road.

**Dioscorea bulbifera** Linn. Sp. Pl. 1033. 1753 ; Cooke 3 : 265 ; Indraji 660, 1910 ; Santapau, Pl. Saur. 795. 1953 ; Santapau & Jan 48. 1967. *D. sativa* Thunb Fl. Jap. 151. 1784 (non Linn. 1753) ; FBI 6 : 295. (excl. *D. cliffortiana*).

Tubers large, globose or elongate ; stem terete, unarmed, glabrous bulbiferous in the leaf - axils, the bulbils warty. Leaves opposite and alternate, variable in size, 7.5 - 35 cm long, and broad, membranous, dark green, broadly ovate, acuminate, cuspidate or caudate, base cordate with a broad, deep, or shallow sinus ; nerves 7 - 8 (rarely 11). Male flowers variable in size, green or purplish, in short slender (almost capillary), spikes 2.5 - 10 cm long, close together or scattered on the branches of crowded axillary slender pendulous glabrous spikes or panicles reaching 30 cm long. Stamens 6 ; filaments short ; anthers minute didymous ; pistillate 3 lobed. Female flowers sessile, 0.5 cm long, in axillary solitary or fascicled pendulous spikes 10 - 25 cm long. Capsules 16 - 25 × 8 - 12 mm, quadrately oblong, rather broader upwards, with a truncate or subcordate base. Seeds winged at the lower end only.

*Local name* : Varakand, Vanavel.

*Flowers* : August onwards.

*Occurrence* : Sasan near river, upstream, across the river, edges of forest and Junagadh forest road.

*Uses* : Dry bulb pounded and is applied on swellings. (Indraji 660. 1910).

**Dioscorea pentaphylla** Linn. Sp. Pl. 1032. 1753 ; FBI 6 : 281 ; Cooke 3 : 264 ; Santapau in JBNHS 49 : 631 ; Santapau & Jan. 48. 1967. *D. jacquemontii* Hook. f. in Fl. Brit. Ind. 6 : 290. 1892.

Root-tubers oblong, very long ; stem slender, twining glabrous, prickly towards the base, often bulbiferous in the leaf-axils. Leaves alternate, 3 - 5 foliate, glabrous or sparsely pubescent beneath ; common petiole 25 - 60 mm long, leaflets variable in size and shape, 5 - 7.5 × 2.5 - 5 cm, elliptic lanceolate, ovate or obovate, acuminate, cuspidate or subcaudate, base usually acute ; lateral leaflets oblique at the base ; petiolules very short. Male flowers pale-greenish fragrant, in very slender shortly pedunculate racemes 2.5 - 3.6 cm long. Stamens 3 perfect, anthers subsessile ; staminodes 3, minute. Pistillode 3 lobed. Female flowers in axillary pendulous pubescent, spikes 5 - 15 cm long. Capsules

quadrate-oblong, 1.8–2.5 cm. long, usually retuse at both ends, nearly glabrous or more or less pubescent often apiculate. Seeds 12–18 mm long.

*Flowers* : September to October.

*Occurrence* : Sasan, forest nursery.

*Uses* : The flowers are often collected and used as vegetable. Leaves are also eaten in times of scarcity. Tubers are used to disperse swellings and as tonic. (WI)

## LILIACEAE

Leaves minute, often spinescent scales, bearing axillary tufts of needle-like or slightly flattened cladodes

*Asparagus*

Leaves well developed :

Climbing plant ; leaves ending in a tendril ; flowers large, yellow and red

*Gloriosa*

Frect undershrubs or herbs ; leaves very thick ; perianth reddish-yellow and green

*Aloe*

Herbs without distinct above-ground stems :

Flowers in heads or umbels sheathed by one or more spathes

*Allium*

Flowers racemose or fascicled in racemes :

Rootstock small with fleshy or tuberous roots :

Leaves semi-terete, fistular

*Asphodelus*

Leaves flat, not fistular

*Chlorophytum*

Rootstock a bulb or corm :

Leaves radical, linear, glabrous

*Dipcadi*

Leaves nearly flat, sub-bifarious, linear

*Urginea*

## ALLIUM Linn.

*Allium cepa* Linn., Sp. Pl. 300. 1753 ; FBI 6 : 337 ; Cooke 3 : 284 ; Santapau, Pl. Saur. 797. 1953 ; Santapau & Jan. 48. 1967.

Bulbous, biennial herb. Leaves linear, hollow fleshy and cylindrical. Flowers on a scape in many flowered umbel, white or lilac with 2-3 bracts, reflexed. Perianth segments 6, petaloid, linear oblong. Stamens 6, exserted, ovary superior, 3 celled with 2 ovules in each cell, style slender, stigma minute. Capsule small.

*Local name* : Dungali ; Kanda.

*Flowers* : January.

*Occurrence* : Cultivated at Junagadh, Rajkot, Gondal, etc.

*Uses* : The onion is said to possess stimulant, diuretic, and expectorant properties and is considered useful in flatulence and dysentery. Freshly expressed onion juice has moderate bactericidal properties. (WI)

#### ALOE Linn.

*Aloe barbadensis* Mill., Gard. Dict. ed. 8, No. 2, 1768 ; Santapau, Pl. Saur. 798. 1953 ; Santapau & Jan. 48. 1967 ; Stewart, Fl. West Pakistan 48. 1972. *Aloe vera* auct. non Mill. 1768.

Leaves ensiform, dense, aggregate, 5-10 cm broad narrowed from base to apex, pale green, with distant horny prickles on the margins. Scape 60-90 cm long, simple or branched. Raceme dense, 15-30 cm long. Perianth yellow, cylindric, 1.8-2.5 cm long.

*Local name* : Kuamwar Panthu.

*Flowers* : August to December.

*Occurrence* : Okha, common in muslim cemeteries, also recorded from Veraval, Patan and many other places as a hedge plant.

*Uses* : Aloes is used as a stomachic, purgative and emmenagogue. It is regarded as valuable in the treatment of piles and rectal fissures. The mucilage is cooling and is used to poultice for inflammations. The young scapes (shelaran) pickled in salt water. (WI)

#### ASPARAGUS Linn.

*Flowers* in axillary clusters, not racemose ; cladodes mucronate, in clusters of 3-8, straight or falcate

*dumosus*

*Flowers* racemose :

Cladodes more than 1 2 cm long ; very slender, bracts  
small *racemosus* var. *javanica*

Cladodes flattened, linear, 0.12 cm wide, usually-falcate *gonoclados*

**Asparagus dumosus** Bak. in Journ. Linn. Soc. 14 : 608. 1874 ; FBI 6 : 315 ; Cooke 3 : 269 ; Indraji 663. 1910, Santapau, Pl. Saur. 799. 1953 ; Santapau & Jan. 48. 1967.

A branched spreading diffuse undershrubs, 60 cm high, the older branches woody, the younger flexuous ; branchlets pale, glabrous, conspicuously striate, the stride often minutely scabrous. Leaves deltoid ovate, cuspidate, with a spur about 0.1 cm long at the base, standing out from the branch. Cladodes 0.6 1.2 cm long, in clusters of 3 8, stout, linear, channeled, mucronate Flowers axillary, 2 4 nate ; pedicels 0.2 cm long, filiform. Perianth rather more than 0.3 cm long, funnel shaped segments oblanceolate. Stamens 0.2 cm long ; anthers subglobose. Style 0.1 cm long ; stigmas 3, spreading about 0.8 cm long. Berry 0.4 cm in diam.

*Local name* : Dariai-gajvel, Ekalkanta, Darialsatavari.

*Flowers* : May to October.

*Occurrence* : Mangrol ; Okha ; Porbander.

*Uses* : Roots boiled in milk taken as a tonic. It is used by the women to wash head for growing long hair. (Indraji 662. 1910).

**Asparagus gonoclados** Bak. in Journ. Linn. Soc. 14 : 627. 1874 ; FBI 6 : 318, Cooke 3 : 271 ; Santapau, Pl. Saur. 800. 1953 ; Santapau & Jan. 48. 1967.

A much branched armed small weak undershrub with nodular roots. Leaves spurred as the base with hard spines. Cladodes 2 6 at a node, flat, firm, narrowed at both ends, finely spinous pointed. Flowers white, few in racemes, bract boat shaped. Perianth segments 6, linear oblong. Stamens 6, anthers minute. Ovary superior, stigmas 3. Berry globose.

*Flowers* : October to January.

*Occurrence* : Rajkot, Residency Garden ; Balachari, H.H. Bangalow, Ghumli and Dwarka, growing in sands.

*Uses* : Cultivated in the gardens.

**Asparagus racemosus** var. **javanicus** Baker in Journ. Linn. Soc. 14 : 624. 1875. FBI 6 : 316; Cooke 3 : 270; Indraji 661. 1910, Santapau, Pl. Saur. 801. 1953; Santapau. & Jan. 48. 1967.

An extensive, spinous, much branched climber with fasciculated tuberous roots. Leaves linear, with a stout conical spinous spur, straight or slightly curved cladodes very slender, spinous pointed. Flowers white, fragrant in simple racemes, either one or 2, bract small. Perianth segments 6, oblong obtuse. Stamens 6, anthers subglobose ovary superior Style short, stigma 3, spreading. Berry globose, red.

*Local name* : Shatavari, Ekalkanto.

*Flowers* : October January.

*Occurrence* : Junvania Nes, Shirwan, Tulshishyam, Sasan in forest upstream from main dam.

*Uses* : Root is useful in the treatment of dysentery, convulsion. It is also given in impotency. (Indraji 662. 1910).

#### ASPHODELUS Linn.

**Asphodelus tenuifolius** Cav. in Ann. Ciene. Nat. 3 : 46, t. 27, fig. 2. 1801; FBI 6, 332; Cooke 3 : 279; Santapau, Pl. Saur. 803. 1953; Santapau & Jan. 48. 1967.

A small annual herb with fibrous roots. Leaves 15-30 × 0.2-0.3 cm, terete, fistulous, acute; sheathing at the base, finely puberulous. Scapes several from the root, smooth or puberulous, much branched in the upper part, 30-60 cm high. Flowers white, distant laxly racemose, solitary in each bract, stamens 0.3 cm long; filaments slightly fusiform towards the top; anthers 0.1 cm long. Style 0.2 cm long; stigma small, sub-capitate, minutely 3 lobed. Capsule globose, 0.4-0.5 cm in diam., erect, the valves deeply wrinkled. Seeds are 3 mm long, sharply 3-gonous, acute, black.

*Local name* : Dungaru.

*Flowers* : January to March.

*Occurrence* : Rajkot, Pradumna Park.

*Uses* : Seeds are considered to be diuretic. (WI)

## CHLOROPHYTUM Ker Gawler

**Chlorophytum tuberosum** (Roxb.) Baker in Journ. Linn. Soc. 5 : 332. 1875 ; FBI 6 : 334 ; Cooke 3 : 281 ; Indraji 664. 1910 ; Santapau, Pl. Saur. 804. 1953 ; Santapau & Jan. 48. 1967. *Anthericum tuberosum* Roxb. Fl. Ind. 1 : 149. 1832.

Root fibres cylindric, with ellipsoid tubers hanging from them. Leaves 6-12, membranous, sessile, 15-30×1.2-2.5 cm, shorter than the scape. Flowers white in simple or shortly branched racemes 5-10 cm long, by 2.5-3.6 cm wide, when expanded ; bracts lanceolate, acuminate. Stamens 8 mm long ; anthers 0.4-0.5 cm long, narrowly linear, ultimately twisted. Stigma minute. Capsules obovoid, 0.9×0.6 cm, the cells 4-6 seeded. Seeds irregularly orbicular.

*Local name* : Karali Ni Bhaji.

*Flowers* : July to August.

*Occurrence* : Rajkot, along river bed.

## DIPCADI Medik.

**Dipcadi ursulae** Blatt. var. *longiracemosae* Deb & Dasgupta in JBNHS 72(3) : 823. 1975.

Herbs scapiferous, bulbous ; bulbs ovoid, small about 3 cm in diam., tunicate, rooting from the base. Leaves radical 30-40 cm×0.5-1.5 cm, linear, glabrous entire, acute ; veins parallel, 12-20. Raceme 10-15 cm long, 22-30 flowered. Flowers bisexual, regular, white. Stamens 6 ; filaments linear, adnate to the inner perianth tube. Carpels 3, syncarpous ; ovary sessile, superior, stigma trilobed. Capsule not seen.

*Flowers* : August.

*Occurrence* : Rozi at Jamnagar and from Junagadh Girnar Hill.

*Note* : Type : The holotype P.V. Bole 743 collected from Girnar hill, Junagadh on 25 August 1958 is preserved in the Blatt. Herb., St. Xavier's College, Bombay. P.V. Bole 851 collected from Rozi on 29-8-52 is designated as the paratype.

There have been no subsequent collections from Saurashtra.

## GLORIOSA Linn.

**Gloriosa superba** Linn. Sp. Pl. 305. 1753 ; FBI 6 : 358 ; Cooke 3 274 ; Indraji 666. 1910 ; Santapau, Pl. Saur. 807. 1953 ; Santapau & Jan. 49. 1967.

A large annual, herbaceous climber, rootstalk fleshy tuberous, solid and white. Stems 3 - 6 m long, given off from the angles of the young tubers, herbaceous. Leaves sessile or nearly so, ovate lanceolate, acuminate, tip ending in a tendril like spiral, base cordate, nerves parallel. Flowers large, axillary, solitary or sub corymbose. Perianth segments 6, linear lanceolate with crisply wavy margins, green at first then yellow, passing through orange and scarlet to crimson. Stamens 6, hypogynous, spreading, anthers versatile, extrorse. Ovary superior 3 celled, ovules many in each cell, style slender, deflexed at right angles with the ovary, stigma 3. Capsule long, septicidal

*Local name* : Dudhio vachhanag, Shingadio vachhanag.

*Flowers* : August to October.

*Occurrence* : Modpur vidi, Halar district.

*Uses* : Roots and leaves pounded in water and is applied on the swellings of rheumatism. Roots are poisonous. (Indraji 667. 1910).

## URGINEA Steink

**Urginea indica** (Roxb.) Kunth, Enum. 4 : 333. 1843 ; FBI 6 : 347 ; Cooke 3 : 277 ; Indraji 665. 1910 ; Santapau, Pl. Saur. 808. 1953 ; Santapau & Jan. 49. 1967. *Scilla indica* Roxb. Fl. Ind. 2 : 147. 1832.

A small herb with white, 5 - 10 cm long, ovoid, thick bulb. Leaves appearing after the flowers, 15 - 45 × 1.2 - 2.5 cm, nearly flat, sub bifarious, linear, acute. Flowers dingy brown, very distant, in slender laxly flowered racemes 15 - 30 cm long. Stamens 6, included, filaments flattened. Ovary superior, 3 celled, ovules many, style tapering, obconic capsule ellipsoid, 12 - 18 mm long, seeds elliptic.

*Local name* : Pankando. Jungalikando.

*Flowers* : June to October.

*Occurrence* : Junagadh Forest Road and Junwania Nes in Gir Forest.

*Uses* : It is used in the treatment of consumption asthma and kidney trouble. (Indraji 665. 1910).

## COMMELINACEAE

Leaf sheaths inflated	<i>Amischophacelus</i>
Leaf sheaths not inflated :	
Floral bracts inconspicuous ; staminodes present	<i>Commelina</i>
Floral bracts large, imbricate ; staminodes absent	<i>Cyanotis</i>

### AMISCHOPHACELUS R. Rao & Kammathy

Leaves linear-elongate, lanceolate	<i>axillaris</i>
Leaves oblong-lanceolate	<i>cucullata</i>

**Amischophacelus axillaris** (Linn.) R. Rao & Kammathy, J. Linn. Soc. Bot. 59 : 306. 1966 ; Saldanha, Fl. Hassan, 642. 1976. *Commelina axillaris* Linn. Sp. Pl. 42. 1753. *Cyanotis axillaris* (Linn.) D. Don, Prod. Fl. Nepal. 46. 1825 ; Santapau & Jan. 49. 1967.

A small herb, stem coloured, prostrate. Leaves sessile, narrowly linear-lanceolate, acute, hairy, sheath inflated ciliate. Flowers violet blue, clustered in the inflated sheaths, cymes reduced to axillary fascicles of flowers with small linear bracteoles. Sepals 3 spathulate, lanceolate. Corolla tube short, lobes 3, ovate. Stamens 6, filaments bearded, ovary superior, 3 - celled, 3 cellular, style fusiform naked. Capsule beaked.

*Flowers* : August to September.

*Occurrence* : Recorded from between Dhari and Visavadar and Veraval and Dholka.

*Uses* : Used in external applications in cases of ascites. (WI)

*Note* : S.R. Rolla and R.V. Kammathy state in Bull. Bot. Surv. Ind. 3 : 393 - 394. 1961 and 6 : 2. 1964, that "Basic chromosome number of the genus *Cyanotis* is  $n = 12$ . The observation made with several populations of *Cyanotis axillaris* and *C. cucullata* regarding their inter-relationship with other species constantly reveal  $n = 10$  and this further supports the taxonomic evidence so far gathered and thus confirms the possibility of separating not only *C. axillaris* (Sharma, Genetica 27 ; 323 363. 1955) but also *C. cucullata* of the section Ochreaeflora of Clarke (DC. Mon. Phan. 3 : 178. 1881) into a distinct genus.

On the basis of evidence gathered, the two species *Cyanotis axillaris* (Linn.) Schult. f. and *Cyanotis cucullata* (Roth) Kunth were transferred to the genus *Zygomenes* Salisb. But it is now found that Salisbary in 1812 did not describe the genus and later, by Hasskaral's citation, the generic name got validated under a different circumscription and therefore it becomes a superfluous synonym to *Cyanotis* D. Don (sensu stricto). Hence a new name *Amischophacelus* Rolla et Kammathy has become necessary".

**Amischophacelus cucullata** (Roth) R. Rao & Kammathy, J. Linn. Soc. Bot. 59 : 336. 1966 ; Saldanha, Fl. Hassan dist. 642. 1976. *Tradescantia cucullata* Roth, Nov. Pl. Sp. 189. 1821. *Cyanotis cucullata* (Roth) Kunth, Enum. 4 : 107. 1843 ; Santapau & Jan. 49. 1967.

Erect, glabrous or sparsely hairy herb. Leaves oblong lanceolate, linear, obtuse. Flowers light blue clustered in the sheaths ; filaments nearly naked, capsule depressed in the centre with 3 projections, seeds subquadrate pitted.

*Flowers* : October.

*Occurrence* : Gondal Irrigation Lake, Rajkot river bed ; Rajkot beyond station, Gondal Road, Rajkot.

#### COMMELINA Linn.

Ovary 3-celled, the 2 anticus cells 2-ovulate, the posticus

1-ovulate or obsolete :

Capsules 3-celled ; anticus cells, 2-seeded seed free :

Spathes complicate, the margins free or connate, at the very base only :

Seeds free in the cells, reticulate, cylindric	<i>diffusa</i>
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Seeds adnate to the cells, broadly ellipsoid, ashy	<i>undulata</i>
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Seeds smooth, truncate at one end	<i>hasskarlii</i>
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Spathes turbinate ; capsule always 5-seeded ; seeds closely pitted	<i>benghalensis</i>
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Capsule 3-celled, anticus cells 1-seeded, seed free or adnate to the cell	<i>forskalei</i>
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All the cells of the ovary 1-ovulate :

Capsules 2-celled ; flowers white	<i>suffruticosa</i>
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Capsules 3-celled ; flowers blue	<i>albescens</i>
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**Commelina albescens** Hassk. in Schweinf. Beitr. Fl. Aethiop. 210. 1867; FBI 6 : 673; Cooke 3 : 294; Santapau & Jan. 49. 1967.

Root fibres thick; stems thickened at the base, often 2 or more from the root, clothed below with many white membranous sheaths, glabrous. Leaves 5-7.5×0.6-1.2 cm, linear or linear lanceolate, acute, glabrous, the margins often undulate. Spathes 1.2-1.8 cm long and sometimes nearly as broad as long, 1-3 together, subsessile, glabrous or nearly so, finely striate, cuculate, falcately hooked at one end, auricled at the other. Flowers blue, the lower raceme obsolete, the upper 3-5 flowered. Capsule 4 mm long, 3 celled, 2 valved, the dorsal cell indehiscent, with muricate ribs. Seeds 0.2-0.3 cm long, rounded at the ends and on the back, somewhat angular on the inner face, dull black.

*Flowers*: August to November.

*Occurrence*: Dwarka-slacks.

**Commelina benghalensis** Linn. Sp. Pl. 41. 1753; FBI 6 : 370; Cooke 3 : 291; Indraji 672. 1910; Santapau, Pl. Saur. 810. 1953; Santapau & Jan. 49. 1967.

A small herb with dichotomously branched, slender stem. Creeping and rooting below. Leaves 2.5-7.5×1.2-3.6 cm broad, ovate or oblong obtuse, sessile or shortly petiolate, hairy on both sides, base oblique rounded, sheath short or long hairy, margins ciliate or bearded with rufous hairs. Spathes 1-3 together, funnel shaped, auricled on one side, hairy, peduncles short or 0. Upper branch of cyme 2-3 flowered, the lower 1-2 flowered, sometimes rudimentary. Sepals 3, small, oblong, hairy. Petals 3, blue, larger petals orbicular or transversely oblong. Stamens 3 perfect, anthers oblong. Ovary superior, 3 celled, 2 cells, 2 ovulate, one cell, 1 ovulate. Capsule membranous, 5-seeded.

*Local name*: Motushishmuliyun.

*Flowers*: August to October.

*Occurrence*: Rajkot, Catholic Church, Jubilee Garden; Chotila plains; Junwania Nes, Sasan up stream near hedges in Gir Forest.

*Uses*: Its rhizomes, which are starchy and mucilaginous, are cooked and used as food. The leaves are used as pot-herb, in times of scarcity. The plant is bitter, and is said to be beneficial in leprosy. (WI)

**Commelina diffusa** Burm. f. Fl. Ind. 18, t. 7, f. 2. 1768; Panigrahi & Kamathy in JIBS 43 : 299. 1964; Rao in Notes R. bot. Gard. Edinb. 26 : 352. 1965; Santapau & Jan. 49. 1967. *C. nudiflora* auct. Plur. non Linn. FBI 6 : 369; Cooke 3 : 290; Santapau in RBSI 16(1) : 323. 1960.

A small diffuse glabrous herb with fibrous roots, stems branching from the base, prostrate often rooting at nodes, tips ascending. Leaves sessile,  $3.6 - 7.5 \times 1.2 - 1.6$  cm, lanceolate or ovate lanceolate, acute, glabrous, sheath loose with ciliate margins. Cymes usually two, 1-3 flowered, flowers 12-16 mm across, the two interior petals obovate with long claws, dark blue, the exterior subsessile, orbicular, or a paler blue or nearly white, sometimes subobsolete. Ovary 3 celled, of which two cells are 2 ovulate, the third 1 ovulate. Capsules 5 mm long, broadly oblong, acuminate, coriaceous, 5 seeded. Seeds oblong cylindric, tuberculate and reticulate, brown.

*Local name* : Shishamuli.

*Flowers* : September to December.

*Occurrence* : Gregarious and abundant in moist roots at Junwania Nes in Gir Forest.

*Uses* : The leaves are used as vegetable and fodder, and also for poulticing sores. (WI)

**Commelinia forskalaei** Vahl, Enum. 2 : 172. 1806 ; FBI 6 : 371 ; Cooke 3 : 292 ; Santapau, Pl. Saur. 811. 1953.

Stems long, branched, slender diffuse, rooting at the nodes. Leaves  $2.5 - 5 \times 0.6 - 1.2$  cm, glabrous or puberulous, narrowly oblong, obtuse, or subacute, narrowed at the base. The margins usually undulate or crenulate. Spathes 1.2 cm long and about 0.9 cm wide, broadly ovate, complicate or headed, acute sparsely hairy with long slender hairs, finely striate, base usually truncate or sometimes synecarpous. Upper cyme branch 1-3 flowered. Petals blue, the 2 larger obovate, with a very long slender claw. Filaments very long, spirally coiled. Capsule long, oblong, somewhat laterally compressed, rounded at both ends, slightly ribbed, containing 1 large seed which quite fills the cell.

*Flowers* : May to October.

*Occurrence* : Chotila, Rajkot R.C. Compound, along the river bed ; Gondal Irrigation lakes ; Jamnagar Jail ; Sasan, Iran river up stream, in moist shady spots, gregarious and Okha. Dwarka, it was found abundant in the cultivated fields.

**Commelinia hasskarlii** Clarke, Comm. & Cyrt. Beng. 13, t. 3. 1874 ; FBI 6 : 370 ; Cooke 3 : 291 ; Santapau & Jan. 49. 1967.

Stem much branched, glabrous or pubescent, sometimes scabrous. Leaves  $2.5 - 7.5 \times 1.2 - 1.8$  cm, narrowly lanceolate, subacute, sheaths 1.2 cm

long, with a broad base, ciliate spathes 1.2-2.5 cm long, axillary, scattered, ovate lanceolate, cordate at the base with rounded lobes, glabrous, scabrid, or hispid, peduncles 1.2-2.5 cm. Flowers blue in pubescent cymes, the upper branch 2-4 times the lower 1-2 flowered. Capsule 6 mm long, quadrate, subtruncate, apiculate, membranous. Seeds 0.4-0.3 cm long, cylindric, truncate at one end, subacute or rounded at the other, without an appendage.

*Flowers* : August to October.

*Occurrence* : Sasan Gir to Junwania. It was a very gregarious species in moist spots.

**Commelina suffruticosa** Blume, Enum. Pl. Jav. 1 : 3. 1830 ; Rolla & Kam. in JBNHS 59 : 65 ; t. 3, map. 4 : 1962 ; Santapau & Jan. 49. 1967.

Slender, erect herb, 25-50 cm tall, stem glabrescent to glabrous. Leaves distant below and crowded above, 9-17×3.5-7 cm, broadly lanceolate to elliptic, sub acuminate, inequilateral, margins scabrid, rough and dark green on upper side, greyish and sparsely hairy on the lower ; sheaths up to 2.5 cm long, hirsute on margins. Flowers white, enclosed in funnel shaped spathe containing mucilage or not, in cyme. Capsules 5×5 mm, 2 seeded, sub orbicular, flattened, dehiscent ; seeds free from pericarp and without appendage, tuberculate, reniform or nearly so.

*Flowers* : June.

*Occurrence* : Recorded from Junagadh, at the foot of Girnar, along roadsides and slopes, especially growing under shade of shrubs.

*Note* : This plant is likely to be confused with *C. obliqua* Buch. Ham. from which it differs in having smaller flowers, 2 - celled capsules, seeds which are appendaged and not adnate to the cell. Moreover *C. suffruticosa* Blume shoots out of the ground with the first rains of monsoon and flowers much earlier than *C. obliqua*.

**Commelina undulata** R. Br. Prodr. 270. 1810 ; R.S. Rao in Notes R. bot. Gdr. Edinb. 26 : 352. 1966 & in Blumea 14 : 351. 1966 ; Santapau & Jan. 49. 1967. *C. kurzii* Clarke in JLS 11 : 144. 1870 ; FBI 6 : 373 ; R.S. Rao & Kammathy in JBNHS 59 ; 61, Pl. 1A & D, 1962 ; Panigrahi & Kammathy in J. Indian bot. Soc. 43 : 304, f. 10. 1964.

Much branched, perennial, erect, ascending, straggling, or creeping decumbent herbs ; branches up to 90 cm long, slender, fistular, terete, glabrous. Leaves 4.5-12.5×1.5-4 cm, lanceolate, somewhat undulate along margin, dark green and minutely hirsellous above, paler and

glabrous beneath, acuminate at apex, abruptly contracted at base ; sheaths 1-2.5 cm long, striate, minutely hairy along margin, spathes 1.3-2.2 cm across, funnel shaped, beaked at anterior end, glabrate, 3-5 together in clusters accompanied by 2-4 smaller leaves and 2 mature, subtending leaves ; peduncles 3-5 mm long, covered by leaf sheaths. Flowers violet or purplish violet in 2-nate cymes ; outer branch with 3-6 flowers, inner represented by a stump. Capsules 2-3 per spathe, each 5-8 mm long, oblong, 3-loculed, 3-valved. Seeds oval with a membranous margin.

*Flowers* : August to October.

*Occurrence* : Junwania Nes, Sasan near forest nursery, Sasan, across the river on river banks and in forest near river in the Gir Forest and Junagadh, foot of Girnar.

### CYANOTIS D. Don

A floccosely silky or cobwebby woolly herb ; filaments bearded with hairs of 2 colours

*fasciculata*

Not floccosely silky nor cobwebby ; filaments bearded with the hairs of one colour

*eristata*

*Cyanotis cristata* (Linn.) D. Don. Prodr. Fl. Nep. 46. 1825 ; Santapau & Jan. 49. 1967. *Commelina cristata* Linn. Sp. Pl. 42. 1753. *Cyanotis cristata* (Linn.) Schult. f. Syst. 7 : 1150. 1830 ; FBI 6 : 385 ; Cooke 3 : 304.

Root fibrous, the fibres very slender ; stem branches from the base, the branches 15-45 cm long, slender, creeping and rooting below, then ascending, glabrous or with spreading hairs, internodes 2.5-7.5 cm long. Leaves 3-5.4×1.2-1.8 cm sessile, spreading, ovate oblong, obtuse or subacute, flat, glabrous or sparsely hairy, with villously ciliate margins, base rounded or cordate ; sheaths short, hirsute. Flowers in scorpioidly recurved cymes 1.2-2.5 cm long, longer than the bracteoles, peduncles 1.2-10 cm long, sometimes almost 0. Sepals lanceolate, acuminate. Corolla tube not much exceeding the sepals ; corolla - lobes ovate. Filaments fusiform below the tip, bearded above. Style naked. Capsules 0.1-0.3 cm long, oblong, 3-gonous, truncate, membranous, nearly glabrous. Seeds 0.2 cm long, 3-gonous, striate and with 2 large pits on two of the faces, black.

*Flowers* : August to October.

*Occurrence* : Junagadh, foot of Girnar on epiphytic plant, rare; and also noted from the Gir Forest, Sasan Gir to Junwania.

*Uses* : An ornamental plant.

*Cyanotis fasciculata* (Heyne ex Roth) Schult. f. Syst. 7 : 1152. 1830 ; FBI 6 : 387 ; Cooke, 3 : 303 ; Santapau & Jan. 49. 1967. *Tradescantia fasciculata* Heyne ex Roth, Nov Pl. Sp. 189. 1821.

A small branched floccosely silky or cobwebby woolly herb, root annual, fibrous; branches 10-25 cm long, spreading slightly rooting below, leafy. Leaves 1.8-5×0.4-0.9 cm, sessile, linear lanceolate or narrowed from the base to the tip, acute or acuminate, straight or recurved, cobwebby on both sides. Cymes 0.6-1.6 cm long, axillary and terminal, peduncles 1.2-2.5 cm long, 1 or more together; bracts lanceolate, bracteoles lanceolate or ovate lanceolate, falcate, acuminate. Sepals 0.4-0.2 cm, elliptic lanceolate, acute, cobwebby. Corolla 0.6 cm long, pink; lobes 0.1-1.3 cm long, ovate obtuse or subacute. Filaments filiform, spirally twisted, bearded with hairs of 2 colours, blue and white. Ovary with an erect tuft of hairs at the apex; style naked, fusiform at the tip. Capsules 0.4×0.2 cm, oblong, 3-gonous, pilose at the apex, seeds oblong, faintly rugose.

*Flowers* : August to October.

*Occurrence* : Sasan, high hill north of village. Masses of this plant were found on rocks on very top of hill.

## ARECACEAE

### ( PALMAE )

Unbranched palms :

Leaves simple, palmate *Borassus*

Leaves compound, pinnate :

Leaves bipinnate; leaf-segments rhomboid or triangular *Caryota*

Leaves simple-pinnate; leaf-segments strap-shaped :

Trunks rough with the remains of persistent leaf-bases

*Phoenix*

Trunks with annular marks, not covered with persistent leaf-bases :

Fruits less than 5 cm long, orange-coloured	<i>Areca</i>
Fruits more than 20 cm long, green or greenish-yellow	<i>Cocos</i>
Fruits less than 1 cm long	<i>Roystonea</i>
Fruits 30 cm long	<i>Nipa</i>
Branching palms	<i>Hyphaene</i>

#### ARECA Linn.

**Areca catechu** Linn. Sp. Pl. 1189. 1753; FBI 6 : 405; Cooke 3 : 319; Indraji 673. 1910; Santapau, Pl. Saur. 815. 1953; Santapau & Jan. 49. 1967.

A graceful slender stemmed palm; trunk reaching nearly 33 m high, scarcely exceeding 30 cm in diam., green in the upper part annulate with raised rings which are not quite horizontal but alternately inclined to opposite side. Leaves pinnate, 1.5-2 m long; leaflets quite glabrous, 30-60 cm long, with one or several midribs, the upper leaflets confluent. Spadix androgynous, from below the leaves, branched. Lowest spathe large, glabrous, pale straw coloured, parallel veined. Stamens 6. Fruit 3.6-5 cm long, fleshy fibrous, orange or scarlet, supported by the persistent perianth, the seeds in the upper part.

*Local name* : Sopari.

*Flowers* : December onwards.

*Occurrence* : Commonly cultivated at Junagadh; Gondal; near Veraval, Mangrol and Chorwad.

*Uses* : Nuts are eaten with betel leaf. The fresh nuts produce giddiness. The juice of tender nuts, in small doses, acts as a laxative. The burnt nut is used as a dentifrice. (WI)

#### BORASSUS Linn.

**Borassus flabellifer** Linn. Sp. Pl. 1187. 1753; FBI 6 : 482 (excl. *B. aethiopum*); Cooke 3 : 321; Indraji 671. 1910; Blatt. Palms Brit. Ind. & Ceylon, 174-213, pt. 38-39. 1926; Santapau, Pl. Saur. 816. 1953; Santapau & Jan. 49. 1967.

A large, tall palm marked with horizontal rings. Stem very rough on account of stumps of old leaf - stalks. Trunk attains 33 m high and 60 cm in diam. Leaves 1-1.5 m in diam., segments 60-80, shining, folded along the midrib, linear lanceolate; petioles 60-120 cm, long, semiterete, the margins with hard spinescent serratures. Flowers dioecious. Spadix very large, simply branched, sheathed with numerous open spathes. Male flowers small; spikes 1-3 at the ends of the branches, cylindric, densely clothed with imbricating bracts, numerous minute secund spikelets concealed by the bracts so as to appear immersed in the spike. Stamens 6, filaments connate with the corolla into a stalk. Female flowers larger, globose, 2.5 cm in diam. Sepals imbricate. Petals smaller, convolute. Staminodes 6-9, ovary 3-4 celled. Fruit a large subglobose brown drupe 15 cm in diam., or more, with 1-3 obcordate fibrous. Pyrenes, enclosed by the enlarged perianth. Seeds oblong, 3 lobed at the top.

*Local name* : Tad.

*Flowers* : January to March.

*Occurrence* : Grown in Rajvadi baug, Porbander.

*Uses* : The leaves are extensively used for making fans, umbrellas, baskets and mats, and for thatching roofs. Brooms are made from their stiff veins. Toddy and Nira are obtained from it. (Indraji 677. 1910)

#### CARYOTA Linn.

**Caryota urens** Linn. Sp. Pl. 1189. 1753 ; FBI 6 : 422 ; Griff. Paln. Brit. E. India 169. 1850 ; Cooke 3 : 315 ; Indraji 675. 1910 ; Blatt. Palms Brit. Ind. & Ceylon, 339, t. 57, f. 48. 1926 ; Santapau, Pl. Saur. 817. 1953 ; Santapau & Jan. 49. 1967.

Trunk 13-20 m high by 30-38 cm in diam., cylindric, annulate, not or scarcely suboliferous, smooth, grey, shining covered with long shallow cracks with corky edges. Leaves bipinnate, 6-6.5×3-5 m; primary divisions 1.5-2 m long, arched and drooping, leaflets 10-20 cm long, fasciculate or alternate cuneiform, obliquely truncate, irregularly serrate toothed on the truncate margin, the upper margin produced beyond the leaflets into a tail, flabellately veined, quite glabrous, bright green, shining, petiole very stout, about 7.5 cm thick at the base. Spadix 3-4 m long, branches simple, forming a dense tassel drooping from the stout short peduncle, all reaching the same level. Spathes 45 cm long, closely embracing the peduncle of the spadix. Male flowers : Buds narrowly cylindric, 1.2 cm long. Sepals cordate, ciliate. Petals coriaceous

concave, reddish. Stamens about 40, filaments short, white, anthers acuminate, as long as the petals. Female flowers : Sepals rather broader than in the male. Staminodes usually 3, ovules solitary, erect. Fruit 1.6–1.6 cm in diam., reddish; pericarp acrid, stinging. Seeds 1 or 2.

*Local name* : Shivjata, Shankerjata.

*Flowers* : Throughout the year.

*Occurrence* : Recorded from Junagadh Motibaug, Lalbaug.

### Cocos Linn.

**Cocos nucifera** Linn. Sp. Pl. 1188. 1753; FBI 6 : 482; Cooke 3 : 322; Indraji 678. 1970; Santapau, Pl. Saur. 818. 1953; Santapau & Jan. 49. 1967.

A handsome, tall palm. Trunk 13–26 m high, annulate, thickened at the base, with a mass of rootlets. Leaves 2–5 m long, leaflets equidistant, 60–90 cm, linear lanceolate, coriaceous; petioles 1–1.5 m, stout. Spadix 1.5–2 m long, androgynous, at length drooping, simply panicled; branches bearing scattered female flowers towards their bases and numerous male above. Male flowers unsymmetric. Sepals small, velvet. Petals 0.6 cm long, oblong, acute, velvet. Stamens 6; filaments subulate, anthers linear erect. Pistillode minute or 0. Female flowers; larger than the male, 2.5 cm long, ovoid, supported by broad bracteoles. Perianth accrescent. Sepals 2.5 cm in diam., round, concave, imbricate. Petals shorter than the sepals, convolute, with imbricate tips. Fruit 20–30 cm long, 3-gonously obovoid or subglobose green or yellowish.

*Local name* : Naliyeri.

*Flowers* : All the year around.

*Occurrence* : Cultivated at many places. Recorded from Chorwad and Mangrol.

### HYPHAENE Gaertn.

**Hyphaene indica** Becc. in Agric. Colon. 2 : 173. 1908; Indraji 678. 1910; Blatter Palms. Brit. Ind. & Ceylon, 157. 1926; S.R. Rolla in JBNHS 60 : 761–763, t. 1. 1964; Santapau & Jan. 49. 1967.

Stem dichotomously branched. Leaves flabellate-multifid, suborbicular, measuring 1.5 m from the apex of the petiole to the end of the

central segments. Petiole about 1 m long and about 20 cm broad at the apex, regularly rounded on the under side, channelled on the upper side of the lower part and almost flattened near the apex. Ligule very irregular and asymmetrical margin subligeneous, irregular and spinulose. Segments about 40. Male spadix rather stout, about 1 m long and about 4 cm in diam., at the peduncular part. Spathes tubular, ending at the apex on one side in a triangular, acuminate limb ; branches of spadix about 6, the lowest 3.5 cm in diam., bearing about 6 flowering branchlets digitately arranged, the next bearing 5, and the apical branch, bearing 2 ; the branches arise from their respective spathes. Branchlets 20-25 cm long, 0.9-1 cm in diam., the axillary part tough and subligeneous, no flowers at the base for the distance of about 1 cm. Flowers 3 for each scale and rising from it successively, having the appearance of small straw-coloured globules. Segments of corolla rigid and parchment-like rotundate, and very strongly striate nervose ; at the apex the flowering branchlets are suddenly narrowed into a small obtuse tail about 0.5 cm long and devoid of flowers. Female spadix not known. Fruit regularly obovate pyriform, markedly and gradually attenuate towards the base, subhemispheric. The antero-posterior diam., of the entire fruit is 5.1-5.15 cm and the transverse diam., 5 cm total length of fruit 7.20 cm, pericarp very large in comparison with the seed. Seeds obovate, 2.5 cm long and 2.6 cm broad.

*Local name* : Ravan tad ; Hoka tad.

*Flowers* : January onwards.

*Occurrence* : Burkhill reports this plant from Okhamandal and Diu (Blatt. Palms of Bombay 157).

*Uses* : The leaves as those of many palms are used for thatching and for making mats, hats, baskets and bags. (Indraji 678. 1910)

#### NIPA Wurmb.

**Nipa fruticans** Wurmb. in Verh. Bat. Genootsch. 1 : 349. 1779 ; Mart. Hist. Nat. Palm. 3 : 305, t. 208 ; Roxb. Fl. Ind. 3 : 677. 1832 ; FBI 6 : 424 ; Indraji 676. 1910 ; Blatter, Palms Brit. Ind. & Ceylon 554. 1926 ; Santapau, Pl. Saur. 820. 1953 ; Santapau & Jan. 49. 1967.

Rootstocks 45 cm in diam., rooting along the lower surface. Leaves very many, erect and recurved, 5-10 m long, petioles 120-125 cm long, very stout, sheath short, leaflets innumerable, shortly decurrent on the rachis, 120-125 cm long, very stout, sheath short, leaflets innumerable, shortly decurrent on the rachis, 120-125 cm long, bright, green above,

glaucous and 3 keeled beneath, tip subulate, midrib scurfy. Spadix 120-210 cm long, peduncle 90-270 cm. Male flowers very small; sepals linear with clavate inflexed tips. Petals similar but narrower; ovary crowded, cuneate obovate, angled, top pyramidal. Fruit 30 cm in diam., nodding, carpels 10-15 cm long, densely packed on a globose, areolate receptacle, compressed, broadly cuneiform, dark brown, crown 3 or more angled; seed as large as a hen's egg.

*Local name* : Paradeshitadia.

*Flowers* : January.

*Occurrence* : It was brought from Sunderban and grown in the Creak at Porbander.

*Uses* : Leaves and mesocarp of fruit yield fibre. Pounded leaves are used in the form of cataplasm or lotion for ulcers. The juice of young shoots is taken internally in herpes. The ash obtained by burning roots and leaves is considered useful for relieving. (WI)

### PHOENIX Linn.

Leaves longer. The foot often surrounded by a dense mass of root suckers

*dactylifera*

Leaves shorter

*sylvestris*

**Phoenix dactylifera** Linn. Sp. Pl. 1188. 1753; FBI 6 : 424; Santapau & Jan. 49. 1967; Blatter, Palms Brit. Ind. & Cey. 24. 1926.

A tall tree, attaining 33-40 m, trunk covered with the persistent bases of petioles, the foot often surrounded by a dense mass of root suckers. Leaves grey, longer pinnae 20-32 cm long, regularly distichous, forming a very acute angle with the petiole, petiole grey, laterally compressed, almost flat. Male panicles white, compact, 15-22.9 cm long, on a short peduncle. Flowers 0.4-0.8 cm long, sweet scented, sheaths outside with rusty down. Peduncles of female inflorescence 0.8-1.2 cm broad, sometimes broader below, spikes 30-60 cm long. Fruit oblong, 2.5-7.5 cm long, generally reddish or yellowish brown when ripe, pulp fleshy, sweet. Seed cylindric, with a longitudinal furrow in front, and a small cylindric embryo in the middle of the rounded back.

*Local name* : Khajur, Date palm.

*Flowers* : January to March.

*Occurrence* : Given on the authority of Santapau.

*Phoenix sylvestris* (Linn.) Roxb. Fl. Ind. 3 : 787. 1832 ; FBI 6 : 425 ; Griff. Palm. Brit. E. Ind. 141. 1850 ; Cooke 3 : 311 ; Indraji 676. 1910 ; Santapau, Pl. Saur. 821. 1953 ; Santapau & Jan. 49. 1967. *Elate sylvestris* Linn. Sp. Pl. 1189. 1753. Pro parte.

Stem 2.5-6.5 m high, rarely much shorter. Leaves rather short ; leaflets very many, quadrifariously inserted, subequidistant, 17.5-25 cm long, linear-lanceolate, pungent, coriaceous concave, spreading at right angles, bright green. Spathes 20-35 cm long, keel furfuraceous. Spadix 30 cm long, or more, young scopiform ; peduncle stout ; rachis flattened ; branches of male 10-15 cm long, of female longer. Male flowers 0.4 cm long ; stamens 6 ; anthers subsessile, linear ; female spadix long peduncled ; peduncle 2.5 cm broad, flattened, branches 15-25 cm long, divergent in fruit. Female flowers scattered, globose, 0.3 cm in diam., calyx cup-shaped, petals orbicular. Fruit 1.2 cm × 0.6 cm in diam., ovoid oblong, apiculate, red, at length violet blue ; seed nearly as long with the groove dilating into a canal of various forms.

*Local name* : Khajuri Jangli.

*Flowers* : January to March.

*Occurrence* : Collected from Kankai ; Sasan near river, along the railway line to Kansia near station.

*Uses* : Fruits edible.

#### ROYSTONEA O.F. Cooke

Leaves not large base sheathing : sheath cylindric slightly attenuate upwards

*oleracea*

Leaves very large ; leaf - sheath elongate, tightly enveloping the vegetative cone

*regia*

**Roystonea oleracea** O.F. Cooke in Bull. Torrey Bot. Club, 549. 1901 ; Santapau & Jan. 49. 1967. *Oreodoxa oleracea* Mart. Hist. Nat. Palm. III, 166, 310, t. 156, 163. 1849.

Stems more or less thickened at the base, for the rest equal, 33-42 m high, annulate. Leaves up to 6.5 m long, patent, forming a graceful crown, pinnatisect ; base sheathing ; sheath cylindric, slightly attenuate upwards, about 30 cm in diam., dark green, peduncle 10 cm broad above the sheath and 50-62.5 cm long, semi cylindric and deeply canaliculate with acute margins ; segments about 200 on each side with a thickened pulvinus at the base, the lowest and uppermost almost equidistant, the middle ones slightly crowded, 1 m long, 6.7 cm broad,

lanceolate linear, acuminate, bright green, slightly glaucescent on the lower surface. Spadix rising at the base of the cylinder formed by the leaf-sheaths, 60-90 cm long, decompound. Inner spathe cylindric, attenuate at both ends cuspidate, lignescent, opening longitudinally on the ventral side, reddish inside; peduncle almost 2-5 cm in diam., slightly thickened at the point of branching, branches furfuraceous puberulous. Flowers crowded, 3 together, the middle one female; bract at the base of the female flower small, membranous, triangular subulate, persistent; bracteoles 2, minute, broadly triangular. Male flowers sepals minute, scarcely 2-5 cm long, broadly cordate triangular, imbricate, corolla 5-8 cm long; petals oblong lanceolate; acute, straw coloured, valvete, stamens 8, more than 1 line; anthers linear bifid at the base; pistillode minute, subtriquetrous. Female flowers half the size of the male flowers; calyx 3 phylloids, sepals orbicular ovate, obtuse, imbricate; petals ovate - sub triangular, slightly concave, valvete; staminodes forming a six dentate cupule; ovary ovate; stigmas 3, sessile. Fruit a berry, incurved, obovoid oblong, 8-9 lines long, seed oblong, 4-5 lines long.

*Flowers* : March.

*Occurrence* : Given on the authority of Santapau.

*Uses* : Normally cultivated in gardens.

**Roystonea regia** (HBK) O.F. Cooke in Sci. Ser. 2, 12 : 479. 1900; Santapau & Jan. 49. 1967; Fl. Java 3 : 189. 1968; Stewart, Fl. West Pakistan 33. 1972. *Oreodoxa regia* HBK. Nov. Gen. & Sp. 1 : 305. 1815.

Stem unarmed, annulate 13-20 m high. Leaves very large, leaf-sheath elongate, tightly enveloping the vegetative cone. Leaflets firmly papyraceous, ensiform, quite straight and very gradually narrow above from below the middle, to a very acuminate, rather rigid, briefly bifid apex. Intermediate leaflets 60-90 cm long and 30.1-30.15 cm broad. Spathes 2, the exterior one tubular, pervious at its upper end, considerably shorter than the interior one. Spadices 3-4 at the same time, primary branches conspicuously swollen at their bases and divided into several alternate flowering branchlets, which are slender, terete, 15 to 25 cm long, or shorter, more or less sinuous between the flowers. Male flowers considerably larger than the female, irregularly ovoid, obtuse, 0.5-3.6 cm long, calyx very small, with slightly imbricate, scarious, subpellucid, sub deltoid, obtuse or acute, and more or less carinate sepals; petals considerably longer than the sepals, concave, irregularly ovate-oblong or oblong-elliptical, bluntnish or subacute, striately veined. Stamens usually 6-7, occasionally 8-9, about as long as the petals, anthers relatively large, slightly shorter than the filaments, filaments 0.4 cm long, linear subulate at the apex; rudimentary ovary globose with 3

short acute stigmatic points. Female flowers open a short time after the male, horizontal, 0.4 cm long when full grown sepals reniform, entire, smooth, slightly callous at the base; corolla four times as long as the calyx, staminodes forming a cup, lining the undivided part of the corolla, and crowned by 6 obtuse lobes, 3 of them peeping forth between the divisions of the corolla. Ovary globose, usually uni-cellular, stigmas fleshy, triangular subulate, recurved. Fruit globose - ovoid, and somewhat gibbous,  $0.1 \times 0.9$  cm. Seed broadly ovoid elliptical, rounded at both ends.

*Flowers* : March onwards.

*Occurrence* : Given on the authority of Santapau.

*Uses* : This palm is popular in gardens and parks as an avenue tree.

## PANDANACEAE

### PANDANUS S. Parkinson

**Pandanus fascicularis** Lamarck, Encycl, 1 : 372. 1785 ; FBI 6 : 485 ; Indraji 687. 1910 ; Santapau & Jan. 49. 1967 ; B. Stone, Fl. Hassan Dist, 780. 1976. *P. odoratissimus* Linn. f. Suppl. 424. 1781, norm. superfl. et illegit ; Stone, Gard. Bull, Straits Settlem. 22 : 236. 1967. *P. tectorius* sensu lato of many authors ; Gamble, Fl. Madras 1570 (1095), 1931, but not sensu stricto of Solander ex S. Parkinson, J. Voy. Endeavor 46. 1773.

Shrubby, up to 7 m high, rarely erect, stem supported by aerial roots. Leaves glaucous green, 1-1.5 m long, ensiform, caudate-acuminate, coriaceous, the marginal spines pointing forward, those on the midrib pointing forward or backward. Male flowers : Spadix with numerous subsessile cylindric spikes 5-10×2.5-3.6 cm, enclosed in long white fragrant caudate acuminate spathes. Staminal column 0.6-1.2 cm long; anthers longer than the slender filaments, cuspidate, inserted along the whole length of the upper portion. Female flowers : Spadix solitary, 5 cm in diam. Carpels confluent in obpyramidal groups of 6-10 or fewer; stigmas short, reniform, yellow. Fruit an oblong or globose syncarpium, 15-25 cm long and broad, yellow or red; drupes numerous (50-60) each consisting of 5-12 carpels; 0.5-7.5 cm long, turbinate, angular, the crown smooth, convex, more or less depressed round the reniform stigmas.

*Local name* : Kevado.

*Flowers* : July to September.

*Occurrence* : On Barda Hills ; on the banks of rivers and streams, also recorded from Mangrol near new bus station.

*Uses* : The plant yields a fibre. The fruits are eaten after cooking. The fibrous parts of the fruit after removal of the softer parts are made into a sort of crude paint brush. The male inflorescences are valued for the fragrant smell and for the valuable attar obtained from them. (WI)

## TYPHACEAE

### *TYPHA* Linn.

Leaves exceeding the flowering stem,  
semicylindric above the sheath

*angustata*

Leaves long, ensiform, 3-gonous

*elephantina*

*Typha angustata* Chaubard, Bory et al., Exped. Sci. Moree. Bot. 1 : 338. 1833 ; FBI 6 : 489 ; Cooke 3 : 326 ; Santapau, Pl. Saur. 824. 1953 ; Santapau & Jan. 50. 1967.

A robust plant ; stem 3.5 - 9.5 m high. Leaves exceeding the flowering stem, 1.8 - 2.5 cm broad, semi cylindric above the sheath. Spikes cylindric, the male and female spikes often separated by a considerable interval, the female spikes pale brown, 0.8 - 0.2 cm in diam. Female flowers mixed with clavate tipped pistillodes ; bracteoles subspathulate, equalling the linear stigmas, both longer than the hairs. Pollen simple.

*Flowers* : May to October.

*Occurrence* : Kabrastan, Jamnagar city and Rajkot river bed.

*Uses* : The fibrous stems and leaves are used for many purposes, they are used for thatching huts and houseboats, for making soft matt ings, ropes and baskets. The male and female flowers used for decorative purpose. [Gaz. A(3) : 80. 1961]

*Note* : C.J. Saldanha in Fl. Hassan District 760. 1976, gives a note under *T. angustata* Chaub. & Bory that "The taxonomy of this genus is difficult with no constant morphological characters to distinguish species. Geze (Et. Typha 115. 1912) and Mason (Fl. Marshes California 39. 1957) reduce *Typha angustata* Chaub. & Bory to synonymy under *T. domingensis* Pers. Backer (Fl. Malesiana Ser. 1, 4 : 243. 1951) reduces *T. domingensis* Pers. to synonymy under *T. angustifolia* L., sensu lato.

The genus is being monographed by Mr. Kurt Krattinger (Univ. of Zurich) who feels that *T. angustata* Chaub. & Bory is distinct from the European *T. angustifolia* L."

***Typha elephantina*** Roxb. Fl. Ind. 3 : 566. 1832 ; 1901 ; Cooke 3 : 326 ; Indraji 688. 1910 ; Santapau, Pl. Saur. 825. 1953 ; Santapau & Jan. 50. 1967.

Root stoloniferous, perennial. Culms straight, round, smooth, glossy, jointed at the insertion of the leaves ; 1.5 - 3 m high. Leaves long, ensiform, very smooth in every part ; sheath smooth, embracing the culm, and the sheaths of the inner leaves. Male spike 5 - 7.5 cm above the female one and terminating the culm, cylindric 30 cm long. Female spike about as long as the male.

*Local name* : Gha bajariyun.

*Flowers* : May to October.

*Occurrence* : Jamnagar and on Barda Hills.

*Uses* : Roots are used to relieve urine. It is a good fodder during scarcity. Spike or the ash of the spike is applied on the wounds. It yields a good fibre. (Indraji 688. 1910)

## ARACEAE

Water or marsh plants ; leaves entire ; barren appendage none ; leaves sessile, obovate-cuneate, in a rosettelike tuft ; base stoloniferous

*Pistia*

Terrestrial herbs :

Leaves and scapes rising directly from a tuber-like hypogaeal corm, the leaves usually more or less lobed :

Flowers preceding the solitary leaf ; males and females remote ; neuters present above the females ; leaves pedatifidate

*Sauromatum*

Males and females contiguous or nearly so ; neuters wanting ; leaves 3-sect

*Amorphophallus*

Leaves and scapes rising from a short caudex prolonging a hypogaeal rhizome ; leaves peltate

*Colocasia*

**AMORPHOPHALLUS Blume**

**Amorphophallus commutatus** (Schott) Engl. in DC. Mon. Phan. 2 : 319. 1879 ; FBI 6 : 515 ; Cooke 3 : 337 : Santapau, Pl. Saur. 826. 1953 ; Santapau & Jan. 50. 1967.

Annual, tuber oblate spherical,  $10 \times 5$  cm, depressed above. Leaf solitary appearing a month or more after the flowers, about 60 cm in expansion, 3 sect, each primary division 2 sect ; petiole reaching 60 cm long by 1.8 cm in diam., tapering upwards, solid, rough and variously spotted. Leaflets 1 terminal  $11.2 \times 5$  cm, and decurrent on each side and 2 below the bifurcation reducing in size downwards. Peduncle 30 - 90 cm long by about 1.8 cm in diam., at the base, tapering upwards, variously spotted with purple and white and rough with minute spinules ; cataphylls 2, sheathing the base of the peduncle, pale rose coloured, acute. The longest about 10 cm long. Spathe thick, brownish purple outside, pinkish purple inside,  $15 - 25 \times 5 - 12.5$  cm., ovate lanceolate, acute or acuminate, broadest at the middle, rough inside at the base, obtuse at the tip. Spadix sessile, columnar ; appendage as long as or longer than the spathe, cream coloured, terete, smooth, not contracted above the inflorescence, the tip obtuse. Male inflorescence 2.5 - 5 cm long. Anthers sessile, at first round, straw coloured, changing to brownish purple and becoming enlarged and irregularly quadrate in outline. Female inflorescence : Ovaries numerous, 1 celled ; ovule solitary ; stigma sessile, disciform, orange red.

*Local name* : Suran, Jangali Suran.

*Flowers* : May to June.

*Occurrence* : Commonly cultivated as a vegetable, in mango orchards at Chorwad.

**COLOCASIA Clusius ex Fabricius (nom. cons.)**

**Colocasia esculenta** (Linn.) Schott, Melet, 1 : 18. 1832 ; Santapau, Pl. Saur. 827. 1953 ; Santapau & Jan. 50. 1967. *Arum esculentum* Linn. Sp. Pl. 965. 1753. *Arum colocasia* Linn. Sp. Pl. 965. 1653. *Colocasia antiquorum* Schott, Melet. 1 : 18. 1832 ; FBI 6 : 523 ; Cooke 3 : 340.

Rootstock tuberous. Leaves large, ovate, with a broad triangular basal sinus. Spathe 20 - 45 cm long, caudate acuminate erect, pale yellow.

*Local name* : Alavi, Alu.

*Flowers* : July to September.

*Occurrence* : Sasan along river. Cultivated in most of the part of Saurashtra for leaves and tubers.

*Uses* : Leaves are edible.

#### PISTIA Linn.

**Pistia stratiotes** Linn. var. **cuneata** Engl. in Fl. Bras. 3(2) : 214. 1879 ; Santapau, Pl. Saur. 828. 1953 ; Santapau & Jan. 50. 1967.

A floating aquatic, stoloniferous herb. Leaves sessile, ovate to obovate cuneate, densely pubescent, 3.2 - 10 cm long, variable in breadth ; spathe 2 - 4 cm long, tubular at its base, free and spreading above, slightly constricted above the middle. Flowers minute, sessile on a spadix. Fruits ovoid to ellipsoid, green, crowned by persistent style. Seeds few to many, oblong or ovoid with a broad top.

*Local name* : Jalshankhala.

*Flowers* : July to November.

*Occurrence* : Recorded from Junagadh near Girnar Hill, found in a stream.

*Uses* : The ashes of the plant are applied to the ringworm of the scalp. The leaves are used in eczema, leprosy, ulcers, piles and syphilis. With rose water and sugar they are given for cough and asthma. Leaves are said to be anthelmintic. Juice of the leaves boiled in coconut oil and applied externally in chronic skin diseases gave relief in a number of cases. (WI)

#### SAUROMATUM Schott.

**Sauromatum pedatum** (Willd.) Schott. in Schott. & Endl., Melet, Bot. 17. 1832. **S. guttatum** (Wall.) Schott., Melet. 1 : 17. 1832 ; FBI 6 : 508, emend ; Cooke 3 : 335 ; Santapau, Pl. Saur. 829. 1953 ; Santapau & Jan. 50. 1967. **Arum pedatum** Willd. Enum. Suppl. 54. 1809. **Arum guttatum** Wall. Pl. As. Rar. 2 : 10, t. 115. 1831.

A large herb with a big tuber. Leaf pedatisect 15 - 30 broad ; segments 7 - 15, variable 5 - 37.5 × 2.5 - 7.5 cm, elliptic acuminate, deep green ; midrib and veins impressed above, prominent beneath, the lower

part of the midrib often spotted ; petiole stout, 30–45 cm long, green or spotted. Peduncle rather short, stout. Spathe 30–70 cm long, tube ovoid or subglobose. Spadix shorter than the spathe ; appendage 5–20 cm long, cylindric and obtuse or narrowed from the base to a fine point, green or dark purple. Male inflorescence 1.2 cm long, about 7.5 cm above the female. Anthers densely packed. Female inflorescence 1.2 cm long. Neuters 1.2 cm long, spreading, close above the female.

*Flowers* : April to August.

*Occurrence* : Junagadh, Forest Road.

*Uses* : The fresh inflorescence appearing in the hottest part of the year is cooked and eaten in Bombay and Ratnagiri Dt. (WI).

## LEMNACEAE

### LEMNA Linn.

**Lemna trisulca** Linn., Sp. Pl. 970. 1753 ; FBI 6 : 557 ; Cooke 3 : 343 ; Santapau & Jan. 50. 1967.

Fronds submerged, 0.6–1.8 cm long (not including the tall, which often attains 1.2 cm long), translucent, thin, flat, elliptic lanceolate or oblanceolate, crenate serrate near the apex, the young fronds hastate, at length tailed and attenuated into a stalk by which they remain attached to the parent frond, each frond giving rise to a single root fibre ; root-cap acute, ovule solitary, seed semianatropous, horizontal ; testa rough, grooved. The young fronds rise at right angles from one or both sides of the parent frond and remain connected with it crosswise.

*Flowers* : September.

*Occurrence* : Girnar Hill, Junagadh ; the plant was found in vegetative state only, covering most of a large pond.

## ALISMATACEAE

### LIMNO PHYTON Miquel

**Limnophyton obtusifolium** (Linn.) Miq. Fl. Ind. Bat. 3 : 243. 1855 ; FBI 6 : 560 ; Cooke 3 : 345 ; Indraji 690. 1910 ; Santapau, Pl. Saur. 832. 1953 ; Santapau & Jan. 50. 1967. **Sagittaria obtusifolia** Linn. Sp. Pl. 993. 1753.

Rootstock short, stout, with numerous long root fibres. Leaves all radical, 15–30 × 10–20 cm (sometimes as broad as long), reniformly or deltoidly sagittate or triangular, acute or subobtuse, or with rounded tip; basal lobes long, tapering to a fine point, primary nerves 6–8 pairs, radiating from the top of the petiole, with irregular, reticulate venation between them, petiole 30–90 cm long, stout striate, channelled above. Panicle with a stout angular scape 60–120 cm long; branches long; erecto patent, the lower branches usually in 4 whorls, bracts whorled, broadly ovate lanceolate, acuminate, with many parallel nerves, the lower reaching 2–5 cm long. Flowers many, 0.8–1.2 cm in diam., white, in whorls at the nodes of the branches of the panicle 4–15 in a whorl, the upper whorls mostly male, the lower hermaphrodite. Sepals 3, orbicular-ovate, concave, green, ribbed. Petals 3, broadly obovate, 0.4 cm long and broad. Filaments 6, flattened, with dilated bases. Achenes in a globose head 1.2–1.8 cm in diam., obovoid, turgid, wrinkled.

*Local name* : Nalkut.

*Flowers* : October onwards.

*Occurrence* : Dwarka, near station, growing in water, lower part submerged, abundant in talao.

## NAJADACEAE

### NAJAS Linn.

Leaves coarsely toothed almost pinnatifid, flowers dioecious	<i>marina</i>
Leaves finely toothed, flowers monoecious :	
Leaves with 6–10 teeth on each side, anthers 1-celled	<i>minor</i>
Leaves with 30–50 minute spinules on either side, anthers 4-celled	<i>graminea</i>

*Najas graminea* Del., Descr. Egypt. Hist. Nat. 2 : 282, t. 50, f. 3. 1813 ; FBI 6 : 569, Santapau & Jan. 50. 1967.

A very slender, delicate, bright green aquatic plant of grass like habit rooting at the nodes. The densely leaved lateral branches and tips of the main shoot results in a plumose habit of the plant. Flowers of both sexes devoid of spathe; leaves 1.5–2.5 cm long, 0.4–0.6 cm wide, marginal spinules minute, numerous; auricles of the sheath elongate, about

half the length of the sheath, toothed ; flowers solitary or 2-4 together ; male perianth ending directly above the anther in 2 ear-like lobed ; fruit ellipsoid oblong, attenuate at the apex ; areoles minute, subquadrate or polygonal.

*Flowers* : October.

*Occurrence* : Collected from Jamnagar talao.

**Najas marina** Linn., Sp. Pl. 1015. 1753 : de Wilde in Fl. Males. 1, 6(2) : 162. 1962, ff. 2a, g-h, 3. Santapau & Jan. 50. 1967.

Stem rather stout, toothed, fragile. Leaves 1.5-4 cm long, subternately whorled, linear, almost pinnatifidly toothed, teeth 4-8 on either side and a few on the back ; sheath with rounded sides entire or minutely denticulate. Outer perianth present in the male flowers.

*Flowers* : October.

*Occurrence* : Collected from Jamnagar talao and from Ranjit Sagar.

**Najas minor** All., Fl. Pedem. 2 : 221. 1785 ; FBI 6 : 569 ; Cooke 3 : 352 ; Santapau & Jan. 50. 1967.

A small plant, growing in fresh water, 4.2-25 cm high ; stem slender, much dichotomously branched ; internodes short, smooth. Leaves 0.9-2.1 cm long, scarcely 0.2 cm broad narrowly linear, the upper recurved with 6-12 spreading teeth on each margin ; sheaths truncate, rounded. Flowers fasciculate, monoecious, the male and female often found in successive leaf-axils. Male flowers about 1.5 cm long. Anthers 1-celled. Female flowers about 0.2 cm long, style long, stigmas 2, unequal. Achenes 0.2-0.3 cm long. Seed narrowly ellipsoid, pitted.

*Flowers* : October.

*Occurrence* : Rajkot, Pradumna Park ; Sasangir, Gir Forest ; Rajkot, beyond station ; Sasan Gir to Junwania, plant was found submerged and abundant in pond.

**Najas minor** All. var. **spinosa** Rendle in Trans. Linn. Soc. (Ser. 2), 5 : 431. 1899 ; K. Subramanyam, Aqua. Angi. C.S.I.R. Bot. Mon. No. 3, 101. 1962 ; Santapau & Jan. 50. 1967.

The leaves are very narrow and marginal spinules have almost the same length and width as the leaves. The fruit is 0.1-0.2 mm long.

*Flowers* : August onwards.

*Occurrence* : Collected from Dwarka, neighbourhood of Station.

## POTAMOGETONACEAE

Stamens 4, with petal-like connectives ; flowers in spikes ; fruit sessile

*Potamogeton*

Stamens 2, without petal-like connectives ; flowers not in spikes ; fruit on a long stalk

*Ruppia*

## POTAMOGETON Linn.

Upper or all leaves floating

*nodosus*

Leaves all submerged :

Leaves ovate, cordate, amplexicaul

*perfoliatus*

Leaves filiform, opaque

*pectinatus*

**Potamogeton nodosus** Poiret in Lam., Encycl. Suppl. 4 : 535. 1816 ; Dandy in Rechinger, Fl. Iran. 83 (Potamogetonac) : 3. 1971 ; C. J. Saldanha & D. H. Nicolson, Fl. Hassan dist. 638. 1976. *Potamogeton indicus* Roxb., (Hort. Beng. 12. 1814, nom.) Fl. Ind. 1 : 471. 1820, non Roth ex Roemer & Schultes, 1818 ; FBI 6 : 565 ; Cooke 3 : 349 ; Indraji 690. 1910 ; Santapau, Pl. Saur. 834. 1953 ; Santapau & Jan. 50. 1967.

Stem terete, branched, smooth, its length depending on the depth of the water. Leaves petiolate ; the upper floating, 6.2 - 10 × 2.5 - 3.6 cm, alternate or uppermost opposite, oblong or elliptic lanceolate, acute, obtuse or acuminate, thinly coriaceous, opaque, glossy, many nerved, base acute or rounded, the petioles variable in length with stipules 2.5 - 3.6 cm long, free ; the lower submerged leaves reaching 20 cm long, membranous, undulate, with petioles shorter than the blade. Peduncles axillary or leaf - opposed, 2.5 - 5 cm long, stout or slender, not thickened upwards, spike 3.6 cm long, dense flowered, green. Sepals 4, clawed, 0.1 cm long, including the claw which is nearly as long as the limb ; limb suborbicular, 1.5 - 2.1 cm broad, concave. Drupelets 0.3 cm long, obliquely truncate, shortly beaked.

*Local name* : Jalpupedi.

*Flowers* : August to December.

*Occurrence* : Dwarka, neighbourhood of Station. It was found floating on water, large patches were seen in Pond.

**Potamogeton pectinatus** Linn. Sp. Pl. 127. 1753 ; FBI 6 : 567 ; Woodrow in JBVHS 13 : 429. 1901 ; Cooke 3 : 350 ; Santapau, Pl. Saur. 835. 1953 ; K. Subramanyam Acq. Angi., C.S.I.R. Bot. Nom. No. 3, 95. 1962 ; Santapau & Jan. 50. 1967.

Stem filiform, copiously distichously branched, forming with the leaves tassel like masses when taken out of the water. Leaves all submerged, alternate,  $2.5 - 15 \times 0.1 - 0.2$  cm, narrowly linear or filiform, acute, opaque, 1-3 nerved or the lower sometimes 5 nerved; stipules adnate to the leaf-sheaths, the tips free. Peduncle with the spike 5-7.5 cm. long, filiform, usually longer than the leaves, not thickened upwards; flowers few in few distant whorls, minute, green. Sepals suborbicular. Drupelets 0.3-0.4 cm long, turgid, dimidiate obovoid, slightly compressed, shortly beaked, rounded and obscurely 3-keeled on the back, with a very short straight beak.

*Flowers* : August to November.

*Occurrence* : Ranjit Sagar, Jamnagar, plant was found floating on water and Dwarka near station. Woodrow reports it from Saurashtra.

*Uses* : The rootstocks contain starch.

**Potamogeton perfoliatus** Linn., Sp. Pl. 126. 1753 ; FBI 6 : 566. 1893 ; Cooke 3 : 349 ; Santapau, Pl. Saur. 836. 1953 ; Santapau & Jan. 50. 1967.

Stem stout, terete, slightly branched. Leaves 2.5-6.2  $\times$  1.5-2.5 cm, sessile, ovate lanceolate, obtuse, membranous, translucent, amplexicaul, base cordate, 5-9 nerved; stipules small, caducous. Peduncle stout; short, not thickened upwards. Spikes dense-flowered, 0.6-2.1 cm long. Sepals with long claws, elliptic obovate. Drupelets 0.3 cm long, obliquely ovoid, hardly keeled, slightly compressed, with a short usual curved beak.

*Flowers* : December to February.

*Occurrence* : Rajkot, Pradumna Park and Ranjit Sagar, Jamnagar.

#### RUPPIA LINN.

**Ruppia maritima** Linn., Sp. Pl. 127. 1753 ; McCann in JBNHS 45 : 396, ff 1-12. 1945 ; Santapau, Pl. Saur 837. 1953 ; Santapau & Jan. 50. 1967. *R. rostellata* Koch. in Reichb. Ic. Pl. Crit. 2 : 66, f. 174. 1824 ; FBI 6 : 568. 1893.

A submerged aquatic herb growing in brackish water, forming tangled masses of filiform leafy flaccid stems and branches; stems 60 cm long or more. Leaves filiform, 5-10 cm long, dull olive-green. Peduncles 0.4-2.5 cm long, not spirally coiled. Flowers minute, in pairs, enclosed in a leaf-sheath. Stipes of carpels rapidly lengthening after flowering up to 2.5 cm long, spreading and forming an umbellate head of achenes. Achenes 0.2-0.25 cm long, beaked.

*Flowers* : November onwards.

*Occurrence* : Jodiya Port, Jamnagar.

## ERIOCAULACEAE

### ERIOCAULON Linn.

Male and female florets sepals 3 :

Leaves linear-lanceolate	<i>dianae</i> var. <i>longibracteatum</i>
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Leaves erect, caespitose, linear, narrowed towards apex	<i>sollyanum</i>
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Male and female florets sepals 2	<i>truncatum</i>
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**Eriocaulon dianae** Fyson var. **longibracteatum** Fyson, in JIB 2 : 259 ; t. 11. 1921 ; Santapau & Jan. 50. 1967 ; Santapau, Fl. Khandala 294. 1967.

Leaves linear-lanceolate, to 8 cm. Peduncles many, to 15 cm. Head to 7 mm across, receptacle pilose, involucral bracts glabrous, longer than floral bracts. Floral bracts obovate, acuminate, pilose. Male floret : calyx spathaceous, ciliate at apex ; corolla lobes short, ciliate, with apical gland. Female floret : sepals 3, pubescent ; 2 sepals keeled ; one flat, much narrower ; petals eglandular.

*Flowers* : October.

*Occurrence* : Sasangir in Gir Forest.

**Eriocaulon sollyanum** Royle, Ill. 409, t. 97, f. 1. 1839 ; Santapau & Jan. 50. 1967 ; Santapau, Fl. Khandala 294. 1967. **E. trilobum** Buch.-Ham. ex Koern in Linnaea 27 : 647. 1856 ; FBI 6 : 583 : Cooke 3 : 361.

A stemless herb. Leaves erect, caespitose, green,  $4.2 \times 11.2 \times 0.2$  0.6 cm, linear, narrowed towards an acute or subobtuse apex, glabrous, flat, fenestrately 9-11 nerved, not drying red. Peduncles numerous, 7.5-20 cm high, glabrous, 5-6 ribbed, twisted ; sheaths 1.8-5 cm long, obliquely split somewhat lax. Striatulate. Heads 0.3-0.5 cm in diam., subglobose, dark grey ; involucral bracts  $0.3 \times 0.2$  cm, linear-oblong, obtuse, glabrous, floral bracts 0.2 cm long, cuneate-obovate, obtuse or subacute. Male flowers shortly stipitate. Sepals 3, oblong, obtuse, 1.5 cm long, connate into a spathe, glabrous. Corolla-tube 0.1 cm long ; petals minute. Stamens 6 ; anthers black. Female flowers subsessile. Sepals 3, oblanceolate, boat-shaped, 1.5 cm long, hairy on

the back. Petals 3, free, narrowly spatulate, hairy above and with a black spot. Ovary subsessile, 3-lobed; style branches 3, filiform. Seeds ellipsoid.

*Flowers* : October.

*Occurrence* : Sasan along river, in moist soil in river bed.

**Eriocaulon truncatum** Ham. ex Mart. in Wall. Pl. As. Rar. 3 : 29. 1832 ; FBI 6 : 578 ; Fyson, JIB 2 : 199. 1921 ; Santapau & Jan. 51. 1967.

Leaves subulate, to  $3 \times 0.2$  cm. Peduncles few, to 6 cm; head 3 mm across; receptacle villous. Involucral bracts elliptic, glabrous. Floral bracts obovate, papillose-hairy at apex. Male floret; sepals 2, cunnate at base; corolla lobes minute. Female floret: sepals 2, hairy at apex; petals filiform, hairy with apex.

*Flowers* : October.

*Occurrence* : Sasangir to Junwania, it was found on moist soil near stream, not abundant.

## JUNCACEAE

### JUNCUS Linn.

**Juncus maritimus** Lamk., Encyc. 3 : 264. 1789 ; FBI 6 : 393 ; Buchen., Monog. Junc. in Engl. Bot. Jahrb. 12 : 256. 1890 ; Cooke 3 : 308 ; Santapau & Jan. 51. 1967.

Perennial, densely caespitose, stems 60-150 cm high, erect, terete, striate, basal sheaths short, narrow, obtuse, pungent, or produced into a solid terete pungent leaf. Flowers in decompound cymes 2.5-5 cm long, with erect branches; floral bracts ovate, mucronate. Sepals 0.3-0.4 cm long, pale-green, lanceolate, acute. Petals slightly shorter, obtuse. Stamens 6; filaments dilated and connate at the base; anthers linear, yellow, longer than the filaments. Capsules longer than the sepals, ovoid or conic, 3-gonous, obtuse, mucronate, shining, 3-celled. Seeds oblong or obovoid, caudate at each end.

*Flowers* : October.

*Occurrence* : Junagadh.

## CYPERACEAE

Flowering glumes closely imbricate or all distichous :

Rachilla articulated, deciduous *Mariscus*

Rachilla not articulated, persistent :

Nut flattened with one edge against rachilla *Pycreus*

Nut trigonous or if flattened one edge not against rachilla *Cyperus*

Flowering glumes all spirally imbricate or the lower only distichous :

Hypogynous bristles or scales 0 *Fimbristylis*

Hapogynous bristles or scales present :

Nut with hypogynous bristles :

Style-base swollen *Eleocharis*,

Style-base not swollen *Scirpus*

Nut with hypogynous scales :

Hypogynous scales 6, divided to the base into linear segments ; stigmas 3 *Eriophorum*

Hypogynous scales not divided into segments *Fuirena*

## CYPERUS Linn.

Stigmas 2 :

Fruit a laterally compressed nut *triceps*

Fruit a dorsally compressed nut :

Spikelets many, densely packed in a terminal head ; stems reaching 25 cm long *pygmaeus*

Spikelets 1-30 in 1 apparently lateral head ; stems reaching 60 cm long *laevigatus*

Spikelets numerous, many flowered, close-packed ; stems reaching 20 cm long *michelianus*

Stigmas 3 ; fruit a trigonous or triquetrous nut :

Spikelets digitate or clustered, not spicate or racemose :

Annuals (except *C. haspan*).

Nut nearly as long as the obovate-oblong glume ; stamen 1 (rarely 2) *diformis*

Nut 1/3 the length of the glume, stamens 2-3 ; flowering in the first season but often biennial or perennial *haspan*

Perennials with a woody rootstock; stamens usually 3.

Inflorescence of 1 head (sometimes umbellate in *C. conglemaratus*)

Rhizome very short, rootlets wiry *niveus*

Rhizome creeping, rootlets thick :

Rootlets not woolly *arenarius*

Rootlets woolly (inflorescence sometimes umbellate) *conglomeratus*

More slender ; leaves narrower ; spikelets smaller and narrower var. *effusus* Forma *pachyrhizus*

Spikelets spicate rarely subracemosely disposed ; stamens usually 3 :

Rachilla of spikelets not or scarcely winged :

Annual with tufted stems :

Stems 10-40 cm long ; spikelets 1.2-3 cm long as the glume *compressus*

Stems 7.5-15 cm long ; spikelets 0.5-0.8 cm long ; nutless than 1/2 the length of the glume *squarrosum*

Stems 35-50 cm long ; nut nearly as long as the glume *iria*

Stems 20 cm long ; nut more than 1/2 the glume *alulatus*

Perennials with woody rhizome and often long stolons :

Glumes remote ; nut nearly as long as the glume *nutans*

Glumes not remote ; nut 1/2 as long as the glumes ; bracts never divariccate ; no true stolons *eleusinoides*

Rachilla of spikelets distinctly winged :

Leaves short, rarely 1/2 as long as the stem :

Glumes approximate ; stolons long stout *bengalensis*

Glumes remote, in fruit scarcely imbricating stolons 0 *pangorei*

Glumes jointed stolons clothed by scales *scariosus*

Leaves long, more than half as long as the stem or longer :

Rhizome stoloniferous :

Leaves arising from the stem at some distance above the base and below its middle	<i>stolonifer</i>
Leaves radical	<i>rotundus</i>
Rhizome not stoloniferous	<i>exaltatus</i>

**Cyperus alulatus** Kern., Reinwardtia 1 : 463, f. 1. 1952 ; Korlahalli, Bull. Bot. Surv. India 9 : 237. 1967 ; Santapau & Jan. 51. 1967. *C. iria* auct. pro. parte. *C. iria* var. *rectangularis* Kuekenth. in Pfreich. 101 : 152. 1935.

Glabrous, annual herbs with slender, triquetrous culms up to 20 cm long. Leaves flaccid and with recurved margins. Umbels compound ; rays 8, each 2-3.5 cm long ; bracts 5, foliaceous. Spikelets 3 mm long, compressed, spreading at right angles, ovate ; rachilla angular, hispid, flexuous. Glumes 2 mm long, scarcely imbricate, concave, orbicular, emarginate at apex ; keel prominent, curved, spinulose at the back ; nerves 7, one of them stands apart. Stamens 2. Styles 3 fid. Nuts 1-5 mm long, obovate, brown, triquetrous, concave on the faces, densely punctated, shortly stipitate, mucronate at apex.

*Flowers* : August.

*Occurrence* : Given on the authority of H. Santapau and Janardhanan.

*Uses* : The tuberous rhizomes are tonic, stimulant and astringent. (WI)

*Note* : Though a distinct species, it closely resembles *Cyperus iria* Linn. It differs from *C. iria* Linn., in the spikelets spreading at right angles to the hispid rachis, spinulose back of keel and 7 nerved glumes of which one nerve stands apart.

**Cyperus arenarius** Retz., Obs. fasc. 4 : 9. 1986 ; FBI 6 : 602 ; Cooke 3 : 378 ; Santapau & Jan. 51. 1967.

Whole plant pale or glaucous - green ; rhizome elongate, creeping, striate, rigid, dichotomously branched, clothed with lanceolate chestnut brown sheaths ; rootlets thick ; glabrous ; stems solitary 10-30 cm long, distant, stout, rigid, terete, attenuated at the base into the rhizome, clothed below with long withered sheaths. Leaves longer or shorter than the stem, 0.2-0.3 cm broad, linear, spreading and recurved, rigidly coriaceous, terete and grooved above, not keeled, almost nerveless. Head solitary, globose 1.2-2.6 cm in diam., of many sessile radiating spikelets, bracts 2-3, leaflike, rigid, the lowest 5-10 cm long, erect. Spikelets 0.9-1.2 ×

0.4-0.6 cm; elliptic lanceolate, straw coloured, becoming ultimately brown, 8-16 flowered; rachilla stout, not winged. Glumes 0.4-0.5 × 0.2 cm ovate oblong, boat shaped, obtuse, minutely mucronate, dorsally rounded. Stamens 3, filaments elongate, ligulate, persistent; anthers narrowly linear, muticous, exserted from the glume. Nut 1.5 mm long, obovoid, rounded at the apex, style 1.5-2.5 mm long, stigmas 3, capillary, exserted from the glume.

*Flowers* : October onwards.

*Occurrence* : Veraval.

**Cyperus bengalensis** Spreng., Neue Entdeck 3 : 101. 1822; B.C. Korlahalli in Bull. Bot. Surv. India 9 : No. 1-4, 235-239. 1967. **C. tegetiformis** Roxb. (Hort. Beng. 6. 1814 nom. nud.) ex Kunth, Enum. Pl. 2 : 56. 1837, Clarke in J. Linn. Soc. 21 : 157. 1884 & in FBI 6 : 612. 1893; Cooke 3 : 383.

Root perennial, fibrous. Culms erect, round, naked, articulated, smooth, 90-150 cm high, above as thick as a common large quill. Leaves no other than a rusty coloured sheath or two embracing the base of each culm. Umbel terminal, generally compound, though sometimes decom-pound. Involucr several small, chaffy scales. Umbelllets long, slender peduncled, bowing, composed of from eight to twelve linear, sessile, rust coloured spikes. Involucels like the involucres. Seed sub linear, three sided, smooth, light brown.

*Flowers* : October.

*Occurrence* : Rajkot.

*Uses* : Various types of mats are prepared from this sedge; plain, striped and super fine. (WI)

*Note* : The earliest validly published name at specific rank is **C. bengalensis** Spreng. and this has been adopted for this taxon by Korlahalli.

**Cyperus compressus** Linn., Sp. Pl. 46. 1753, emend. Dandy in Exell, Cat. S. Tome 357. 1944; FBI 6 : 605; Cooke 3 : 379.

A glabrous annual; root fibrous; stems tufted, 10-40 cm long, erect, slender, trigonous. Leaves shorter or longer than the stem, 0.1-0.4 cm broad, finely acuminate, 1 nerved. Umbel simple, often with a sessile head at the fork or occasionally altogether reduced to a sessile head, rays 3-6, reaching 7.5 cm long, bearing 4-8 terminal spikelets, bracts 3-6, finely acuminate, leaf-like spikelets 1.2-3 × 0.4-0.5 cm, much compressed, yellow when ripe, linear oblong, 20-40-flowered; rhachilla

stout, angular, closely scarred. Glume 0.5 cm long, oblong lanceolate, closely imbricate. Stamens 3, filaments 0.4 cm long, ligulate. Nut 0.2 cm long, broadly obovoid, style 0.1 cm long, stigmas 3, as long as the style.

*Flowers* : September onwards.

*Occurrence* : Recorded from Gir Forest ; Shihor and from Bhavnagar (G.L. Shah).

**Cyperus conglomeratus** Rottb. Descrip. et Icon. 21, t. 15; fig. 7. 1773 ; FBI 6 : 602 ; Cooke 3 : 379 ; Santapau, Pl. Saur. 839. 1953 ; Santapau & Jan. 51. 1967.

Glabrous, glaucous green ; rhizome short or long, woody, roots of stout woolly fibres ; stem stout, 15-50 cm long, terete below, trigonous above. Leaves as long as the stem or shorter, 0.2-0.4 cm broad, coriaceous, dorsally rounded, shortly cuspidate at the tip, nerves obscure. Umbel simple, often contracted into one head 2.5-3.6 cm diam., of densely crowded, spreading spikelets, bracts 3-4, elongate, narrower than the leaves. Spikelets 1.2-2.5 × 0.3-0.4 cm, oblong lanceolate, compressed, 10-24 flowered. Glumes reaching 0.3 × 0.1 cm, oblong lanceolate, cymbiform. Stamens 3 ; filaments 0.15 cm long, ligulate. Nut 0.15 cm long, obovoid, compressed. Style 0.3 cm long, stigmas 3, capillary much longer than the style.

*Flowers* : October.

*Occurrence* : Rozi, near Jamnagar.

**Cyperus conglomeratus** Rottb. var. *effusus* Forma *pachyrhizus* Trimen. MSS ex Hook. f. in Trim. Fl. Ceyl. 5 : 23. 1900 ; Cooke 3 : 379 ; Santapau, Pl. Saur. 840. 1953 ; Santapau & Jan. 51. 1967. *C. pachyrhizus* (Sp.) Nees ex Boeck. in Linnaea, 35 : 545. 1868 ; FBI 6 : 603 ; Woodrow in JBNHS 13 : 430. 1901.

Differs from the species in having more slender, leaves narrower ; heads 5 cm in diam., spikelets smaller and narrower ; glumes muticous.

*Flowers* : October onwards.

*Occurrence* : Dwarka, Okha sea shore and Mangrol, found very dense on sands. Woodrow reported from Veraval and Porbandar.

**Cyperus difformis** Linn. Cent. Pl. 2 : 6. 1756 & Amoen. Acad. 3 : 302. 1760 ; FBI 6 : 599 ; Cooke 3 : 376 ; Santapau & Jan. 51. 1967 ; Kern. in Backer & Bakh. f. Fl. Java 3 : 475. 1968.

A glabrous annual ; root fibrous, stems 10–50 cm long, tufted, weak, triquetrous towards the top. Leaves few, usually shorter than the stem, 0.3–0.4 cm broad, linear, acuminate, obscurely nerved. Spikes in a simple or compound umbel or contracted into a head. Spikelets many in dense heads, dusky or brown, 0.3–0.5 × 0.1 cm, oblong, obtuse, 10–30 flowered. Glumes 0.08–0.1 cm long, closely imbricate, obovate-oblong, obtuse, concave, 3-nerved. Stamen 1. Nut 0.08 cm long, ellipsoid, obtusely trigonous, rounded and apiculate at the apex. Style much shorter than the nut. Stigmas 3, linear, short.

*Flowers* : August to October.

*Occurrence* : Rajkot river bed, Beyt and Sasangir in Gir Forest, it was found abundant in almost pure stand in moist soil, or in shallow water. Rajkot, beyond station.

**Cyperus eleusinoides** Kunth. Enum. 2 : 39. 1837 : FBI 6 : 608 ; Cooke 3 : 382 ; Santapau, Pl. Saur. 841. 1953 ; Santapau & Jan. 51. 1967.

Perennial ; rootstock woody, with short lateral shoots but no true stolons ; stems 45–120 cm long, stout, triquetrous, with smooth angles. Leaves usually shorter than the stem, rigid, flat, reaching 0.8 cm broad with a stout midrib. Umbel erect, compound, spikes sessile or pedunculate, 1.2–3.6 × 0.6–0.8 cm in diam., green or brown. Spikelets densely imbricate, 0.4–0.8 × 0.2–0.3 cm, linear oblong, erect, flat, 8–12 flowered. Glumes 0.3 × 0.08 cm oblong, obtuse, apiculate, about 5-nerved. Stamens 3 ; anthers small, oblong, obtuse. Nut 0.15 cm long, oblong or ovoid oblong, yellowish brown. Style scarcely 0.08 cm long, stigmas 3, twice as long as the style, capillary.

*Flowers* : August to October.

*Occurrence* : Lalori Talao, Jamnagar Jail, one of the common *Cyperus* near the lakes of the river and the talao.

**Cyperus exaltatus** Retz. Obs. 5 : 11. 1789 ; FBI 6 : 617 ; Cooke 3 : 386 ; Indraji 692. 1910 ; Santapau, Pl. Saur. 842. 1953 ; Santapau & Jan. 51. 1967.

A large glabrous herb ; stolons 0, root fibres stout ; stems 1–2 m long, obtusely trigonous. Leaves few longer or shorter than the stem, linear, 0.4–0.9 cm long, finely acuminate, 1-nerved, multistriate, with more or less scaberulous margins. Umbel compound ; rays 5–10, sometimes reaching 15 cm long, bracts 3–6, leaf-like. Spikelets 0.4–0.6 × 0.15 cm., ascending, narrowly elliptic-lanceolate, chestnut brown, much compressed, 8–16 flowered. Glumes 0.2 cm long, closely imbricate

ovate oblong, mucronate. Stamens 3, anthers 0.1 cm long, yellow. Nut 0.08 cm long, ellipsoid, tapering to both ends, trigonous, brown or yellow; style 0.1 cm long, stigmas 3, rather shorter than the style, capillary, exserted.

*Local name* : Ghodachiodungaro.

*Flowers* : September onwards.

*Occurrence* : On Barda Hills, it grows near the water of talao and streams.

*Uses* : Useful for paper making. (WI)

**Cyperus haspan** Linn. Sp. Pl. 45. 1753 ; FBI 6 : 601 ; Boeck in Linnaea 35 : 530. 1868 ; Cooke 3 : 376 ; Indraji 693. 1910 ; Santapau & Jan. 51. 1967.

Perennial, glabrous ; rhizome creeping ; clothed with ovate triangular scales, stems compressed, 10 - 60 cm long. Leaves usually shorter than the stem, 0.3 - 0.4 cm broad, acute, erect, sheath inflated. Umbel simple or compound, of 4 - 12 very unequal rays up to 7.5 cm long ; bracts 2 - 3 variable, narrow and shorter than the rays. Spikelets 0.4 - 0.8 × 0.15 - 0.2 cm, linear, acute, flat, 10 - 40 flowered, pale or chestnut brown. Glumes 0.15 × 0.05 cm, ovate oblong. Stamens 2 or 3 ; anthers linear oblong. Nuts 0.05 cm long, globosely obovoid, rounded and shortly apiculate at the apex, style longer than the nut, stigmas 3. Capillary.

*Local name* : Chio.

*Flowers* : June onwards.

*Occurrence* : On Barda Hills, near the stream and in fields. Dr. M. H. Parabia also mentions of its occurrence in Saurashtra (G.L. Shah).

*Uses* : Given as fodder to horses and cattle. (WI)

**Cyperus iria** Linn. Sp. Pl. 45. 1753 ; (excl. tab. Rheed.) ; FBI 6 : 606 ; Cooke 3 : 380 ; Santapau & Jan. 51. 1967.

A glabrous annual ; root fibrous ; stems tufted, 35 - 50 cm broad, multistriate, finely acuminate, flaccid. Umbel decompound, of many primary rays 2.5 - 12.5 cm long, bracts 3 - 5, the longest sometimes reaching 20 cm long. Spikelets 0.6 - 0.8 × 0.25 - 0.3 cm, linear - oblong, obtuse, compressed, 6 - 20 flowered, yellow or pale brown. Glumes 0.25 × 0.15 cm, elliptic obovate, obtuse, 3 - 5 nerved. Stamens 2 or 3, anthers small, oblong. Nut 0.2 cm long, obovoid, triquetrous, brown or black,

style very short, scarcely 0.05 cm long, stigmas 3, very short, slightly exserted from the glume.

*Flowers* : May onwards.

*Occurrence* : Junagadh ; Vadia.

*Uses* : The plant is tonic, stimulant, stomachic and astringent. (Caius in JBNHS 38, No. 1, 164. 1935)

*Note* : This closely resembles *C. alulatus* but it differs in the characters of spikelets and the glume (Keel) which is 3-5 nerved.

***Cyperus laevigatus*** Linn. Mantiss 179. 1771 ; Cooke 3 : 373 ; Santa pau, Pl. Saur. 845. 1953 ; Santapau & Jan. 51. 1967. *Juncellus laevigatus* C. B. Clarke in FBI 6 : 596. 1813 ; Woodrow in JBNHS 13 : 430. 1901.

Glabrous ; rhizome creeping ; stems 10-60 cm long, round, somewhat fleshy. Leaves usually short or scarcely any, sometimes as long as the stem, 0.2-0.3 cm broad, the upper part often terete. Spikelets 1-30 in one apparently lateral head, solitary or clustered, straw coloured, bracts 2. Spikelets 0.6-0.8 × 0.3 cm, ovate, subacute, compressed but thick ; straw coloured, 12-30-flowered. Glumes 0.2-0.3 × 0.1-0.15 cm, ovate or oblong, acute, mucronulate, closely imbricate. Stamens 3 ; filaments ligulate, membranous, anthers linear, 0.15 cm long, yellow with a reddish brown acute tip. Nut 0.12 cm long, obovoid, plano convex ; style about as long as the nut ; stigmas 2, short.

*Flowers* : May onwards.

*Occurrence* : Rajkot river bed ; Woodrow also reported it for Saurashtra.

*Note* : This plant can be easily distinguished from other species of the sub genus *Juncellus* by its creeping habit and involucrite leaves.

***Cyperus michelianus*** (Linn.) Delile, Fl. Aegypt. Illustr. 50. 1813 ; Santapau & Jan. 51. 1967. B. C. Korlahalli in Bull. Bot. Surv. India 9 : 237. 1967. *Scirpus michelianus* Linn. Sp. Pl. 52. 1753 ; FBI 6 : 662. 1893.

Small, tufted leafy annual stems 3-20 cm. Leaves equalling stems, flat with inflated, papery, purplish sheaths. Bracts conspicuous, spreading, broadened at the base. Inflorescence a dense, lobed head, 1.0-1.5 cm across. Spikelets numerous, many flowered, compressed, often curved. Glumes ovate-lanceolate, about 2 mm long, acuminate with a broad obtuse, green keel and membranous, nerveless sides. Style short. Stigma 2. Nut oblong, plano-convex, pale brown, bordered.

*Flowers* : September.

*Occurrence* : This is given here on the authority of H. Santapau & Janardhanan.

*Note* : This combination has been wrongly attributed to Link (1827) : Delile made it earlier (1813).

**Cyperus niveus** Retz. Obs. fasc. 5 : 12. 1789 ; FBI 6 : 601 ; Cooke 3 : 377.

Glabrous, glaucescent, rhizome woody ; stems 20–40 cm long, nodose at the base. Leaves much shorter than the stem, narrowly linear, setaceo-acuminate, 0.2–0.3 cm broad. Spikelets 3–12 in one head, reaching 1.8 × 0.6 cm oblong-elliptic, compressed, pale, sometimes almost white, 20–40 flowered, bracts usually 2. Glumes 0.5 × 0.15 cm, ovate-lanceolate, compressed, keel produced into a very short mucro. Stamens 3 ; filaments long, persistent, anther linear. Nut 0.2 cm long, obovoid. Style 0.15 cm long. Stigmas 3, rather shorter than the style.

*Flowers* : October onwards.

*Occurrence* : This plant was reported from Halvad (Jhalawad Dt., G.L. Shah).

**Cyperus nutans** Vahl var. **nutans** Vahl, Enum. 2 : 363. 1806 ; FBI 6 : 607, Cooke 3 : 381.

A tall perennial ; rhizome tuberous ; root-fibres. Stems 60–105 cm long, stout, trigonous, with smooth angles. Leaves as long as the stem, linear 0.4–1.2 cm broad, coriaceous in old plants. Umbel very large, decomound. Spikelets erect, 0.6–0.8 × 0.2 cm, 6–10 flowered, pale, reddish-brown. Glumes 0.2 × 0.08 cm, oblong, distant, erect, obtuse, shortly apiculate. Stamens 3 ; anthers linear-oblong. Nut 0.15 cm long, narrowly obovoid or oblong, tapering towards the base, triquetrous, apiculate, yellow when ripe ; style 0.08 cm long ; stigmas 3, longer than the style, capillary.

*Flowers* : September onwards.

*Occurrence* : Junagadh (Ansari 61007, G.L. Shah).

**Cyperus pangorei** Rottb. Descr. & Icon. 31, t. 7, f. 3. 1773 ; Santapau & Jan. 51. 1967 ; B C. Koilahalli, Bull. Bot. Surv. India 9 : 239. 1967. **C. tegetum** Roxb. Fl. Ind. 1 : 208. 1832 ; Clarke in FBI 6 : 613, et in Journ. Linn. Soc. 21, 160. 1884 ; Cooke 3 : 384.

Glaucous, perennial. Rhizome stout, creeping, bearing dark fibrous scales. Stems to 120 cm. Leaves few, shorter than stems with long, papery, brown to purple sheaths. Inflorescence loose, rays 5-10; secondary bracts inconspicuous. Bracts leafy, equalling to much exceeding rays. Spike broadly ovate with few, distant, erecto patent spikelets. Spikelets linear, acute, red brown, lax flowered with a narrowly to broadly winged rachilla. Glumes elliptic, slightly incurved, distant with narrow keel and nerveless yellow to red brown sides. Anther red crested. Nut oblong, brown.

*Flowers : August.*

*Occurrence :* Collected from Jilla Garden and Pradumna Park, Rajkot.

*Note :* B. C. Korlahalli (loc. cit.) has discussed the nomenclature of the species in detail.

The following key shows specific differences in all three taxa according to Korlahalli (loc. cit.).

Rhizome shortly creeping ; glumes somewhat remote	<i>pangorei</i>
Rhizomes long creeping, often stoloniferous ; glumes not remote but mostly densely imbricate :	
Spikelets divaricatae, narrow, straw coloured ; culms triquetrous at apex and not articulated when dry	<i>bengalensis</i>
Spikelets not divaricatae, broader, brownish ; culms not triquetrous at apex and often articulated when dry	<i>corymbosus</i>

*Cyperus pygmaeus* Rottb. Descr. & Icon. 20, t. 14, f. 4, 5. 1773 ; Cooke 3 : 372 ; Santapau & Jan. 51. 1967. *Juncellus pygmaeus* C. B. Clarke in Hook. f. Fl. Brit. Ind. 6 : 596. 1893.

An annual dwarf herb ; stems 2.5-25 cm long, densely tufted. Leaves numerous, as long as or shorter than the stem, 0.18-0.2 cm broad, flaccid, green, acuminate. Spikelets very many, sessile ; densely packed in a terminal head, 0.6-1.6 cm in diam., ovate, 0.5×0.2 cm compressed, 8-20 flowered, green or pale brown, bracts 2-6, dilated at the base, 2.5-15 cm long, acuminate, leaf like ; rachilla slender, not winged. Glumes closely imbricate, 0.2-0.3×0.08 cm oblong lanceolate cuspidate. Stamen 1 ; anthers linear oblong. Nut 0.1 cm long, stigmas 2, capillary, about as long as the style.

*Flowers* : January to May.

*Occurrence* : Jamnagar, Bhavnagar and Junagadh.

**Cyperus rotundus** Linn. Sp. Pl. 45. 1753 ; FBI 6 : 614 ; Cooke 3 : 385 ; Indraji 691. 1910 ; Santapau, Pl. Saur. 846. 1953 ; Santapau & Jan. 51. 1967.

Rhizomatous, tuberiferous, perennial. Rhizomes many, slender (stolons). Stems leafy at the base, from a tuber. Leaves dark green above, paler beneath, gradually acuminate with reddish brown sheaths. Inflorescence of 3 - 9 spreading rays bearing tassels of few, large spikelets. Spikelets 20 - 40 flowered, red brown to almost black. Glumes ovate to elliptic, subacute, apiculate, imbricate with 1 - 2 - nerved sides and narrow hyaline margin. Nut oblong ovate.

*Local name* : Moth.

*Flowers* : August to October.

*Occurrence* : Rozi near Jamnagar, Okha sea shore, it was growing as separate units in the sands together with the *Heliotropium*. Rajkot, beyond station and Rajkumar College compound. Puneli vidi, Morvi and Gondal Road, Rajkot.

*Uses* : The tubers of the plant are aromatic and are used in medicine, perfumery and for the preparation of fragrant sticks called Agar batties. The tubers are said to be diaphoretic and astringent, and in indigenous medicines, they are given for disorders of the stomach and irritation of the bowels. (WI)

**Cyperus scariosus** R. Br. Prodr. 216. 1810 ; FBI 6 : 612 ; C. B. Clarke in Journ. Linn. Soc. 21 : 159. 1884 ; Indraji 692. 1910 ; Santapau, Pl. Saur. 847. 1953.

Glabrous. Stolons clothed by elliptic acute lax striate concolorous scales. Stems 40 - 90 cm. Leaves variable, usually short, narrow, weak. Umbel thin, rays slender, sometimes up to 7.5 cm long ; bracts nearly always as the leaves. Roots black, pressed and long.

*Local name* : Nagarmoth.

*Flowers* : August to October.

*Occurrence* : Found on Barda Hills and nearby area.

*Uses* : The plant produces deep brown tubers which are aromatic and are used in medicine, perfumery and for the preparation of fragrant

sticks called Agarbatties. The tubers are said to be diaphoretic and astringent, and in indigenous medicine they are given for disorders of the stomach and irritation of the bowels. (WI)

**Cyperus stolonifer** Retz. Obs. 4 : 10. 1786 ; FBI 6 : 615 ; Clarke in JLS 21 : 172. 1884 ; Indraji 692. 1910 ; Santapau, Pl. Saur. 848. 1953 ; Santapau & Jan. 51. 1967.

Woody rhizome, stoloniferous, long creeping, stems trigonous at top, nodose at base, 10-20 cm long. Leaves rigid, filiform. Umbel simple contracted or subcapitate; spikelets terete shortly spicate, glumes close packed concave obtuse. Style branches 3 long, nut obovoid unequally trigonous somewhat curved.

*Local name* : Kansa.

*Flowers* : August onwards.

*Occurrence* : Collected from the sea shore at Porbander.

*Uses* : It serves as a sand binder. They are stomachic and are considered stimulant for the heart. (WI)

**Cyperus triceps** (Rottb.) Endl. Cat. Hort. Vindob. 1 : 94. 1842 ; Santapau & Jan. 51. 1967 ; Santapau, Fl. Khandala 301. 1967. *Kyllinga triceps* Rottb. Descr. & Icon. 14, t. 4, f. 6 (excl. cit. Rheede). 1773 ; FBI 6 : 587 ; Cooke 3 : 391.

Glabrous ; rhizome very short or 0. Stems 5-22.5 cm long, tufted. Leaves as long as but usually shorter than the stem. 0.2-0.4 cm broad, linear, acute spikes ovoid oblong or sub cylindric, usually 3 together ; bracts beneath the head 3-4, leaf-like, up to 7.5 cm long. Two lower glumes hyaline ; the lowest lanceolate, acuminate, 0.12 cm long, the second lanceolate or suborbicular, the third and fourth herbaceous. Stamens 2. Nut oblong or ellipsoid-oblong, yellowish brown, much compressed, 0.15 cm long ; style with 2 filiform stigmas, together nearly as long as the nut.

*Flowers* : August onwards.

*Occurrence* : Junagadh, foot of Girnar and from the Hill.

#### ELEOCHARIS R.Br. (nom. cons.)

Nut yellow-green, exceeded by its 7 bristles	<i>congesta</i>
Nut black :	
Nut 0.75 mm long, with 4 white bristles shorter than itself	<i>atropurpurea</i>
Nut 1.0 mm long or more, with 5-7 pink bristles	<i>geniculata</i>

**Eleocharis atropurpurea** (Retz.) Presl. Reliq. Haenk. 1 : 196. 1828 ; FBI 6 : 627 ; Koyama in Journ. Fac. Sci. Uni. Tokyo III ; 8 (3) : 94. 1961 ; Bhandari, Fl. Indian Desert, 372. 1978. *Scirpus atropurpurea* Retz. Obs. 5 : 14 1789. *E. atropurpurea* Kunth sensu Cooke 3 : 403 ; Santapau & Jan. 51. 1967.

Annual ; roots fibrous ; stems slender, densely tufted, 5-12.5 cm long, straight or curved. Leaves 0, sheaths short. Spikelets 0.3-0.6 cm long, ovoid, obtuse or subacute, much broader than the stem, many flowered, rachilla pitted. Glumes 0.15-0.2 cm long, broadly ovate oblong, obtuse, concave, loosely imbricate, easily detached ; back green ; sides membranous with a chestnut-brown band along each. Anthers small, apiculate. Nut 0.1 cm long, obovoid, biconvex, smooth, black, apiculate with the short stout white style base, stigmas 2.

*Flowers* : August to October.

*Occurrence* : Recorded from Rajkot in moist soil ; Sasangir in Gir Forest, abundant in shallow water on sides of lake, Rajkot, beyond station and Pradumna Park ; also from Pamli-vidi, Morvi.

*Note* : "The combination *E. atropurpurea* (Retzius) has been attributed to Kunth (1837). However, Presl. has made it already about ten years earlier. Koyama (loc. cit.)" (M.M. Bhandari).

**Eleocharis congesta** D. Don, Prodr. Fl. Nep. 41. 1825 ; FBI 6 : 630.

Annual or perennial. Stems 7-35 cm, about 1 mm wide, angular, ridged. Sheath apex truncate, apiculate. Spikelet oblong 5.8 × 2.5-4 mm terete, subacute, purplish, often proliferous. Glumes loosely imbricate, oblong 1.5-2 mm long thin obtuse with a green midrib disappearing in the membranous margin. Stigmas 3. Nut oblong-obovate, 1.5 mm long, yellow green. Bristles 7, white or brown exceeding the nut and style base. Style base conical, 1/3-1/2 as wide as nut.

*Flowers* : October onwards.

*Occurrence* : Recorded from Junagadh and Barda Hill. (NBG 21216, G. L. Shah).

**Eleocharis geniculata** (Linn.) Roem. & Schult. Syst. Veg. 2 : 150. 1871 ; Koyama in J. Fac. Sci. Uni. Tokyo 3, 8 : 93. 1961 ; Santapau & Jan. 51. 1967. *Scirpus geniculatus* Linn., Sp. Pl. 48. 1753. *Eleocharis capitata* R. Br. Prodr. 225. 1810 ; FBI 6 : 627.

Tufted or slenderly rhizomatous, annual. Stems to 30 cm, about 1 mm wide, rather rigid, angular, ridged. Leaf sheaths truncate, with a triangular membranous tip. Spikelet globose to ovoid, about 4.5 × 3 mm,

obtuse. Bract upto 1/2 spikelet length. Glume elliptical, 1.5–2.0 × 1.2–1.4 mm, membranous with a broad, diffuse keel. Stigmas plumose-papillate. Bristles 5–7, shorter to slightly longer than the nut. Nut narrowly obovate, about 1.0 mm long, black. Style base 1/3–1/2 as wide as nut, conical.

*Flowers* : June onwards

*Occurrence* : Dhunvao, 6 m E. Jamnagar and Gondal, growing in moist spot near river.

### **ERIOPHORUM Linn.**

**Eriophorum comosum** Wall. ex Nees in Wt. Contrib. 110. 1834 ; FBI 6 : 664 ; Cooke 3 : 411 ; Koyama in Act. Phytotax & Geobot. 17 : 49. 1957 ; Santapau & Jan. 51. 1967.

A glabrous herb, stems 15–50 cm long, terete below, trigonous at the top. Leaves equalling or exceeding the stem, rigid, linear, narrow, with serrulate margins. Umbel supra-decompound, 5–20 cm in diam., with many rays, the spikelets usually solitary on the top of the rays with 1 or 2 sessile ones in the forks ; bracts very long. Spikelets numerous, 0.6 cm long, elliptic-oblong, obtuse, terete reddish-brown. Glumes 0.3 × 0.08 cm, oblong-lanceolate, 1-nerved. Anthers large, yellow with a long lanceolate pointed bright red crest. Nuts nearly 0.3 cm long by about 0.05 cm wide, linear-oblong or subfusiform, trigonous, style 0.15–0.2 cm long, reddish-brown ; stigmas 3, as long as the style, reddish-brown, much exserted.

*Flowers* : August to October.

*Occurrence* : Girnar Hill, Junagadh.

*Uses* : It is used for making ropes. (WI)

### **FIMBRISTYLIS Vahl**

**Stigmas 2 :**

Spikelets solitary, terminating the stem

*schoenoides*

Spikelets umbellate or capitate :

Annuals	<i>bisumbellata</i>
Perennials :	
Leaves 0 or very short ; stamens 2-3	<i>sieberiana</i>
Leaves many	<i>cymosa</i>
Stigmas 3 :	
Spikelets terete or polygonal, none of the glumes distichous :	
Styles hairy ; glumes acute, mucronate ; rachilla winged	<i>microcarya</i>
Style glabrous ; glumes obtuse, not mucronate ; rachilla not winged	<i>miliacea</i>
Spikelets compressed or trigonous ; all or the lower glumes only distichous ; bracts short in all :	
Spikelet 1 (rarely 2)	<i>ovata</i>
Spikelet many umbellate	
Style longer than nut, glabrous	<i>tenera</i>
Style not longer than nut, glabrous	<i>complanata</i>

**Fimbristylis bisumbellata** (Forsk.) Bub. Dodec. 30. 1850 ; Koyama in J. Fac. Sci. Univ. Tokyo 3. 8 : 113. 1961 ; Santapau & Jan. 51. 1967. **Scirpus bisumbellatus** Forsk. Fl. Aeg.-Arab. 15. 1775. **F. dichotoma** (non Vahl. 1806) FBI 6 : 635 ; Cooke 3 : 394 ; Santapau in RBSI 16 (1) : 268. 1960.

Caespitose annual. Stems 10 cm × 1.25 cm, flattened. Leaf flat with several equal nerves ; ligule a fringe of short hairs, sheath membranous, hairy. Inflorescence of numerous oblong spikelets. Rachilla much elongating. Bracts hairy at base. Glumes ovate-oblong, 1.2 mm, membranous, red-brown, with green, sharp, apiculate keel. Style fimbriate. Stigmas 2. Nut obovate 0.5 × 0.45 mm, rigid with 7 rows of cells ; outer layer transparent.

*Flowers* : October to April.

*Occurrence* : Rajkot, Pradumna Park.

*Uses* : Roots are collected as they are very highly aromatic. (WI)

**Fimbristylis complanata** (Retz.) Link. Hort. Berol. 1 : 292. 1827 ; FBI 6 : 646 ; Cooke 3 : 400. **Scirpus complanatus** Retz. Obs. 5 : 14. 1789.

Densely caespitose, glaucous perennial with flattened shoots. Stems to 45 cm × 2.5 mm, flattened above. Leaves constricted above half way up with a thickened spinulose margin and abruptly triangular apex. Sheath

compressed, asymmetrically keeled, ligule a line of hairs. Inflorescence twice anthers with numerous stalked spikelets. Bract erect spikelets linear to narrowly elliptical,  $7 \times 1$ – $1.5$  mm, angular, red-brown, somewhat contorted, Glumes elliptical,  $2.5 \times 1.5$  mm, shortly hispid with entire margin, nerveless sides and slender apiculate keel. Anther  $1$  mm, style glabrous not longer than nut. Nut obovoid,  $0.65$ – $0.75 \times 0.5$  mm, grey, obtusely trigonous, inflated, verrucose.

*Flowers* : October.

*Occurrence* : Recorded from Ghumli.

**Fimbristylis cymosa** R. Br. Prodr. 228. 1810; Santapau & Jan. 51. 1967. *F. spathacea* Roth, Nov. Pl. Sp. 24. 1821; FBI 6 : 640; Cooke 3 : 396.

Rhizome short or elongate, stout, woody, rootfibres. Stems densely leafy below. Leaves many, densely crowded on the rootstock, much shorter than the stem, spreading and recurved, narrowly linear, obtuse or acute, up to  $0.15$  cm broad. Umbel simple or compound, open or with the spikelets more or less crowded, bracts short, rigid, erect leaf-like. Spikelets  $0.3$ – $0.5 \times 0.2$  cm, ellipsoid or ovoid, rachilla stout. Glumes rather laxly, imbricate,  $0.15$  cm long, broadly ovate, the keel conspicuous. Stamens usually 2. Nut about  $0.08$  cm long, very shortly stipitate, turbinate, tapering at the base, at first yellow, afterwards black, style about  $0.08$  cm long, glabrous, stigmas 2, longer than the style.

*Flowers* : December.

*Occurrence* : Recorded from Bedi bunder near Jamnagar (BSI 54260).

**Fimbristylis microcarya** Muell., Fragm. Phyt. Austral. 1 : 200. 1858 59; Benth. Fl. Austr. 7 : 316. 1878. *F. complanata* var. *microcarpa* (Muell.) C. B. Clarke in Fl. Brit. Ind. 6 : 646. 1893, Cooke 3 : 400. *F. quinquangularis* Kunth, Sensu Santapau & Jan. 52. 1967 (of Kunth).

Stem slender, hardly flattened under the umbel. Spikelets more slender. Nut very small, velvet (i. e. the outermost cells withering and peeling off).

*Flowers* : October.

*Occurrence* : Collected from Ghumli near Porbandar and Rajkot Pradumna Park.

*Note* : The specimens (HS : 10393, 13672) were misidentified by E. Nelmes as *F. quinquangularis* Muell., latter on identified by E. Govindarajalu as *F. microcarya* Kunth.

***Fimbristylis miliacea*** (Linn.) Vahl, Enum. Pl. 2 : 287. 1805 ; FBI 6 : 644 ; Cooke 3 : 397 ; Saldanha & Nicolson, Fl. Hassan distr., Karnataka, 679. 1976. *Scirpus miliaceus* Linn. Syst. Veg. ed. 10, 868. 1759.

Tufted annual or perennial. Axillary stems to 60 cm, quadrangular, bearing bladeless, papery sheath. Leaves on terminal sterile shoot equitant, eligulate. Inflorescence 3-4 × anthelate. Spikelets subglobose, dark reddish brown. Glumes ovate, obtuse, rounded on back. Style 0.8 mm, stigmas 3. Nut narrowly obovate, about 0.55 × 0.5 mm, verrucuose.

*Flowers* : October.

*Occurrence* : Collected from Paneli-vidi, Morvi.

***Fimbristylis sieberiana*** Kunth, Enum. 2 : 237. 1837 ; Kern, Blumea 8 : 131. 1955 ; Saldanha & Nicolson, Fl. Hassan dist., Karnataka, 680. 1976. *F. ferruginea* (Linn.) Vahl var. *sieberiana* (Kunth) Boeck. Linnaea 37 : 17. 1871. *F. ferruginea* (Linn.) Vahl, sensu Santapau & Jan. 52. 1967.

Shortly rhizomatous perennial. Stems to 40 cm. Leaves glaucous, ligulate ; sheath membranous, red-dotted, sparsely pubescent. Inflorescence once anthelate ; bract erect, exceeding rays. Spikelets ovate, about 10 × 4 mm. Glumes broadly ovate, obtuse, apiculate, dark brown, tomentose apically. Nut broadly obovate to orbicular, about 1.8 × 1.4 mm, stipitate, faintly striolate.

*Flowers* : August onwards.

*Occurrence* : Collected from Gondal Irrigation Lakes. Ghumli, Okhamandal.

*Note* : The specimens (HS : 10389, 14667) were misidentified by E. Nelmes as *F. ferruginea* (L.) Vahl, latter on identified by E. Govindarajalu as *F. sieberiana* Kunth.

***Fimbristylis ovata*** (Burm. f.) Kern, Blumea 15 : 126. 1967 ; Saldanha & Nicolson, Fl. Hassan dist., Karnataka 679. 1976. *Carex ovata* N. Burman, Fl. Ind. 194. 1768. *Fimbristylis monostachya* (Linn.) Hasskarl, Pl. Jav. Rar. 61. 1848 ; FBI 6 : 649. 1893 ; Cooke 3 : 399.

Shortly rhizomatous perennial. Stems to 20 cm, thickened at the base. Leaves linear, shorter than stems. Inflorescence of 1-2(3) solitary

spikelets ; bracts very short. Spikelets narrowly ovate, about  $10 \times 3$  mm, acute. Glumes triangular-ovate, acute with pale scarious sides and curved green, shortly excurrent keel. Style smooth. Nut stipitate-orbicular,  $2 \times 1.75$  mm, terete or somewhat ridged, covered by large warts except on the ridges.

*Flowers* : June onwards.

*Occurrence* : Recorded from Junagadh (NBG 40942, G. L. Shah).

**Fimbristylis schoenoides** (Retz.) Vahl, Enum. 2 : 286. 1806 ; FBI 6 : 634 ; Cooke 3 : 394 ; Santapau, Pl. Saur. 851. 1953 ; Santapau & Jan. 52. 1967 ; *Scirpus schoenoides* Retz. Obs. 5 : 14. 1789.

Perennial stems to 30 cm. Leaves glaucous, ligulate, blunt, sheath brown, membranous, inflated above. Inflorescence of 1–2 spikelets ; bract erect. Spikelets broadly ovate to orbicular, about  $6.0 \times 4.0$  mm. Glumes very broadly ovate, obtuse apiculate, rounded on back. Style 0.6 mm. Stigmas 2. Nut elliptic, about  $1.75 \times 1.1$  mm, flattened, finely striate with rows of isodiametric cells.

*Flowers* : September.

*Occurrence* : Collected from Jamnagar.

**Fimbristylis tenera** Roem. & Schult. Syst. 2, Mant. 57. 1824 ; FBI 6 : 642 ; Santapau & Jan. 52. 1967.

Culms many, uncommonly slender, erect, about 30 cm high, towards the base invested with the sheaths of a few slender leaves. Leaves as long as 1/2 stem, 0.12–0.2 cm, broad, flat, glabrous. Umbel very thin, composed of one sessile, oblong spike, and of from six to twelve or about half the number of pedicels of various lengths, bracts 2–3, bristle-like, up to 2.5 cm long. Spikelets  $0.6 \times 0.2$  cm, about 10-fid. Glumes adpressed, boat-shaped, chestnut-red, margins scarious. Stamens often 2. Style longer than nut, glabrous, deciduous with pyramidal. Style-base. Nut as long as 2/5 glume, round-trigonous.

*Flowers* : July onwards.

*Occurrence* : Recorded from Shetrangji ("Rolla 63776", G. L. Shah).

## FUIRENA Rottb.

Hypogynous scales 0 *pubescens*

Hypogynous scales present quadrate or obovate :

Annuals ; leaves hairy *uncinata*

Perennial ; rachilla slender ; petals sessile or nearly so *umbellata*

**Fuirena pubescens** Kunth, Enum. 2 : 182. 1837 ; FBI 6 : 665 ; Cooke 3 : 412 (not of Kunth); Santapau & Jan. 52. 1967.

Rhizome creeping, short or long ; stems many, 30-45 cm high. Leaves 5-10 × 0.4-0.6 cm, linear lanceolate, acute with a strong mid-nerve and recurved margins ; sheaths long, with a short ligule. Spikelets in corymbose, terminal clusters ; bracts small. Spikelets 0.6-0.8 cm long, oblong, terete, many-flowered. Glumes 0.3 cm long, broadly oblong, rounded at the apex below the mucro, green with red streaks by transmitted light, pubescent and ciliate. Anthers linear-oblong, not creted. Nut 0.22 cm long ; subsessile ; beak pyramidal, minutely scabrous.

*Flowers* : October onwards.

*Occurrence* : Rajkot lakes.

**Fuirena umbellata** Rottboell, Progr. 27. 1772 ; and Decr., IC. Pl. 70. t. 19. f. 3. 1773 ; FBI 6 : 666 ; Cooke 3 : 413 ; Santapau, Pl. Saur. 853. 1953 ; Santapau & Jan. 52. 1967.

Robust plants to 1.5 m high from a creeping rhizome. Stems up to 1 cm across, 5-sided with ridged angles, the lowermost internode often bulbously thickened in wet habitats. Leaves with a prominent, generally dark ligule. Inflorescence generally of many spikelets in rounded clusters in branched partial panicles. Spikelets when young 5-angular, acute. Nut smooth with very short or no bristles and almost sessile, obovate, apiculate, 3-nerved scales.

*Flowers* : October.

*Occurrence* : Ranjit Sagar, Jamnagar.

*Uses* : In rice fields it is ploughed in as green manure. (WI)

**Fuirena uncinata** (Willd.) Kunth, Enum. 2 : 184. 1837 ; FBI 6 : 666 ; Cooke 3 : 413 ; Santapau & Jan. 52. 1967. *Scirpus uncinatus* Willd. Sp. Pl. 1 : 300. 1793.

Lax, tufted, hispid-pubescent annual. Stems 5–30 cm long. Inflorescence of few, dense, rounded partial panicles; spikelet clusters sessile or nearly so. Spikelets few-flowered angular echinate, golden and green becoming brown. Nut smooth, surrounded by three short, retrorsely-scabrid bristles and three shortly stalked, orbicular or quadrate, reddish scales with a dorsal, setulose awl from the confluence of three nerves and a triangular, membranous, hairy apex investing the beak of the nut.

*Flowers* : November onwards.

*Occurrence* : Collected from Junagadh, Girnar (BSI 61023).

#### MARISCUS Vahl

**Mariscus squarrosum** (Linn.) C. B. Clarke in J. Hooker, Fl. Brit. Ind. 6 : 623. 1893 ; Saldanha & Nicolson in Fl. Hassan Dist., Karnataka, 690. 1976 ; Bhandari, Fl. Indian Desert. 376. 1978. *Cyperus squarrosum* Linn. in Torner, Cent. Pl. 2 : 6. 1756 ; Santapau & Jan. 51. 1967. *C. aristatus* Rottb. Descr. Pl. Rar. Programm. 22. 1772 ; FBI 6 : 606 ; Cooke 3 : 380.

A small glabrous annual 7.5–15 cm high; roots fibrous; stems tufted. Leaves shorter than the stem; erect acuminate, flat, 1-nerved, flaccid. Umbel with 2–5 rays, or capitate with numerous spikelets crowded into a globose or oblong head; bracts 2–5. Spikelets 0.5–0.8 cm long, oblong, flat, 6–20 flowered, brownish; rachilla not winged, articulated deciduous. Glumes 0.3 cm long by 0.08 cm broad, oblong distichous; keel strong, produced into a recurved beak as long as the limb. Stamens 1; filaments 0.2 cm long; anthers small, oblong. Nut 0.1 cm long, narrowly obovoid; rounded and apiculate at the apex, tapering towards the base, trigonous, reddish-brown.

*Flowers* : August onwards.

*Occurrence* : Collected from Junagadh at the foot of Girnar.

#### PYCREUS Palisot de Beauvois

Stamen 1; nut 0.2 cm long

*pumilus*

Stamen 2; nut 0.08 cm long

*globosus*

**Pycreus globosus** (Allioni) Reichenbach, Fl. Germ. Exc. 140 (10). 1830 ; Saldanha & Nicolson in Fl. Hassan Dist., Karnataka, 692. 1976. *Cyperus globosus* (Allioni), Fl. Pedem. Auct. 49. 1789 ; Cooke 3 : 370 ; Santapau, Pl. Saur. 843. 1953 ; Santapau & Jan. 51. 1967. *Pycreus capillaris* Nels, Linnaea 9 : 283. 1834 ; FBI 6 : 591 ; Indraji 691. 1910.

A glabrous very variable annual ; root fibrous ; stems tufted, 10 - 62.5 cm long, very slender, trigonous. Leaves shorter than the heads, very slender, almost filiform, umbel simple with 3 - 5 rays, 2.5 - 5 cm long, very slender bracts 2 - 3, leaf-like, the longest sometimes reaching 7.5 cm long, narrow, spikelets crowded, 0.9 - 1.8 × 0.2 - 0.3 cm, linear with parallel sides, much compressed 20 - 50-flowered, brown or black. Glumes 0.2 × 0.1 cm long, closely imbricate, ovate-oblong, obtuse, keel greenish-yellow with brownish-red veins. Stamens 2. Nuts 0.08 cm long, broadly or narrowly obovoid, rounded and apiculate at the apex, style about 0.08 cm long, stigma 2, as long as the style, capillary.

*Local name* : Chagi, Chagimoth.

*Flowers* : October onwards.

*Occurrence* : Barda Hill, it was found everywhere with other grasses.

**Pycreus pumilus** (Linn.) Nees, Linnaea 9 : 283. 1834 ; Saldanha & Nicolson in Fl. Hassan Dist. Karnataka, 693. 1976. *Cyperus pumilus* Linn. in Torner, Cent. Pl. 2 : 6. 1756 ; Santapau & Jan. 51. 1967. *Pyereus nitens* (Retz.) Nees in Nov. Act. Nat. Cur. 19, Suppl. 1 : 53. 1843, FBI 6 : 591.

Root fibrous. Culms erect, from 7.5 - 12.5 cm high, half naked, three sided, smooth. Leaves sheathing, the lower ones little more than the sheaths, the superior ones longer than the culm. Umbel terminal, compound, umbelllets some sessile some peduncled, composed of linear, many-flowered spikes. Involucre from three to four leaved, unequal, longer than the culm. Stamens 1. Nut 0.2 cm long. Seed compressed, obovate.

*Flowers* : September onwards.

*Occurrence* : Collected from Paneli-vidi, Morvi, Gir Forest.

### SCRIPUS Linn.

Large herbs ; leafy only near the base, stems 30-180 cm long,  
hypogynous bristles present or not :

Nut marked with transverse wavy lines ; hypogynous  
bristles 0 :

Stems flowering nearer to the top than the base, slender,  
obtusely trigonous; glumes not inflated in front,  
strongly keeled

*supinus* var.  
*lateriflorus*

Stems flowering nearer to the top than the base, slender,  
sub-compressed ; glumes inflated in front, keeled *roylei*

Nut not marked with transverse wavy lines, hypogynous  
bristles present :

Hypogynous bristles retrorsely scabrid *maritimus*

Hypogynous bristles plumose *litoralis* var.  
*subulatus*

Hypogynous bristles unequally plumose *littoralis*

Small tufted herbs with slender stems never reaching 30 cm  
long ; hypogynous bristles 0. *kyllingioides*

**Scirpus kyllingioides** Boeck. in Linnaea 36 : 733. 1870 ; FBI 6 : 662 ;  
Cooke 3 : 409.

Perennial, glabrous ; stem about 7.5 - 15 cm long, slender, with thickened base and sometimes with long slender stolons. Leaves 1/2 - 3/4 the length of the stem, green, keeled, narrowed above and with very minutely dentate margins. Head terminal, 0.3 - 0.6 cm in diam., of 5 - 15 spikelets. Spikelets very small, closely packed, ovoid-lanceolate, many flowered. Glumes ovate-lanceolate or oblong-lanceolate, subacute, keeled, many-nerved, straw-coloured ; hypogynous bristles 0. Stamens 2 or 3 ; filaments a scabrous ; anthers small, not crested. Nut obovoid-oblong, minute, scarcely half as long as the glume.

*Flowers* : October.

*Occurrence* : Recorded from Jamnagar, Rajkot river side and dam (Shah 1967).

**Scirpus littoralis** Schrad. Fl. Germ. 1 : 142, t. 5, f. 7. 1806 ; FBI 6 : 659 ; Cooke 3 : 408. **Scirpus pectinatus** Roxb. Hort. Beng. 81. 1814 ; & Fl. Ind. 1 : 218. 1820. **Scirpus subulatus** Dalz. & Gibbs., Bomb. Fl. 288. 1861 (not of Vahl).

A glabrous annual form a stout rootstock ; roots fibrillose ; stem 5 - 9 cm long, terete, as thick as the thumb at the soft base, more or less triquetrous at apex, spongy, striate, smooth. Leaves 15 - 60 × 0.25 - 0.6 cm, membranous, acuminate ; sheaths soft, open. Umbels compound with numerous, mostly pedicelled spikelets. Spikelets 6 - 8 mm long, oblong, obtuse, terete, pedicellate, in lax subcorymbose or paniculate umbels with

drooping rays, the latter 2.5–5 cm long. Glumes 4 mm long, ovate-oblong, obtuse, concave, notched at apex; keel produced into a short mucro; hypogynous bristles 2–7, longer than the nut, unequally plumose with moniliform hairs. Stamens 2 or 3, upto 4 mm long, filaments broad; anthers tipped with a red appendages. Style 1.5 mm long; stigma 2; 1.5 mm long, as much broad, obovoid, planoconvex, smooth or minutely reticulate with a long apiculation.

*Flowers* : October to November.

*Occurrence* : Kathiawar (Mehta ex Drummond ex Cooke) Rajkot (Cooke), Bedi Bunder (Shah).

*Scirpus littoralis* Schrad. var. *subulatus* Chiov. Pl. Nov. Aethiop. 16. 1928 ; Santapau & Jan. 52. 1967. *Scirpus littoralis* Clarke in Fl. Brit. Ind. 6 : 659. 1893 (non Schrad. 1807).

Rhizomatous perennial. Stems to 70 cm × about 5 mm somewhat spongy, terete through or trigonous below inflorescence. Sheaths splitting into fibers. Sometimes with a short, setaceous blade. Inflorescence with 5–10 flattened, scabrid, branched rays. Bract rigid with an obtuse, flattened tip. Spikelets clustered, ellipsoid, about 7 × 3.5 mm terete. Glumes broadly elliptic retuse, mucronate, rounded on the back with papery red-dotted sides and fimbriate margin. Bristles 4, flattened, plumose, slightly exceeding nut. Anther crest red, papillate. Stigmas 2. Nut obovate, biconvex, 2 mm long, apiculate, smooth.

*Flowers* : October.

*Occurrence* : Collected from local talao at Jamnagar growing in water ; Dwarka ; Rajkot.

*Uses* : They are used for making mats and are sometimes employed for tying purposes. (WI)

*Note* : This variety differs from the type chiefly in having sharply trigonous stems.

*Scirpus maritimus* Linn. Sp. Pl. 51. 1753 ; FBI 6 : 658 ; Cooke 3 : 407 ; Santapau & Jan. 52. 1967.

Stolons thin. Stems to 80 cm long. Leaves flat, linear, to 40 cm long; acuminate, ligulate ; sheaths long. Inflorescence anthelate, loose ; rays 5–8, slender. Spikelets ovoid to cylindric, 10–20 × 4–5 mm, terete

acute. Glumes oblong, hispidulous ; margins membranous, fimbriate. Bristles 6, sometimes fewer, retrorsely scabrid. Styles 2. Anther crest papillate. Nut obovate, compressed-trigonous, smooth.

*Flowers* : November onwards.

*Occurrence* : Collected from Gondal Irrigation lakes and dam ; Dwarka near station ; Rajkot river bed ; Rajkot in moist soil, Rajkot Pradumna Park.

*Uses* : Fresh plants form good forage but soon get too dry. Rhizomes are dried and made into flour in times of scarcity. The tubers are reported to be laxative. (WI)

**Scirpus roylei** (Nees) Duthie, Fl. Gang. Plain 3 (3) : 361. 1929 ; Santapau & Jan. 52. 1967. *Isolepis roylei* Nees in Wight, Contrib. 107. 1834. *Scirpus quinquefarius* Buch.-Ham. ex Boeck in Linnaea 36 : 701. 1869-70 ; FBI 6 : 657 ; Cooke 3 : 407.

Root fibrous, stems 7.5-62.5 cm long, slender terete or slightly compressed. Leaves almost 0. Spikelets 1-9 in a single lateral dense head, usually nearer to the top than the base of the stem 0.9-1.2 × 0.6 cm, ovoid-oblong, obtuse, pale-brown. Glumes inflated in fruit, 0.4 cm long, usually 5-ranked, elliptic-lanceolate, membranous, multistriate, keeled, hypogynous bristles 0. Stamens 3, anthers linear, obtuse. Nut 0.15 cm long, obovoid, acutely trigonous, apiculate ; style 0.15 cm long, stigmas 3, shorter than the style.

*Flowers* : November to December.

*Occurrence* : Collected from Rajkot Lakes ; Rajkot in moist soil ; Junagadh ; Gondal Irrigation lake ; Rajkot Pradumna Park ; Dwarka near station ; Okha sea-shore.

**Scirpus supinus** Linn. var. *lateriflorus* (Gmel.) Koyama in J. Fac. Sci. Uni. Tokyo 3, 7 : 302. 1958 ; Santapau & Jan. 52. 1967. *S. lateriflorus* Gmel. Syst. Veg. 127. 1791. *S. supinus* Roxb. Fl. Ind. 1 : 219. 1820 (non Linn. 1753).

Tufted annual. Stem 2-120 cm long, terete, sheaths often enclosing a long-stigmaed ovary or enlarged nut at base. One leaf blade often developed. Bract 2-12 cm slender, canaliculate, obtuse. Spikelets numerous, mostly sessile, ovoid, about 6 × 2 mm, acute with glumes in 5 ranks, rays

absent or few and short. Glume ovate, papery, strongly keeled above, apiculate, tinged dark red-brown. Bristles lacking. Nut broadly elliptic to orbicular, unequally triquetrous, 1.2 mm long, sharply transversely ridged, black.

*Flowers* : October onwards.

*Occurrence* : Collected from Rozi near Jamnagar.

### POACEAE (GRAMINAE)

Plants not arborescent	<i>Grasses</i>
Plants arborescent	<i>Bamboos</i>

Broadly the grasses are divided into two sub-divisions viz. *Panicoideae* and *Pooideae* (*Poaceae*) on the basis of following characters.

*Panicoideae* : Spikelets all bisexual or with male or barren and bisexual spikelets mixed in the same inflorescence and so arranged that a male or barren spikelet is near a bisexual spikelet or if unisexual then the lemma of fertile floret indurated. Stalk of the spikelet jointed below the empty glume.

*Pooideae* : Stalk of the spikelet not joined below the empty glumes. Rhachilla often joined above the persistent lower glumes. Produced beyond the fertile flowers in the form of a stalk or bearing empty glumes or imperfect flowers.

### KEY TO THE TRIBES OF PANICOIDEAE

Male and female spikelets in separate inflorescence or in different parts of the same inflorescence and of different appearance, lemmas hyaline or membranous and thinner than the glumes

*Maydeae*

Spikelets all hermaphrodite, or with male or barren and hermaphrodite spikelets mixed in the same inflorescence and so arranged that a male or barren spikelet is near a hermaphrodite spikelet, or if unisexual then the lemma of the fertile floret indurated :

Spikelets often paired, with one sessile and the other pedicelled, those of each pair similar or more often dissimilar, rarely solitary and all alike, glumes as long as the spikelet and enclosing the florets, more or less rigid and firmer than the lemmas which are both hyaline or membranous ; upper lemma usually owned

*Andropogoneae*

Spikelets solitary or paired, more or less similar; glumes usually membranous, the lower usually smaller or sometimes suppressed; lower lemma mostly resembling the upper glume in texture; upper lemma papery to very tough and rigid, usually awnless

*Paniceae*

#### KEY TO THE GENERA OF ANDROPOGONEAE

Spikelets solitary, pedicelled or almost sessile at the nodes of a tough or fragile rhachis; inflorescence of a single raceme or of several racemes

*Dimeria*

Spikelets in pairs, rarely in threes (*Ischaemum*), similar or dissimilar, a sessile and a pedicelled or one short-, the other - pedicelled, rarely the pedicelled reduced or very rarely the sessile reduced to a scale or two and the pedicelled spikelet developed :

Spikelets of each pair similar, the sessile and the pedicelled hermaphrodite; the pedicelled very rarely female, rarely the sessile spikelet male and the pedicelled spikelet hermaphrodite; joints of the panicle thin, linear or somewhat expanded at the top :

Spikelets arranged in more or less ample panicles or compound racemes arranged along a central axis; upper lemma awnless or awned from the entire tip or from between two terminal teeth :

Rhachis of racemes tough or tardily breaking up; spikelets deciduous from their pedicels

*Imperata*

Rachis of the racemes breaking up :

Spikelets unawned

*Saccharum*

Spikelets awned

*Spodiopogon*

Spikelets arranged in a single or in several racemes, the latter being digitate or arranged along a very short main axis; spikelets in pairs or in threes; rarely pedicelled spikelets reduced to pedicel

*Eulaliopsis*

Spikelets in each pair dissimilar, the sessile hermaphrodite, the pedicelled male or sterile, or completely absent or if more or less similar than the joints of the raceme and the pedicel thick and swollen :

Joints of the rachis and pedicel of the pedicelled spikelet (if not much reduced) swollen, 3-angled, rounded or flattened :

Sessile spikelet with a male and a hermaphrodite floret ; upper lemma awned, rarely awnless :

Racemes many-noded, not contained in a spath-like sheath :

Raceme solitary, terminal ; lower glume of sessile spikelet not transversely grooved

*Sehima*

Racemes two to many ; lower glume of sessile spikelet often with nodules on the margins or transversely furrowed

*Ischaemum*

Racemes 1-noded, reduced to three heteromorphous spikelets, enclosed in a boat-shaped spathe

*Apluda*

Sessile spikelet with a hermaphrodite floret only or occasionally with a male floret below ; upper lemma unawned :

Sessile spikelet spherical ; lower glume pitted all over ; pedicelled spikelet reduced

*Hackelochloa*

Sessile spikelet not spherical in shape :

Spikelet similar, rhachis very tough ; joints and pedicel fused

*Hemarthria*

Spikelet more or less dissimilar (spikelet solitary in *Ophiuros*) ; rhachis usually breaking up ; joints and pedicels fused or free :

Racemes covered with shaggy hairs

*Elyonurus*

Racemes mostly glabrous, not conspicuously hairy :

Axis of the spikes tough, not breaking up ; spikelet paired

*Hemarthria*

Axis of the spikes fragile :

Spikelets pairs, one sessile the other pedicelled

*Rottboellia*

Spikelets solitary, sessile, the pedicelled suppressed or rudimentary ; pedicels fused to the internode ( joint )

*Ophiuros*

Joints of the rhachis and the pedicel narrow, seldom thickened upwards, occasionally with a translucent longitudinal groove ; sessile spikelet usually awned :

Inflorescence a terminal raceme

*Sehima*

Inflorescence a panicle :

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 :

Spikelets dorsally compressed, in panicles of many pairs or in threes of which one is hermaphrodite

*Sorghum*

Spikelets compressed from the sides :

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, not tuberculate

*Chrysopogon*

Spikelets with many pairs of spikelets arranged in whorled racemes ; lower glume tuberculate

*Vetiveria*

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 :

Upper lemma of the sessile spikelet with a basal awn ; sessile spikelet compressed from the side ; pedicelled spikelet reduced

*Arthraxon*

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 :

Margins of the lower glume of the sessile spikelets sharply infolded, 2-keeled ; awn glabrous :

Upper lemma of the sessile spikelet not cleft, often stipitate and passing into the awn :

Spikelets arranged in false racemes terminating the branches and branchlets of a tree panicle ; pedicels with a median translucent furrow

*Capillipedium*

Spikelets arranged in false racemes which are either solitary and terminal or subsessile, arranged along a central axis but not at the tips of capillary branches :

Racemes solitary at the ends of the branches supported by spathes, but sessile spikelets not overlapping :

Racemes with two fertile spikelets ; lower glumes not pitted

*Pseudanthistiria*

Racemes with many fertile spikelets ; lower glumes - pitted or not

*Eremopogon*

Racemes several to many, if solitary then the sessile spikelets imbricate :

Joints and pedicel with a translucent longitudinal furrow

*Bothriochloa*

Joints and pedicels without a translucent furrow

*Dichanthium*

Upper lemma of the sessile spikelet 2-lobed or 2-cleft, awned in the sinus :

Aromatic grasses; racemes in pairs supported by spathes, often collected into huge panicles ; one pair of spikelets in each raceme homogamous, male or neuter, all other pairs heterogamous

*Cymbopogon*

Grasses not aromatic ; 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

*Andropogon*

Margins of the lower glumes inturned and rounded at the sides, at the most keeled upwards ; callus mostly sharp and long : awn usually hairy :

Racemes solitary at the ends of the branches, surrounded at the base by an involucre of homogamous spikelets :

Involucral spikelets pedicellate, deciduous; callus of fertile spikelet very short truncate or obtuse

*Iseilema*

Involucral spikelets sessile, not  
deciduous ; callus of the fertile  
spikelets pointed

*Themeda*

Racemes without an involucre

*Heteropogon*

#### KEY TO THE GENERA OF MAYDEAE

Female spikelets completely enclosed in metamorphosed leaf-sheath which takes the form of a spherical or cylindrical, osseous or ivory bead-like structure

*Cotx*

Female spikelet not enclosed in a false involucre as above

*Zea*

Female spikelets enclosed in a structure partly from the hardened lower glume and partly from the thickened axis-joint or internode :

Lower glume of the female spikelet 3-lobed, the central lobe larger than the others

*Trilobachne*

Lower glume of the female spikelet not 3-lobed, at most with 2 or 3 small teeth

*Chi'onachne*

#### KEY TO THE GENERA OF PANICEAE

Spikelets mostly unisexual, occasionally some hermaphrodite

*Spinifex*

Spikelets all similar in shape and sex :

Spikelets falling singly, not subtended by bristles, or if so, then the bristles persisting after the spikelets have fallen (*Setaria*) :

Spikelets arranged in more or less open panicles, or with the panicles contracted and spike-like :

Spikelets not subtended by bristle-like branches

*Panicum*

Spikelets subtended or replaced by one to many bristle-like branchlets which remain after the spikelets have fallen

*Setaria*

Spikelets arranged in one-sided spikes or spike-like racemes ; spikes or racemes digitate or — scattered, rarely solitary :

Lemma of the upper floret more or less crustaceous or coriaceous, usually with narrow inrolled margins, exposing much of the palea :

Lower glume and lowest internode of the rhachilla not forming a swollen callus at the base of the spikelet :

Lower glume (when present) turned away from the rhachis of the racemes or spike the back of the upper lemma facing it, i. e. spikelets abaxial :

Lower glume developed, although sometimes small :

Glumes acuminate or awned, rarely only acute; upper lemma not mucronate :

Leaf-blades linear, racemes dense; culms erect or - suberect

*Echinochloa*

Leaf-blades lanceolate to ovate; racemes loose to moderately dense; culms creeping and ascending

*Oplismenus*

Glumes awnless, if acuminate, then with the upper lemma mucronate :

Leaf-blades linear, racemes dense; culms erect or - suberect

*Echinochloa*

Leaf-blades lanceolate to ovate; racemes loose to moderately dense; culms creeping and ascending

*Oplismenus*

Glumes awnless, if acuminate, then with the upper lemma mucronate :

Upper lemma acute, not mucronate

*Paspalidium*

Upper lemma obtuse, mucronate or very short awned

*Urochloa*

Lower glume usually absent, spikelets planoconvex

*Paspalum*

Lower glume turned towards the rhachis, the back of the upper lemma turned away from it, i. e. spikelets adaxial

*Brachiaria*

Lower glume and lowest internode of the rhachilla forming a swollen callus at the base of the spikelet ; upper lemma mucronate or short awned

*Eriochloa*

Lemma of the upper floret thiniy cartilaginous, usually with flat hyaline margins :

Spikelets awnless

*Digitaria*

Spikelets awned

*Alloteropsis*

Spikelets with an involucre of bristles or subtended by a solitary bristle and falling with or without the bristles at maturity, solitary or in clusters :

Upper lemma smooth ; bristles caducous :

Involucre of free, naked or plumose bristles

*Pennisetum*

Involucre of spines or rigid bristles united at the base into a hard cup

*Cenchrus*

Upper lemma transversely rugose ; bristles - persistent

*Setaria*

#### KEY TO THE TRIBES OF THE POOIDEAE

Spikelets borne in open or contracted or spikelike panicles less often in racemes or spikes :

Spikelets usually with two or more fertile florets, or if with one fertile floret then with sterile reduced - florets above it :

Lemma and rhachilla glabrous or hairy, but with the hairs not enveloping the lemma, or if so, then the lemma with a geniculate awn ; low or moderately tall grasses :

Lemmas usually 5- to many-nerved, awnless or awned ; awn usually simple, not kneeled or twisted below the knee

*Aeluropodeae*

Lemmas 1 3-nerved ; inflorescence of panicles or racemes :

Inflorescence of panicles ; if racemes or spikes the spikelets not secund

*Eragrostaeae*

Inflorescence of racemes or panicles of racemes, the spikelets secund

*Chlorideae*

Lemmas or rhachilla-joints bearing long silky hairs which envelop the lemma (at least in fertile florets), - lemmas awnless or with a straight awn from the tip, often thin ; tall grasses with usually large plume-like panicles

*Arundineae*

Spikelets with one fertile floret (male or female in unisexual 1-flowered spikelets), with or without one or two male or barren florets below it, the latter often much reduced :

Glumes minute (usually represented by two semi-circular inconspicuous lips) or suppressed ; fertile lemma and palea very similar in shape and texture ; spikelets firmly compressed ; stamens usually six ; florets hermaphrodite or unisexual

*Oryzeae*

Glumes well developed ; fertile lemma and palea not similar :

Spikelets with 2 florets ; the lower, male or barren, the upper hermaphrodite

*Arundinelleae*

Spikelets with one fertile floret :

Spikelets very rarely falling entire and then with firmly membranous to coriaceous, awned or 5-nerved lemmas :

Lemmas hyaline or membranous at maturity, rarely indurated and then laterally compressed, awnless or awned from low down on the back, or from the middle or from the entire or bifid tip

*Sporoboleae*

Lemmas indurated or rigid at maturity, terete or dorsally compressed

*Aristideae*

Spikelets falling entire at maturity, either singly or in clusters from the axis of slender spike-like panicles or racemes ; lemma delicate 1-3-nerved

*Zoysiaeae*

Spikelets sessile or shortly pedicelled along one side of the rhachis of solitary, digitate, or scattered spikes, spike-like racemes (with one fertile floret and 1-3-nerved lemmas) or on opposite sides of the rhachis of solitary spikes or racemes :

Spikelets on opposite sides of the rhachis of solitary spikes or spike-like racemes

*Triticeae*

Spikelets secund on a tough rhachis ; 1-2 florets hermaphrodite with sterile florets above ; inflorescence of digitate or solitary spikes or panicle of spikes

*Chlorideae*

## KEY TO THE GENERA OF CHLORIDEAE

Inflorescence terminal, spicate, not of digitate or racemose spikes ; lemmas not obovate :

Inflorescence of spaced clusters of awned spikelets on a simple rhachis

*Melanocenchrus*

Inflorescence a simple spike or spikes of awned or awnless spikelets

*Schoenfeldia*

Inflorescence of digitate spikes or spikes racemose, very rarely solitary, but if so the lemmas obovate :

Spikelets with one or more fertile florets and one or more imperfect florets above them ; lemmas usually widened upwards :

Spikes 1 - 3 ; fertile florets 2 or more

*Tetrapogon*

Spikes 4 or more ; fertile florets one only

*Chloris*

Spikelets with one fertile floret and no imperfect florets

*Cynodon*

## KEY TO THE GENERA OF ERAGROSTEAE

Lemmas usually entire at the apex, obtuse, acute or acuminate or if 2-toothed (*Arachne*) or awned from the tip then glabrous near the margins and along the side nerves ; cleistogamous spikelets not developed in the axils of the leaf-sheaths :

Glumes aristate or aristate-acuminate

*Dinebra*

Glumes obtuse, acute or acuminate, rarely the upper awned and the spikelets then in digitate spikes or a short raceme of spikes (*Dactyloctenium*) :

Internodes of the rhachilla boarded at the tip with long hairs up to half the length of the — lemma ; spikelets subsessile or short-pedicelled on the erect branches of a contracted elongated panicle

*Halopyrum*

Internodes of the rhachilla glabrous or only — shortly hairy :

Spikelets in open, contracted or spike-like panicles, rarely in solitary secund spikes (*Eragrostiella*) :

Inflorescence a panicle, sometimes spike-like

*Eragrostis*

Inflorescence a solitary secund spike

*Eragrostiella*

Spikelets sessile or very short-pedicelled, loosely to densely imbricate in digitate or racemosely arranged spikes or spike-like racemes, very rarely in solitary spikes (*Eleusine* sp.) :

Axis and branches of the inflorescence ending in a spikelet :

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  
Spikelets breaking up at maturity ; spikes few to several :

Spikes digitate or sub-digitate ; spikelets 3 - 6-flowered ; glumes 1-5-nerved ; grain oblong to globose, grooved with a loose conspicuous pericarp

*Desmostachya*

*Eleusine*

Spikes usually in Pseudowhorls or scattered; spikelets 8 - 20-flowered ; grain coarsely rugose, grooved or hallowed on one face, with an early deciduous pericarp

*Acrachne*

Axis of spikes terminating in a sharp point ; upper glume mucronate or awned ; spikes digitate, rarely racemose

*Dactyloctenium*

Lemmas usually emarginate or 2 - 4-lobed or toothed at the apex, rarely entire and then hairy along the nerves, frequently mucronate or awned ; cleistogamous spikelets sometimes developed in the sheaths :

Spikelets in panicles or in digitate or racemosely arranged spike-like racemes

*Leptochloa*

Spikelets in terminal solitary secund spikes

*Tripogon*

<i>Tribe</i>	<i>Genus</i>
<i>Oryzeae</i>	<i>Oryza</i>

#### KEY TO THE GENERA OF SPOROBOLEAE

Inflorescence spicate, very dense, subtended by an inflated sheath bearing a rudimentary blade

*Crypsis*

Inflorescence a spreading panicle, or spike-like and elongate ; no inflated sheath :

Inflorescence elongate, spike-like ; fruit with a conspicuous beak

*Urochondra*

Inflorescence a panicle (spike-like in *S. spicatus*) fruit without a beak

*Sporobolus*

Tribe	Genus
<i>Triticeae</i>	<i>Triticum</i>

#### KEY TO THE GENERA OF ZOYSIEAE

Glumes of the spikelets with recurved spines or one armed and one smooth ; spikelets arranged in erect racemes

*Tragus*

Glumes of the spikelets, smooth, compressed ; shining; spikelets arranged in rigid, erect spikes

*Zoysia*

Tribe	Genus
<i>Aeluropodeae</i>	<i>Aeluropus</i>
<i>Aristideae</i>	<i>Aristida</i>
<i>Arundinaceae</i>	<i>Phragmites</i>
<i>Arundinelleae</i>	<i>Arundinella</i>

Bambus in Saurashtra are represented by two monospecific genera *Bambus* and *Dendrocalamus* which could be distinguished as follows :

Pericarp thin, adnate to the seed *Bambusa*

Pericarp crustaceous, not adnate to the seed *Dendrocalamus*

#### ACRACHNE Wight & Arn.

**Acraчhne racemosa** (Heyne) Ohwi in Bull. Tokyo Sci. Mus. n. 18, 1. 1947, Bor, 487. 1960 ; Santapau & Jan. 52. 1967. *Eleusine racemosa* Heyne ex Roem. et Schult. Syst. Veg. 2 : 583. 1817 ; Roth, Nod. Pl. Spec. 80. 1821.

Culms erect, round, smooth, from 30–120 cm high. Leaves bifarious. Spikelets numerous, panicled. Panicle erect, oblong, composed of many verticillated, expanding, round, sessile, linear spikes. Spikelets imbricated in two rows on the underside of the spikes. Calyx from eight to twelve flowered, coroll-like. Corolla ; exterior valve ending in a long dagger ; inner valve membranaceous. Seed oblong, wrinkled, arilled.

*Flowers* : October.

*Occurrence* : Recorded on the authority of H. Santapau and Janardhanan.

*Uses* : The grain is eaten largely by the poor classes, it is not considered to be very wholesome. The straw is excellent fodder for cattle and is said to improve by keeping. It is asserted that the grain is never attacked by insects. (Blatt. & McC. 260. 1935)

#### AELUROPOUS Trin.

**Aeluropus lagopoides** (Linn.) Trin. ex Thw. Enum. Pl. Zeyl. 374. 1864 ; Per errorem lagopodioides. Santapau Pl. Saur. 856. 1953 ; Bor, 380. 1960 ; Santapau & Jan. 52. 1967. *Dactylis lagopoides* Linn. Mantiss. 1 : 33. 1967. *Aeluropus villosus* Trin. ex L. Mey. Verz. Pflanz. Cauc. 18. 1831 ; FBI 7. 334 : Cooke 3 : 567.

Perennial ; stems 7.5 - 20 cm long, crowded on a woody rootstock with stout root fibres, simple or branched, smooth and polished ; branching sometimes elongate ; divaricate, 15 - 25 cm long, resembling stolons, nodes glabrous, internodes short or long. Leaves 0.4 - 2.5 cm long, narrowly lanceolate, acuminate, ciliate, sheaths short, terete, glabrous or ciliate, ligule a shortly hairy ridge. Heads of spikelets, shortly pedunculate. Spikelets 0.3 cm long, 4 - 8 flowered, crowded, sessile, villous with soft hairs, white. Lower invol. glume 0.2 cm long, ovate oblong, hairy, upper invol. glume 0.3 cm long, floral glume 0.3 cm long, ovate, many nerved hairy. Anthers 0.15 cm long, oblong. Grain 0.06 cm long, obovoid oblong, dorsally compressed.

*Flowers* : October onwards.

*Occurrence* : Recorded from Dwarka near station ; Syke's point 6 m. NE Salaya ; Rozi Port near Jamnagar.

#### ALLOTEROPSIS J. S. Presl ex C. B. Presl

**Alloteropsis cimicina** (Linn.) Stapf in Prain. Fl. Trop. Afr. 9 : 487. 1919 ; Bor, 276. 1960 ; Santapau & Jan. 52. 1967. *Milium cimicinum* Linn. Mant. Alt. 184. 1771. *Axonopus cimicinus* (Linn.) Beauv., Agrost. 12. 1812 ; FBI 7 : 64 ; Cooke 3 : 441.

A tufted grass ; stems 30 - 60 cm long, erect, or decumbent at the base ; nodes hairy. Leaves 2.5 - 7.5 cm × 10 - 16 mm, ovate lanceolate from a broad cordate base, acute, flat, glabrous or hairy, ciliate on the margins with stiff bulbous based hairs ; sheaths glabrous or hairy ;

ligule of short hairs. Inflorescence in spike like racemes, 3–10 on the top of a slender smooth peduncle, 5–15 cm long. Spikelets 6–8 mm long, subsecund, solitary or 2–nate, erect, pedicels unequal. Glumes 4; lower invol. glume more than 2.5 mm long, narrowly ovate lanceolate, 3-nerved; upper invol. glume 5 mm long, broadly ovate, 5-nerved; lower floral glume 4 mm long, ovate oblong, upper floral glume 6 mm long, ovate, acute, palea as long as the glume; coriaceous, elliptic oblong, subobtuse.

*Flowers* : August onwards.

*Occurrence* : Recorded from Girnar Hill, Junagadh and Sansangir in Gir Forest.

#### ANDROPOGON Linn.

**Andropogon pumilus** Roxb. Fl. Ind. 1 : 277. 1820 ; FBI 7 : 170 ; Cooke 3 : 495 ; Bor, 93. 1960 ; Santapau & Jan. 52. 1962.

Annual; stem 15–45 cm high, slender, suberect, quite glabrous; nodes glabrous. Leaves 7.5–12.5 cm × 2.5–4 mm, linear, finely acuminate, glabrous, sheaths compressed, keeled, ligule short. Racemes 1.2–1.6 cm long, in nearly equal pairs on a very slender peduncle, joints 0.25 cm long, flattened, ciliate and a cup shaped 2–3 toothed apex. Spikelets sessile, 0.5 cm long, callus glabrous. Glume 4; lower invol. glume 0.5 cm long, linear-lanceolate, the keels strong, running into slender awns, upper invol. glume as long as the lower, narrowly lanceolate, 1-nerved, lower floral glume hardly 0.3 cm long, linear lanceolate, upper floral glume 0.25 cm long, narrowly linear; awns 1.5 cm long. Anthers 0.2 cm long. Pedicellate spikelets not awned. Glumes 3; lower invol. glume 0.4 cm long, ovate lanceolate, acuminate, 5-nerved.

*Flowers* : September onwards.

*Occurrence* : Recorded from Barad Port, Jamnagar; Pamli vidi Morvi and from Hirasar.

*Uses* : The grass is considered good fodder and is eaten by cattle, green or dry. (WI)

#### APLUDA Linn.

**Apluda mutica** Linn. Sp. Pl. 82. 1753 ; Santapau, Pl. Saur. 858. 1953 ; Bor, 93. 1960 ; Santapau & Jan. 52. 1967. *A. aristata* Linn.

Amoen. Acad. 4 : 303. 1756 ; Santapau in RBSI 16(1) 270. 1960. *A. varia* Hack. Monog. Andropog. in DC. Monog. Phan. 6, 196. 1889 ; FBI 7 : 150 ; Cooke 3 : 474 : Blatt. & McC. Bombay Grasses 29, t. 20.

Stems densely tufted, 30-180 cm high, erect or branches rambling among bushes, stout or slender, internodes very long. Leaves 10-45 × 0.25-1.8 cm, narrowed from the middle to a filiform tip and usually below it into a long or short slender petiole ; sheaths long, smooth, ligule oblong, lacerate, inflorescence very variable, or spikelets clustered on short peduncles, the clusters solitary or few or very numerous and arranged in elongate very contracted panicles ; rachis slender, glabrous, bracts sessile or pedicellate. Spikes longer or shorter than the bracts with rounded base. Sessile spikelets 0.3-0.5 cm long ; upper floral glume 3-5 nerved, below the sinus, the lateral nerves arching and meeting the midnerve at the insertion of the awn.

*Flowers* : October to December.

*Occurrence* : Reported from Sasan, Iran river up stream, Junwania Nes, Girnar Forest, Junagadh ; Rajkot, Pradumna Park, Jilla Park ; Gondal Irrigation lake and cattle Farm ; Paneli vidi, Morvi ; Rozi Port near Jamnagar ; Junagadh, Road to the right of steps Girnar.

*Uses* : In some districts it is considered to be a good fodder, especially for buffalows when young and green. (Blatt. & McC. 29. 1935)

*Note* : A very much variable plant, occurring in awned and unawned forms. Dr. N. L. Bor upholds Hackel's opinion that 'the varieties pass into one another by numerous intermediates and for that matter, several other equally distinct varieties could be set up'.

### ARISTIDA Linn.

Awns not articulate on the floral glume, tripartite from the base without a column :

Invol.-glumes not awned *adscensionis*

Invol.-glumes awned *setacea*

Awns with a twisted column :

Column of awns articulate on the floral glume :

Stems less than 15 cm high ; lower invol.-glume 0.5 cm long *hystricula*

Stems reaching 60 cm high ; lower invol.-glume 0.1 cm long *funiculata*

Stems 15-20 cm high ; first glume 1-2 cm or less *royleana*

Column of awns not truly articulate on the floral glume *redacta*

**Aristida adscensionis** Linn. Sp. Pl. ed. 1, 82. 1753 ; FBI 7 : 224 ; Woodrow in JBNHS 13 : 439. 1901 ; Cooke 3 : 529 ; Indraji 705. 1910 ; Santapau, Pl. Saur. 863. 1953 ; Bor, 407. 1960 ; Santapau & Jan. 52. 1967.

Annual or perennial ; stems 22.5 - 60 cm long, densely tufted, very slender, erect or ascending, simple or branched, branches erect smooth. Leaves 7.5-30 × 0.1-0.2 cm, convolute filiform, smooth or scaberulous ; sheaths smooth, ligule of fine short hairs. Panicle 7.5-30 cm long, contracted, subsecund ; rachis filiform, smooth, branches short. Spikelets erect, 0.6-0.8 cm long. Lower invol. glume 0.4 cm long, oblong lanceolate ; acute, membranous, often purple, upper invol. glume lanceolate, 0.6 cm long, 2-toothed and apiculate at the tip, the keels smooth, floral glume 0.8 cm long, 3-nerved, smooth ; awns 3, not articulate on the glume, callus long, pointed, hairy at the base, pale minute, oblong, hyaline, retuse.

*Local name* : Uthlanpado.

*Flowers* : August onwards.

*Occurrence* : Recorded from Pipartoda, near Jamnagar, Panelividi, Morvi, Rajkot, on rocks and Jilla Park. Woodrow reported it from Jetalsar.

*Uses* : In Madagascar an ointment consisting of lard and the ashes of the flowers, is used topically for itch and ringworm. (Caius in JBNHS 33 : 546. 1936)

**Aristida funiculata** Trin. & Rupr. Sp. Gram. Stip. 159. 1842 & in Mem. Acad. Sci. Petersb. Ser. 6, 7 : 159. 1843 ; FBI 7 : 226 ; Cooke 3 : 531 ; Indraji 705. 1910 ; Santapau, Pl. Saur. 859. 1953 ; Bor, 410. 1960 ; Santapau & Jan. 52. 1967.

Annual, very slender, stem 25-60 cm long. Leaves 5-15 × 0.1-0.2 cm, convolute or flat, ciliate at the base ; sheaths glabrous ; ligule a small ciliate membrane. Panicle 10-25 cm long, lax, narrow ; rachis angular. Spikelets variable in length 1.2-2.1 cm long. Lower invol. - glume somewhat shorter than the lower, similar in shape and similarly awned ; floral glume small, smooth, awned ; awn articulate on the glume, the column 1.2-1.8 cm long, twisted with 3 capillary branches of which the middle is the longest, reaching 3 cm long.

*Local name* : Lasolanpado.

*Flowers* : August onwards.

*Occurrence* : Recorded from Rozi near Jamnagar ; Sasan Gir ; Gondal Road Rajkot, river bed ; and Chotila ; Girnar up the steps ; Targhari, it is very common in heavily grazed grasslands.

**Aristida hystricula** Edgew. in J. Linn. Soc. (Bot.) 6 : 208. 1862 ; FBI 7 : 227 ; Cooke 3 : 530 ; Indraji 706. 1910 ; Santapau, Pl. Saur. 860. 1953 ; Bor 410. 1960 ; Santapau & Jan. 52. 1967.

Annual, dwarf, slender, about 2.5 - 7.5 cm high, pale. Stems many from the root, 1.2 - 2.5 cm high, densely crowded, nodes glabrous. Leaves subulate, curved, acuminate, glabrous, convolute, less than 2.5 cm long. Sheaths glabrous, ligule a small line of hairs. Panicle without the awn 1.2 - 2.5 cm long, shorter than the awns, narrow few flowered ; branches few, short, erect. Spikelets 0.9 cm long or more. Lower invol. glume 0.4 - 0.5 cm long, much shorter than the upper, ovate lanceolate, acute, apiculate ; upper invol. glume 0.9 cm long, linear running out in a slender awn, lower floral glume 0.4 cm long, columns of awn 1.2 cm long, twisted, the 3 branches subequal, extremely slender.

*Local name* : Lampado ; Bhoynalampado.

*Flowers* : June.

*Occurrence* : Collected from Porbandar.

**Aristida redacta** Stapf in Kew Bull. 85. 1892 ; FBI 7 : 227 ; Cooke 3 : 531 ; Bor 412. 1960 ; Santapau & Jan. 52. 1967.

Annual, or sometimes perennial ; stems tufted, 15 - 16 cm high, simple, or proliferously branched in robust specimens, nodes glabrous. Leaves 10 - 15 cm long, very slender, convolute, hairy above, smooth below, margins rough ; sheaths glabrous ; ligule narrow, ciliate. Panicle 22.5 - 25 cm long, by 18 - 7 cm broad, branches usually twin, remore at length spreading pedicels unequal, shorter than the glumes. Spikelets on long or short capillary pedicels, green or purplish. Lower invol. glume subequal, narrowly lanceolate, finely acuminate, shortly aristate, 1.2 cm long ; floral glume with a hairy callus, usually purplish, armed with an awn ; column of awn capillary, twisted ; branches 3 from the top of the column, the lateral much shorter than the middle one, sometimes 0.

*Flowers* : October.

*Occurrence* : Collected from Junagadh, Girnar, on earth banks.

**Aristida royleana** Trin. & Rupr. Sp. Gram. Stip. 160. 1842 & in Mem. Acad. Sci. Petersb. Ser. 6, 7 : 160. 1843 ; Bor. 412. 1960 ; Santa -

pau & Jan. 52. 1967. *A. funiculata* Trin. & Rupr. loc. cit. FBI 7 : 226 ; Cooke 3 : 531. *A. funiculata* var. *royleana* Hook. f., Fl. Brit. Ind. 7, 227. 1896.

A small slender, 15-20 cm high. Leaves eciliate, flat, slender. Spikelets smaller, on more distant spreading flexuous branches, first glume 1-2 cm or less column of awn 0.4-0.6 cm, branches more unequal.

*Flowers* : September.

*Occurrence* : Recorded from Rajkot near ditches.

**Aristida setacea** Retz. Obs. fasc. 4 : 22. 1786 ; FBI 7 : 225 ; Woodrow in JBNHS 13, 439. 1901 ; Cooke 3 : 529 ; Blatt. & McC. 211, t. 139 ; Bor 412. 1960 ; Santapau & Jan. 52. 1967.

Perennial, stem 60-90 cm high, stout, erect, with stout wiry root-fibres, hard, smooth and polished. Leaves 15-30 × 0.2-0.4 cm, usually convolute, coriaceous, smooth ; sheaths long, smooth ligule of short hairs. Panicle various, 15-30 cm long, inclined sometimes sub secund ; rachis slender, smooth ; branches long or short. Spikelets 1.5 cm long (excluding awns), erect ; pedicels capillary. Lower invol. glume awned, 1.5 cm long, 1 nerved ; upper invol. glume a little longer than the lower, notched at the insertion of the awn, 1 nerved ; floral glume 1.5 cm long, 3 nerved ; awns 3, inarticulate at the base. Callus long, bearded with long hairs. Stamens 3 ; anthers 0.4 cm long.

*Flowers* : August.

*Occurrence* : Woodrow reported it from Rajkot.

*Uses* : It is used for making brooms and tatties. (WI)

#### ARTHRAXON P. Beauv.

Lower glumes of sessile spikelets rounded on the back, not keeled ; spikelets laterally compressed

*lancifolius*

Lower glume of sessile spikelet 2-keeled ; sometimes almost flat on the back ; spikelets not laterally compressed :

Lower glume flat on the back or slightly convex with strongly marked nerves, pectinate on the keels from base to apex but not muricate on the intermediate nerves

*lanceolatus*

Lower glume rounded on the back, often cylindrical but keeled, pectinate on the keels and often muricate on the intermediate nerves as well near the tip

*prionodes*

**Arthraxon lanceolatus** (Roxb.) Hochst. in Flora 39 : 188. 1856 ; FBI 7 : 143 ; Woodrow in JBNHS 13 : 437. 1901 ; Cooke 3 : 487 ; Santapau, Pl. Saur. 861. 1953 ; Bor, 100. 1960 ; Santapau & Jan. 52. 1967. *Andropogon lanceolatus* Roxb. Fl. Ind. 1 : 257. 1820.

A tall subscandent grass 30–90 cm high, emitting roots from the joints, seems perennial. Leaves lanceolate, base cordate, and stem-clasping, apex acute, smooth on both sides, but the edges from the middle down, bristle-ciliate. Spikes terminal, two, three, or four, peduncled. Rachis and pedicel of the male flower, somewhat woolly. Calyx lanceolate ; exterior valve, and chiefly that of the hermaphrodite sessile flower with the margins minutely and acutely pectinate-serrate. Corolla in both two-valved, with an arista in the hermaphrodite one.

*Flowers* : October.

*Occurrence* : Woodrow reported it from Morvi.

**Arthraxon lancifolius** (Trin.) Hochst. in Flora 39, 188. 1856 ; Bor, 100. 1960 ; C. J. Saldanha & H. Nicolson, Fl. Hassan Distr. 709. 1976. *Andropogon lancifolius* Trin. in Mem. Acad. Sci. Petersb. Ser, 6, 2, 271. 1832. *Arthraxon microphyllus* (Trin.) Hochst. in Flora 39, 188. 1856 ; FBI 7 : 147 ; Cooke 3 : 488.

Annual ; stem and branches filiform, 15–30 cm long, straggling, glabrous or more or less obscurely pubescent below the spikes. Leaves 1.8–3.1 × 0.4–0.3 cm, ovate or elliptic ; acuminate, membranous, very sparingly hairy or nearly glabrous, base slightly auricled, margins naked or sparsely ciliate, especially towards the base ; sheaths short, glabrous, ligule small, hyaline. Panicle of 3–5 slender branches ; rachis capillary ; internodes shorter than the slender spikelets, ciliate. Spikelets solitary, 0.3 cm long, narrowly lanceolate ; callus nearly glabrous. Glumes 4 ; lower invol.-glume thinly membranous, lanceolate 2-cuspidate, 5–7-nerved above the middle, upper invol.-glume as long as the lower narrowly lanceolate, narrowing out into a very fine awn-like point ; lower floral glume much shorter than the upper invol.-glume 0.2 cm long, ovate-lanceolate, subacute ; hyaline with an awn, the column of the awn brown, much shorter than the usually purplish capillary subulate portion.

*Flowers* : October.

*Occurrence* : Recorded from Junagadh, Girnar Forest, it was found on vertical earth banks in pure dense stands.

**Arthraxon prionodes** (Steud.) Dandy in Andrews, Fl. Pl. Sudan, 3 : 399. 1956 ; Bor, 101. 1960 ; Santapau & Jan. 52. 1967. *Andropogon prionodes* Steud, Syn. Pl. Glum. 1 : 383. 1854

A perennial grass, rhizome short. Stems rather slender, up to 90 cm high, many-noded, pubescent, sometimes glabrous. Leaf blades lanceolate to ovate-lanceolate, setaceous acuminate, 2.5–3 cm long, 12–18 mm wide, margins cartilaginous, ciliate, smooth, very finely pubescent below or glabrous, primary lateral nerves about 8–11 on each side, ligule 1–2 mm long, rounded, sheaths terete, tight, slightly shorter than the internodes. Racemes 2–5-nate, slender, greenish or suffused with purple or violet, 3 to over 5 cm long on a short common axis; rachis fragile, joints narrowly linear, 3.3–6.3 mm long, hairy on the back and sides, pedicels very similar. Sessile spikelets narrowly lanceolate-linear to linear, callus very short. Glumes 4. Lower invol.-glume 6 mm long, lanceolate, hyaline, upper invol.-glume linear-lanceolate, 3-nerved, glabrous. Lower floral glume linear, acute, up to 4 mm long, hyaline, nerveless. Anthers up to 3 mm long. Grain bacilliform, 4.2 mm long. Pedicelled spikelet male, linear-lanceolate, acute about 5 mm long. Involucral glumes subequal. Lower floral glume as in the sessile spikelet, upper linear-oblong, obtuse, nerveless muticous.

*Flowers* : August.

*Occurrence* : Recorded from Sasangir in Gir Forest.

### ARUNDINELLA Raddi.

Upper lemma with two setae, one on each side of the awn, at the tip :

Whole plant covered with tubercle-based hairs ; spikelets long, acuminate, 7.5–9.5 mm long

*tuberculata*

Plants not entirely covered with tubercle-based hairs; spikelets at most 5–6 mm long

*setosa*

Upper lemma with a single awn or the awn absent :

Upper lemma not awned or if so, awn not more than 2 mm long ; base of upper lemma naked

*leptochloa*

Upper lemma bearing a geniculate awn

*pumila*

**Arundinella leptochloa** (Nees ex Steud.) Hook. f. Fl. Brit. Ind. 7 : 76. 1896 ; Bor 43. 1900 ; Santapau & Jan. 52. 1967. *Panicum leptochloa* Nees ex Steud., s. n. Pl. Ghut. 1 : 62. 1854. *Arundinella gigantea* Dalz. in Dalz. et Gibbs. Bomb. Fl. 293. 1861 ; FBI 7 : 76 ; Cooke 3 : 525 ; Indraji 697. 1910 ; Santapau, Pl. Saur. 864. 1953.

A tall grass ; stems erect, smooth, terete, 180 cm high ; nodes glabrous. Leaves 30-60 cm  $\times$  2.1-1.8 cm ; linear-lanceolate, finely acuminate, glabrous, many nerved, base rounded or cordate ; sheaths striate ; ligule a narrow glabrous membrane. Panicle subcorymbosely thyrsiform, 12.5-17.5  $\times$  5-7.5 cm, rachis stout. Spikelets 0.2-0.3 cm long. Glumes 4, lower invol.-glume 0.2 cm long, broadly ovate, acute, strongly 3-nerved, with a scaberulous keel ; upper invol.-glume 0.2-0.3 cm long, ovate, narrowed into an acuminate point, 5-nerved ; lower floral glume 0.20-0.25 cm long, ovate, subobtuse, 3-5 nerved, paleate, the palea 0.15 cm long, elliptic, hyaline ; upper floral glume 0.15 cm long, elliptic, thickly coriaceous, white without an awn.

*Local name* : Motun Bajariyun, Vadu Bajariyu.

*Flowers* : June onwards.

*Occurrence* : Recorded from Barda Hill.

*Uses* : Used as fodder. (Indraji 697. 1910)

**Arundinella pumila** (Hochst.) Steud. Syn. Pl. Glum. 1 : 114. 1854 ; Santapau, Pl. Saur. 865. 1953 ; Bor, 423. 1960 ; Santapau & Jan. 53. 1967. **Acratherum pumilum** Hochst. ex A. Rich. Tent. Fl. Abyss. 2 : 414, t. 100. 1851. **Arundinella tenella** Nees & Wight, ex Steud. Nom. Bot. ed. 2, 1 : 143. 1840 ; nom. nud. ; FBI 7 : 71 ; Cooke 3 : 522 ; Indraji 697. 1910.

Annual, nearly glabrous ; stems solitary or tufted, erect. Leaves 2.5-7.5  $\times$  0.6-1.8 cm, ovate to linear-lanceolate, acuminate, membranous, many-nerved with soft hairs, base narrowed, sheaths usually glabrous with ciliate margins. Panicles 5-25 cm long, effuse, copiously branched ; rachis slender, branches alternate or the lower subverticillately fascicled. Spikelets the smallest of the genus, 0.15-0.2 cm long, pedicels long, slender. Glumes 4 ; lower invol.-glume 0.12-0.15 cm long, ovate-lanceolate, acute, 3-nerved ; upper invol.-glume longer 0.12-0.2 cm long, ovate-lanceolate, cuspidately acuminate, 5-nerved ; lower floral glume 0.12 cm long, ovate, obtuse, paleate ; upper floral glume 0.1 cm long, lanceolate, scabrid above ; awn solitary, about 0.2 cm long, the lower part brown, slightly twisted, the upper part pale.

*Local name* : Bajariyun.

*Flowers* : June onwards.

*Occurrence* : Recorded from Sasangir in Gir Forest.

*Uses* : Used as fodder. (Indraji 697. 1910)

**Arundinella setosa** Trin. Gram. Panic. 63. 1826 ; FBI 7 : 70 ; Cooke 3 : 521 ; Indraji 697. 1910 ; Santapau, Pl. Saur. 866. 1953 ; Bor. 424. 1960 ; Santapau & Jan. 53. 1967.

Perennial; stem 30–90 cm high, erect from a hard rootstock slender, rigid, subtuberous at the base, nodes glabrous. Leaves 15–30 × 0.3–0.6 cm, linear, finely acuminate, glabrous, pubescent or sometimes hispidly hairy; sheaths glabrous; ligule very small. Panicle 7.5–25 cm long, lax; branches 5–12.5 cm long, distant suberect, filiform. Spikelets 0.6 cm long. Glume 4; lower invol.-glume 0.6 cm long, ovate-lanceolate, aristately acuminate, 3-nerved, hairy or almost glabrous; upper invol.-glume rather more than 0.6 cm long, oblong-lanceolate, narrowed into a long awn with truncate tip, 5-nerved; lower floral glume 0.5 cm long, obtuse, paleate, male, the palea 0.3 cm long, oblong-lanceolate, subacute; upper floral glume 0.3 cm long, ovate-lanceolate, acuminate, 2-sexual; palea as long as the glume, narrowly oblong-lanceolate, subacute; median awn more than 0.6 cm long, brown below; pale above; lateral awns capillary, 0.15 cm long.

**Arundinella tuberculata** Munro ex Lisboa in Journ. Bomb. Nat. Hist. Soc. 5 : 344. 1891 ; FBI 7 : 69 ; Cooke 3 : 521 ; Bor. 425. 1960 ; Santapau & Jan. 53. 1967.

Annual; stem erect or slightly decumbent at the base, 30–45 cm high, glabrous. Leaves 2.5–8.7 × 0.4–1.2 cm, linear-lanceolate, acute, hispid with white bulbous hairs, base rounded; sheaths 5 cm long, ligule a ridge or hairs. Panicles 7.5–15 cm long, narrowly oblong; rachis angular; branches 1.2–2.5 cm long. Spikelets ovoid, acute, pedicellate, single or geminate, 0.4 cm long. Glumes 4; lower invol.-glume 0.4 cm long, 3-nerved, with bulbous-based hairs along the nerves, upper invol.-glume 0.4 cm long, ovate, acute, 5-nerved with the hairs, lower floral glume rather more than 0.4 cm long, elliptic-oblong, obtuse, 2-fid, glabrous, paleate, male, the palea as long as the glume, oblong-lanceolate, acute, upper floral glume rather more than 0.2 cm long, lanceolate, acute, median awn 1.2 cm long, the lower half brown, twisted or not, the upper half straight whitish lateral awns acicular, transparent, 0.21–0.14 cm long.

*Flowers* : August onwards.

*Occurrence* : Collected from Valadhari near Rajkot.

#### BAMBUSA Schreb.

**Bambusa arundinacea** (Retz.) Roxb. Pl. Cor. t. 79. 1796 ; FBI 7 : 395 ; Cooke 3 : 569 ; Holttum, Taxon 5 : 67. 1956 ; Santapau & Jan. 53.

1967 ; C. J. Saldanha & H. Nicolson, Fl. Hassan Distr. 712. 1976. *Bambos arundinacea* Retz. Obs. Bot. 5 : 24. 1789. *Bambusa bambos* Voss in Vilm. Bluemeng. 1 : 1189 ; Santapau in RBSI ed. 1, 16(1) : 346. 1953 ; Santapau, Pl. Saur. 868. 1953.

A giant bamboo with stout root-stalks ; the dense clumps reaching 35 m in height and 15-22.5 cm in diam., stem golden yellow often stripped with green or red, the graceful curving branches bearing 2-3 stout, recurved spines at nodes. Leaves linear-lanceolate, tip stiff, margins sharp, base rounded, leaf sheath ending in auricles. Panicles very large bearing clusters of lanceolate, sessile, spikelets. Glumes 2 or 0, ovate-lanceolate, floral glumes 3-7, uppermost 1-3 male or neuter, lodicules 3. Stamens 6, free. Ovary oblong, style short, stigma 2-3. Grain grooved on one side, beaked by the style base.

*Local name* : Kalak.

*Flowers* : Flowering very infrequent.

*Occurrence* : Collected from Girnar road, Junagadh.

*Uses* : Its chief use being for floating heavy timber and for structural purposes. Split clumps are used for mat making basket work, etc. It yields paper pulp of good quality. Young shoots are pickled or made into curries. Its leaves and twigs are used as fodder and are largely consumed by elephants and cattle. The leaves are reported to be given to horses as a remedy for coughs and colds. (WI)

*Note* : Most authors credit *B. arundinacea* to Willd. (Sp. Pl. 2 : 245. 1799) but Roxburgh clearly antedates that publication.

### BOTHRIOCLOA O. Ktze.

Lower racemes longer than the rachis :

Racemes 2-8, up to 5 cm long ; spikes pale or purplish *pertusa*

Racemes 2-7 in number, up to 5 cm long ; spikes usually purplish *ischaemum*

Lower racemes shorter than the rachis *intermedia*

**Bothriochloa intermedia** (R. Br.) A. Camus in Ann. Soc. Linn. Lyon (n. s.) 76, 164. 1930 ; Santapau, Pl. Saur. 869. 1953 ; Bor, 108. 1960; Santapau & Jan. 53. 1967. *Andropogon intermedius* R. Br. Prodr. 202. 1810 ; FBI 7 : 175 ; Cooke 3 : 500 ; Indraji 703. 1910. *Amphilophis glabra* Blatt. & McC., Bombay Grasses 87. 1935 (non Stapf, 1917).

Perennial ; stem 60 - 120 cm high or more, stout, erect, slightly flattened on one side, simple or sparingly branched, leaf upwards ; nodes usually hairy. Leaves 15 - 45 × 0.3 - 0.8 cm, narrowly linear, glaucous, finely acuminate with capillary tip, glabrous or ciliate towards the base ; sheaths terete, glabrous ; ligule a narrow truncate, ciliate or not. Panicle 7.5 - 1.5 cm long, erect, pyramidal ; rachis glabrous ; branches 1.2 - 3.7 cm long, racemes slender, fragile, pale-green or purplish, with a capillary rachis. Sessile 0.3 - 0.4 cm long, callus very short, bearded ; lower invol. glume thin, oblong, obtuse, 4 - 9 nerved, upper invol.-glume as long as the lower, oblong-lanceolate, faintly 3-nerved, smooth ; lower floral glume much shorter, oblong, nerveless ; upper floral glumes represented by the hyaline slightly flattened base of the awn ; palea 0 ; awn 1.5 cm long. Pedicillate spikelets linear-oblong, narrower than the sessile ; pedicels 0.2 cm long with a translucent centre, usually ciliate.

*Local name* : Gharfo, Gharfoghas.

*Flowers* : November.

*Occurrence* : Collected from Barda Hills, in the forest.

*Uses* : Used as a fodder. (Indraji 704. 1910)

**Bothriochloa ischaemum** (Linn.) Keng. in Contr. Biol. Lab. Sci. Soc. China, Bot. Ser. 10, 201. 1936 ; Bor, 108. 1960 ; Santapau & Jan. 53. 1967. *Andropogon ischaemum* Linn. Sp. Pl. ed. 1, 1047. 1753 ; FBI 7 : 171 ; Indraji 701. 1910.

Stems 70 - 90 cm, erect or geniculately ascending, subsimple, naked above ; nodes naked or shortly bearded. Leaves 30 - 60 cm × 0.15 - 0.4 cm, glabrous or hairy above, especially towards the base, glaucous, scaberulous above, base rounded, sheath loose ; ligule very short. Spikes unequal, 3.7 - 7.5 cm, shortly stipitate usually purplish, sessile spikelets, glume first dorsally flat ; second lanceolate, mucronulate, keels scabrid above ; third oblong-lanceolate, acute, ciliate ; fourth awn 1.2 - 1.8 cm. Pedicelled spikelets usually darker than the sessile, male ; glume first lanceolate, 9-nerved, glabrous, keels ciliate above ; second linear-lanceolate, 5 - 7 - nerved ; third linear-oblong, obtuse, ciliate, fourth very narrow.

*Local name* : Dungarijinjavo ; Jenjavo.

*Flowers* : June onwards.

*Occurrence* : Collected from Barda Hills in Adityana Forest and Bileshwar.

*Uses* : This grass is very soft, thin & sweet. It is given as a medicine to ill cattles. It is said to increase the flow of milk in milk cattle. (Indraji 701. 1910)

**Bothriochloa pertusa** (Linn.) A. Camus in Ann. Soc. Linn. Lyon, 1930, n. s. 76, 164. 1931 ; Santapau, Pl. Saur. 870. 1953 ; Bor, 109. 1960 ; Santapau & Jan. 53. 1967. *Holcus pertusus* Linn. Mant. Alt. 301. 1771. *Andropogon pertusus* (Linn.) Willd. Sp. Pl. 4, 922. 1806 ; FBI 7 : 173 ; Cooke 3 : 497 ; Indraji 702. 1910.

Very variable in habit and structure, rarely 30 cm high, tufted, annual or perennial ; stem sometimes creeping and rooting, usually ascending from a leafy base, slender, even filiform ; nodes sometimes densely bearded. Leaves 5-30 × 0.2-0.4 cm, acute or acuminate, glabrous except at the ciliate base, rarely hairy, surface scaberulous, dull green ; sheath hardly compressed, glabrous or villous ; ligule short, membranous, truncate. Spikes pale or purplish ; joints and pedicels very slender. 1/2 the sessile spikelet, glume first of sessile spikelet subacute, coriaceous ; second 1-3-nerved, third linear-oblong, obtuse, glabrous, fourth, awn 1.2-1.8 cm capillary, base slightly dilated ; palea minute or 0. Pedicelled spikelets like the sessile, male or neuter ; glume first 7-13-nerved, glabrous, pitted, or not, keels ciliate throughout their length, second lanceolate, 5-nerved, ciliate, third linear-oblong, glabrous, fourth short or 0.

*Local name* : Khetaranjinjavo, Jenjavo.

*Flowers* : September.

*Occurrence* : Collected from Barda Hills. Found at the road-sides near rivers and in the fields.

*Uses* : It is a good fodder for cattle and is given during illness. It is said to increase the flow of milk in milk cattle. (Indraji 702. 1910)

### BRACHIARIA Griseb.

Lower invol.-glume minute, nevertheless :

Leaf-base rounded ; lower invol.-glume triangular *eruciformis*

Leaf-base cordate-amplexicaul ; lower invol.-glume semilunate *reptans*

Lower invol.-glume not minute, 3-5-nerved :

Lower invol.-glume ovate acute, 1/2 as long as the upper floral glume *ramosa*

Lower invol.-glume orbicular, about 1/3 as long as the upper floral glume *setigera*

**Brachiaria eruciformis** (J. E. Smith) Griseb. in Ledeb. Fl. Ross. 4 : 469. 1853 ; Bor, 283. 1960 ; Santapau & Jan. 53. 1967. *Panicum eruci-forme* J. E. Smith, in Sibth et J. E. Smith, Fl. Graeca 1 : 44, t. 59. 1806. *P. isachne* Roth ex Roem. et Schult. Syst. Veg. 2 : 458. 1817 ; Cooke 3 : 448.

Annual stems many, 30–60 cm long, ascending from a decumbent or creeping and rooting base, geniculate, very slender, with villous nodes, otherwise glabrous, much branched below, simple above. Leaves 2.5–5 × 0.2–0.5 cm, linear lanceolate from a rounded base, acute, glabrous or hairy ; sheaths glabrous or hairy, ciliate on the upper part ; ligule a fringe of hairs. Inflorescence 5–7.5 cm long, erect, consisting of 6–12 secund or subsecund racemosely arranged spikes 1.2–2.5 cm long, longer than the internodes, sessile or shortly pedunculate. Spikelets 0.2–0.15 cm long, softly hairy ; pedicels very short. Glumes 4 ; lower invol. glume membranous ; oblong, obtuse, 5 nerved, hispidly pubescent ; lower floral glume narrower, 3 nerved, paleate, neuter or sometimes male, with hyaline palea ; upper floral glume shorter, oblong, obtuse, dorsally flattened, coriaceous, glabrous, 2 sexual, with coriaceous palea. Anthers 0.1 cm long.

*Flowers* : August.

*Occurrence* : Recorded from Dhunvao vidi, Pipartoda, near Jamnagar ; Gondal Road, Rajkot, frequent ; Valadhari.

*Uses* : Fodder grass. (WI)

**Brachiaria ramosa** (Linn.) Stapf in Fl. Trop. Afr. 9 : 542. 1919 ; Blatt. & McC. 134, t. 86 ; Bor, 284. 1960 ; Santapau & Jan. 53. 1967. *Panicum ramosum* Linn. Mant. 1 : 29. 1967 ; FBI 7 : 36 ; Cooke 3 : 449.

Annual, stem 30–90 cm, decumbent and branched below, branches erect, leafy. Leaves 7.5–10 × 0.6–2.5 cm, lanceolate, acuminate, thin, glabrous or pubescent, base rounded and usually deeply lobed, margins minutely ciliolate, sheath glabrous or pubescent, mouth usually ciliate ; ligule short. Panicles 5–15 cm, inclined, oblong, glabrous or pubescent ; rachis angular. Spikes 2.5–5 cm, erecto patent, rather distant, sometimes divided at the base. Spikelets alternate, close or distant, often in pairs a sessile and pedicelled, pale green or yellowish, turgid, pedicel usually with long cilia. Glumes 4, lower invol. glume 1/2 as long as the lower floral glume, ovate, acute ; upper invol. glume about equalling the lower floral glume, ovate, acute, 5 nerved ; lower floral glume slightly broader, upper floral glume coriaceous, ovoid oblong, acute, rugulose.

*Flowers* : August.

*Occurrence* : Recorded from Rajkot, Rajkumar College Compound, Jilla Garden : Girnar Hill, Junagadh, Dhunvao vidi, Paneli vidi, Morvi ; Gondal Road, Rajkot ; Sasangir in Gir Forest.

*Uses* : It is cultivated as a short duration crop, the straw is relished by cattle. (WI)

**Brachiaria reptans** (Linn.) Gard. & C. E. Hubb. in Hook. Icons Pl. Sub. tab. 3363. 1938 ; Bor, 285. 1960 ; Santapau & Jan. 53. 1967. *Panicum reptans* Linn. Syst. Nat. ed. 10, 870. 1759. *Urochloa reptans* (Linn.) Stapf in Prain Fl. Trop. Afr. 9, 601. 1920. *Panicum procumbens* Nees, Agrost. Bras. 109. 1829 ; FBI 7 : 34.

A slender annual grass ; stems 10–45 cm long, ascending from a long creeping base ; often branched below ; nodes pubescent, internodes 2.5–7.5 cm long. Leaves 2.5–5 cm × 6–18 mm, ovate lanceolate from a cordate amplexicaul base, acuminate, thin, flat, nearly glabrous, ligule a tuft of white hairs or 0. Racemes 5–8, alternate, secund, 1.3–3.2 cm long, sessile or shortly pedunculate ; rachis slender, angular. Spikelets 1.6–2 mm long, solitary or binate, glabrous ; pedicels very short, with long slender hairs at the tip. Glumes 4 ; lower invol. glume, minute, semilunate, hyaline, nerveless ; upper invol. glume about equalling the lower floral glume, membranous, broadly ovate, acute, pubescent, 7-nerved, lower floral glume 5-nerved ; empty, with hyaline palea ; upper floral glume elliptic, dorsally rounded, thinly coriaceous, finely striolate, nearly white with subcoriaceous palea. Anthers 0.8 mm long.

*Flowers* : August.

*Occurrence* : Recorded from Junagadh, cattle Farm ; Rajkot, Pradumna Park and Dhunvan vidi.

**Brachiaria setigera** (Retz.) C. E. Hubb. in Hook. Icons Pl. 34, 2, sub. tab. 3363. 1938 ; Bor, 286. 1960 ; Santapau & Jan. 53. 1967. *Panicum setigerum* Retz. Obs. Bot. 4 : 15. 1786 ; FBI 7 : 36 ; Cooke 3 : 449. *Panicum setigerum* var. *tomentosa* Hook. f. FBI 7 : 37. 1896 ; Woodrow in JBNHS 13 : 433. 1901.

Stem 30–90 cm, slender, prostrate and widely straggling below ; lower internodes long, nodes rooting, tomentose. Leaves 7.5–12.5 × 1.2–1.7 cm, finely acuminate, flat, margins crispedly wrinkled below, or to beyond the middle ; sheath with ciliate margins, ligule a few hairs. Spikes 3–6, suberect or spreading, rather distant, angles of rachis scabulous, spikelets solitary or geminate, suberect, very acuminate 0.2–0.3

cm long, 2 seriate. Glumes 4; lower invol. glume about 1/3 as long as the upper, orbicular; upper invol. - glume broadly ovate, acute, or acuminate, 7 nerved; lower floral glume about equal to the upper glume, 5 nerved, paleate, neuter, the palea membranous, as long as the glume, subacute; upper floral glume elliptic; obtuse, shortly apiculate, granulate, with narrowly incurved margins, the palea coriaceous, elliptic oblong, obtuse.

*Flowers* : September to December.

*Occurrence* : Woodrow reported it from Rajkot.

#### CAPILLIPEDIUM Stapf

**Capillipedium filiculme** (Hook. f.) Stapf in Hook. Icon. t. 3085. 1922; Blatt. & McC. 82; Bor, 111. 1960; Santapau & Jan. 53. 1967. *Andropogon filiculmis* Hook. f. in Fl. Brit. Ind. 7 : 181. 1896; Cooke 3 : 502.

Stems 60-90 cm, apparently decumbent and interlaced, copiously geniculately branched, throughout, quite glabrous, internodes long pubescent. Leaves pale green 0.3-0.4 cm broad, tip filiform, glabrous or sparsely hairy beneath, margins smooth ciliate towards the very narrow base, costa and nerves very slender; sheaths long, narrow, spreading at the ramification glabrous, bearded at the top; ligule broad, membranous, ciliate. Panicle 2.5-5 cm, branches few or extreme slenderness. Spikelets pale green or white; callus densely shortly villous; glume first of sessile, membranous, nerve faint; second oblong, truncate, mucronate, 3 nerved, glabrous; third very small, ovate, nerveless, eciliolate, fourth, awn 1.2-1.8 cm, column brown twisted. Pedicelled spikelets narrower than the sessile; glume first, lanceolate, tip truncate mucronate, 7-9-nerved, ciliate, with long hairs; second as long, ovate lanceolate, acute, strongly 5-7 nerved; third broadly oblong, hyaline, nerveless, fourth 0.

*Flowers* : November onwards.

*Occurrence* : Recorded from Barda Hill and Jamnagar.

#### CENCHRUS Linn.

Bristles of the involucres retrorsely scabrid

*biflorus*

Bristles of the involucres antrorsely scabrid :

Bristles connate at the base only

*ciliaris*

Bristles connate into a cup, 1 - 3 mm long :

Inner bristles very slender, widened into a cup at the  
base, the outer bristles slender numerous *pennisetiformis*

Inner bristles rigid, flattened and subulate ; the outer few  
or absent *setigerus*

**Cenchrus biflorus** Roxb. Fl. Ind. 1 : 238. 1820 ; FBI 7 : 89 ; Woodrow in JBNHS 13 : 435. 1901 ; Cooke 3 : 431, Indraji 698. 1910 ; Santa pau, Pl. Saur. 87. 1953 ; Bor, 287. 1960 ; Santapau & Jan. 53. 1967. *C. catharticus* Delile, cat. Hort. Monsp. 1838, 4. 1839 ; Santapau, Pl. Saur. 872. 1953.

Annual 9 ; stem 15 - 60 cm long ; simple. Leaves 7.5 - 25 × 0.3 - 0.9 cm, linear lanceolate finely acuminate, glabrous or hairy. Sheaths glabrous, ciliate near the mouth ; ligule and pubescent ring. Racemes 5 - 10 cm long, solitary, cylindric ; rachis angular, smooth ; involucral usually 2 flowered, rounded at the base ; bristles thick, lanceolate subulate, erect, dorsally flattened. Spikelets 0.4 cm long, subglobose. Glumes 4 ; lower invol. glume 0.15 cm long, ovate, acuminate, hyaline, 1 nerved, upper invol. glume 0.4 cm long, ovate ; apiculate, 5 nerved, hyaline ; lower floral glume scarcely shorter than the upper invol. glume, ovate acute, 5 - 7 nerved, paleate, the palea 0.3 cm long, oblong, obtuse ; upper floral glume as long as the lower, ovate, obtuse. Anthers 0.15 - 0.3 cm long. Styles free almost to the base. Grain 0.20 × 0.15 cm, orbicular oblong, compressed, smooth, pale brown.

*Local name* : Dhramanu, Dhramanu Ghas.

*Flowers* : September onwards.

*Occurrence* : Recorded from Rozi near Jamnagar ; Lalpari Talao and Pradumna Park, Rajkot. Woodrow reported it for Morvi.

*Uses* : Green fodder. (WI)

**Cenchrus ciliaris** Linn. Mant. Alt. 302. 1771 ; Santapau, Pl. Saur. 873. 1953 ; Bor, 287. 1960 ; Santapau & Jan. 53. 1967. *Pennisetum cenchroides* Rich. in Pers. Syn. 1 : 72. 1805 ; FBI 7 : 88 ; Cooke 3 : 432 ; Woodrow in JBNHS 13 : 435. 1901. *P. ciliare* Link. Hort. Berol. I, 213. 1827. Blatt. & McC. 181. 1935.

Stems tufted, 15 - 45 cm, erect or decumbent and much branched from the base, stout or slender, leafy or ascending from a branching often nodose rootstock, the sheaths of which are often woolly. Leaves 15 - 25 × 0.3 - 0.4 cm, glabrous hairy or villous. Spikes 3.7 - 10 cm,

pale, rarely purplish ; peduncle often flexuous ; rachis scaberulous ; involucels subsessile, outer bristles slender, squarrosely spreading, inner twice as long as the spikelets, thickened and ciliate below, filiform flexuous and scabrid above. Spikelets 3, polygamous, glume third male or sometimes female, with an obcordate ovary ; fourth coriaceous ; styles nearly free at the base.

*Flowers* : September.

*Occurrence* : Recorded from Pradumna Park and Targhari near Rajkot. Woodrow reported from Rajkot.

*Uses* : The grass is considered to be the most nutritious among fodder grasses. The grass can be fed green or turned into silage or made into hay. It is said to increase the flow of milk in milk cattle and impart to them a stock and glossy appearance indicative of well doing stock. The grass is a good sand binder. (WI)

*Cenchrus pennisetiformis* Hochst. & Steud. Syn. Pl. Glume 1 : 109. 1854 ; FBI 7 : 88 89 ; Bor, 289. 1960 ; Santapau & Jan. 53. 1967. *Pennisetum cenchroides* Rich. in Pers. Syn. 1 : 72. 1803 ; FBI 7 : 88 ; Cooke 3 : 432. *Pennisetum cenchroides* var. *echinooides* Hook. f. Fl. Brit. Ind. 7 : 88. 1896.

A stout erect grass ; stem 30 90 cm high, erect from a woody rootstock with stout root fibres. Leaves 10 25 × 2.5 3.2 cm oblong-lanceolate, acute or acuminate, more or less unequal sided, thin, smooth, glabrous or sparsely hairy, 9 11 nerved, base narrowed, sheaths usually glabrous except at the mouth ; ligule a broad sometimes lacerate membrane. Panicle 20 25 cm long and broad, branches slender, suberect, Spikelets 5 mm long, oblong-lanceolate, acute. Invol. glume distant ; lower 2.5 - 3.2 mm long, ovate, acute, apiculate, 3 nerved, upper 3.2 4.3 mm long, ovate oblong, acute, apiculate, 3 5 nerved ; lower, floral glume 4 5 mm long, broadly ovate oblong, obtuse, apiculate, 7 nerved, upper floral glume about as long as the lower, oblong, obtuse, 7 nerved, finely apiculate, usually with 2 rows of tubercle based ultimately deflexed bristle closed to each margin in the upper part of glume, sometimes naked ; palea 2.5 3.2 mm long, narrowly lanceolate, acute with ciliate keels.

*Flowers* : August.

*Occurrence* : Recorded from Chotila Hill ; Modpar vidi Halar District.

*Uses* : Used as a fodder grass. (WI)

**Cenchrus setigerus** Vahl, Enum. Pl. 2 : 395. 1806 ; Bor 290. 1960 ; Santapau & Jan. 53. 1967. *C. biflorus* sensu Fl. Brit. Ind. 7: 89. 1896 ; non Roxb. (1820).

Annual, stems erect, glabrous. Leaves 8–25 × 0.3–1 cm, linear lanceolate, acuminate, glabrous or hairy; sheaths compressed, keeled, ciliate on margins; ligule a shortly ciliate rim. Racemes 6–10 × 0.4–0.6 mm, straw coloured, pale green or purple, solitary, cylindric, rachis angular, smooth. Involucels usually 2–3-flowered, rounded at base, sub sessile bristles thick, connate into a cup, the outer 2.5 mm long, glabrous, few or absent, the inner 3 mm long, glabrous or antrorsely scabrid. Spikelets in a cluster 2–3, 4 mm long, sessile, ovate, acute. Glumes 4, ovate, obtuse, hyaline, 1 nerved; outer invol. glume 2.5 mm long; inner invol. glume, 4 mm long, 5 nerved; lower floral barren or male, as long as upper invol. glume, 5–7 nerved, ovate, apiculate, paleate; palea 3 mm long, oblong, obtuse; upper floral glume hermaphrodite, as long as the lower, ovate, obtuse.

*Flowers* : August onwards.

*Occurrence* : Collected from Jilla Garden, Gondal Road, along river bed, Rajkot ; on rocky places of heavily grazed grassland, Dhunvan vidi ; Dwarka, near station.

*Uses* : Fodder grass (WI)

#### CHIONACHNE R. Br.

**Chionachne koenigii** (Spreng.) Thw. Enum. 357. 1864 ; Santapau, Pl. Saur. 874. 1953 ; Bor, 262. 1960 ; Santapau & Jan. 53. 1967. *Coix koenigii* Spreng. Syst. 1 : 228. 1825. *Polytoca barbata* Stapf in FBI 7 : 102. 1896 ; Cooke 3 : 519.

Roots annual. Culms erect and near the top, bowing a little, ramous, jointed, smooth, 90–180 cm high; joints sometimes bearded. Leaves sheathing from 60–90 cm long, narrow keeled; margins armed with small prickles, on the upper side sometimes a few, sometimes numerous, stiff, white hairs, mouths of the sheaths slightly bearded. Spikes numerous, stiff, white hairs, mouths of the sheaths slightly bearded. Spikes numerous, pedicelled, terminal, and from the exterior axils, forming altogether a large linear panicle, collected in fascicles of from two to six on a common peduncle, and embraced by a common spathe. Pedicels compressed, jointed near the top and there a partial spathe, there insertions are intermixed with lanceolate, chaffy scales. Male flowers in pairs, one a little above the other in a second spike above the female. Calyx two-

flowered ; valvelet obliquely oblong, hairy on the outside. Corol, glume awnless. Female flowers solitary, below the male. Calyx or involucre, consisting of one oval, very hard, glossy valve, which embraces most completely the corol, its margins are double, not united. Corol four valved, the interior two long and somewhat fleshy.

*Flowers* : August onwards.

*Occurrence* : Recorded from Joupur vidi, Sadgi vidi, Junagadh and Pipartoda, near Jamnagar. E. Blatter reported it from Junagadh (Blatter 3784).

*Uses* : It is considered to be a poor fodder because of the stiff hairs on sheaths and leaves. The stony fruits, which resemble those of *Coix lachryma-jobi*, are used as rosary beads. (WI)

### CHLORIS Sw.

Rachilla product beyond the flowering glume and bearing  
1 awn

*dolichostachya*

Rachilla produced beyond the flowering glume and bearing  
1 - 4 reduced empty glumes :

Spikes 2 - 10. Lower flowering glume bearded at the base  
and on the margins above the middle :

Rachilla bearing 1 - 2 awned, tubular or inflated glumes :

Upper involucral glume awned *virgata*

Upper involucral glume awnless *barbata*

Rachilla bearing 3 - 4 empty glumes, spikelets 4-awned  
altogether *montana*

Spikes 5 - 18 *quinquesetica*

**Chloris barbata** Sw. Fl. Ind. Occ. 1 : 200. 1797 ; FBI 7 : 292 ; Cooke 3 : 557 ; Indraji 707. 1910 ; Santapau, Pl. Saur. 875. 1953 ; Bor, 465. 1960 ; Santapau & Jan. 53. 1967.

Perennial, stem 30 - 90 cm, stout erect from a geniculate or from a creeping proliferously branched base, simple or branching above, nodes with often large tufts of leaves having compressed equitant sheaths. Leaves 15 - 45 cm long, flat ; mouth of sheaths ciliate ; ligule obscure. Spikes 1.2 - 10 cm, suberect, strict or flexuous. Spikelets 0.15 - 0.4 cm,

green or red - purple ; glume first and second acuminate, secund much the longest ; third ovate, more or less densely bearded above the middle and dorsally, tip acute or notched ; awn 0.6 - 0.8 cm, third cuneiform, at length globose, ciliate ; fourth much smaller, globose, awned.

*Local name* : Mindadiyu Ghas.

*Flowers* : November.

*Occurrence* : Recorded from Jodiya Port, Dhunvao, Rozi near Jam - nagar and Rajkot Jilla Park.

*Uses* : It is a good fodder before flowering. Cattle do not like it in later stages. It is not considered useful for silage or for hay, since the loss in weight when dried is considerable. (WI)

***Chloris dolichostachya*** Lagasca, Gen. et Spec. Pl. 5. 1816 ; Bor, 466. 1960 ; Santapau & Jan. 53. 1967. *Chloris incompleta* Roth, Nov. Pl. Sp. 60. 1827 ; Cooke 3 : 556.

Culms near the base procumbent, but when supported by bushes erect and often from 120 - 150 cm high. Leaves upperside somewhat hairy ; mouths of the sheaths bearded. Spikes four to five, digitate, secund, spreading, filiform from 15 - 22.5 cm long, hairy at the base. Rachis three-sided. Flowers in two rows, sessile, awned. Calyx one - flowered ; glumes unequal, the interior being three or four times longer than the exterior, and short awned. Corol, valves unequal, the largest has a long awn issuing just below its apex on the outside. Corpuscle, or neuter floret pedicelled, and awned.

*Flowers* : February.

*Occurrence* : Recorded from Sasan, Iran river up stream, gregarious.

*Uses* : It is considered to be a good fodder grass before flowering. (WI)

***Chloris montana*** Roxb. Fl. Ind. 1 : 331. 1820 ; FBI 7 : 292 ; Bor, 466. 1960 ; Santapau & Jan. 53. 1967.

This species of *Chloris* differ from *C. barbata* in the following respects — (1) The spikes four to six in number united into a common flower bearing rachis near the base. (2) The neuter floret has a third awned valve and the awns are all straw coloured.

*Flowers* : August.

*Occurrence* : Collected from Sasangir in Gir Forest.

**Chloris quinquesetica** Bhide in J. Proc. As. Soc. Beng. n.s. 8, 311. 1912 ; Bor, 466. 1960 ; Santapau & Jan. 53. 1967.

A glabrous, perennial grass, creeping and rooting at the lower nodes and forming small tufts of leaves and an erect flowering stem 60 cm high, nodes glabrous. Leaves 2-15 cm long and 3-5 mm broad, sparsely, delicately long ciliate when young, ultimately glabrous lanceolate, acuminate, truncate at the base, margins minutely scabrid, ligule a narrow fimbriate membrane. Spikes 5-18, 2.5-5 cm long, crowded in a very short racemose fascicle the branches of which are often decurrent into the peduncle. Peduncle below the spikes and the rhachises hairy. Spikelets 8 mm long, including the awns. Glumes 7 : I and II empty, III flowering, awned, paleate, IV-VII barren, epaleate. Lower invol. glume 1.5 mm long, elliptic lanceolate, membranous, 1-nerved, oblique, upper 1½ times as long as the lower, elliptic oblong, mucronate, 1-nerved. Lower floral glume without the awn as long as the upper, elliptic obovate, cuneate, 3-nerved. Palea as long as the glume but narrower, hairy, 2-fid at the apex, keels minutely ciliate. Stamens 3, styles 2, stigmas plumose. Grain plano convex or trigonous. Lodicules minute.

*Flowers* : May.

*Occurrence* : Recorded from Rajkot, river bed.

**Chloris virgata** Sw. Fl. Ind. Occ. 1 : 203. 1797 ; FBI 7 : 291 : Santapau, Pl. Saur. 877. 1953 ; Bor, 468. 1960 ; Santapau & Jan. 53. 1967.

Stem rather stout, flattened, 20-30 cm high, usually leafy, decumbent and much proliferously branched below. Leaves rather broad, flat acute ; 5-30 cm × 3 mm upper sheaths more or less inflated margins thin and membranous. Ligule a thin narrow, membranous ridge. Spikes 6-15, erect crowded at the end of the peduncle, 2.5-6 cm long, rachis fine, angular. Spikelets about 2.5 mm long, 2-awned, short stalked, consisting of 4 glumes. Lower invol. - glume slender, subulate, with the keel globerulous, 1-nerved, upper invol. glume oblong lanceolate, 2-fid at the apex, glabrous. Lower floral glume oblong ovate, cymbiform and rather deep, bifid at the apex, and awned in the sinus, awn about 6 mm long, bearded at base. Palea much narrower and rather shorter often reduplicate, toothed or notched. Rhachilla somewhat adnate to lower floral glume. Grain fusiform, sometimes slightly curved, pericarp loose.

*Flowers* : August to October.

*Occurrence* : Recorded from Rajkumar College Compound, Gondal Road, Rajkot, Sasan along river ; Dhunvao vidi and Cattle Farm, Juna gadh, Targhari. Abundant in heavily grazed grassland.

*Uses* : It is considered to be a nutritious fodder. (WI)

### CHRYSTOPOGON Trin.

Stems reaching 300 cm high ; leaves up to 45 cm long ; callus bearded on one side only

*fulvus*

Stems reaching 45 cm high ; leaves up to 10 cm long ; callus, villous all over

*aucherri*

Stems reaching 60 - 90 cm high ; leaves up to 25 cm long ; callus bearded at the very base only

*polyphyllus*

***Chrysopogon aucheri* (Boiss.) Stapf in Kew Bull. 21. 1907 ; Santapau, Pl. Saur. 878. 1953 ; Bor, 116. 1960 ; Santapau & Jan. 54. 1967. *Andropogon aucheri* Boiss. Diagn. Ser. 1, 5 : 77. 1844 ; FBI 7 : 195 ; Cooke 3 : 505.**

Stem 15 - 45 cm, simple or sparingly branched, base - thickened, leafy. Leaves 5 - 10 × 0.15 - 0.4 cm, sometimes undulate, acute or acuminate, pale green, often ciliate towards the base, margins scaberulous ; sheaths very pale. Panicle 5 - 7.5 cm, erect, long peduncled, rachis scabrid. Spikes usually crowded, rarely binate on a branch. Sessile spikelets ; callus obtuse ; glume first compressed with sometimes long terminal bristles ; second awned or not, awn hirsutely ciliate ; third hyaline, oblong, obtuse, ciliate, fourth the long, hyaline, 3 - nerved. Pedicellate spikelets 0.5 - 0.6 cm, pedicels silkily villous from base to apex ; glume first sparsely ciliate, dorsally, and with very long cilia on the keels towards the tip, awn pale hirsute.

*Flowers* : August to October.

*Occurrence* : Recorded from Rajkot and Rozi near Jamnagar, Sadgi vidi.

***Chrysopogon fulvus* (Spreng.) Chiov. Fl. Somalia 1 : 327. 1929 ; Bor, 116. 1960 ; Santapau & Jan. 54. 1967. *Pollinia fulva* Spreng. Pugill. 2 : 10. 1815. *Andropogon monticola* Schult. ex Roem. & Schult. Syst. Veg. 2. Mant. 665. 1827 ; FBI 7 : 192 ; Cooke 3 : 505.**

Perennial ; stems densely tufted, 30 - 120 cm high, usually slender, erect, simple or branched, leafy chiefly at the base, nodes glabrous. Leaves 5 - 45 × 0.3 - 0.6 cm, erect, linear, acute, flat, rigid, glaucous,

smooth or scaberulous ; sheaths, the upper terete, the lower compressed ; ligule a very short ciliate membrane. Panicle 5-12.5 cm long, ovate or oblong, rhachis slender, smooth branches 2.5-5 cm long, whorled, capillary, spreading at length, erect, racemes reduced to a single sessile female and 2 pedicellate spikelets. Sessile spikelets 0.6 cm long ; callus about 0.09 cm long, bearded on one side with rufous hairs. Glumes 4 ; lower invol. glume 0.5 cm long, linear, 2-toothed at the apex, 4-nerved ; upper invol. glume 0.6 cm long, ovate lanceolate, concave, ciliate on the keel with rufous hairs with an awn, 0.8 cm long, 3-nerved, lower floral glume oblong, obtuse, ciliate, upper floral glume narrowly linear, hyaline ; awn 1.8 cm long. Pedicellate spikelets as long as the sessile ; pedicels 0.2 cm long, ciliate, flattened ; lower invol. glume lanceolate, acute or awned, 7-nerved ; upper invol. glume lanceolate, acuminate ; floral glumes smaller, oblong, hyaline, ciliate.

*Flowers* : October.

*Occurrence* : Recorded from Rajkot.

**Chrysopogon polyphyllus** (Hack.) Blatt. & McC. in J. Bomb. Nat. Hist. Soc. 32 : 416. 1928 ; Santapau, Pl. Saur. 879. 1953 ; Bor, 178. 1960 ; Santapau & Jan. 54. 1967. *Andropogon polyphyllus* Hack. ex Hook. f. Fl. Brit. Ind. 7 : 194. 1896.

Stem simple or fastigiately branched quite glabrous 60-90 cm with leaves many 15-25 × 0.2-0.4 cm long narrow rigid acuminate flat pale glaucous-green glabrous coriaceous, sheath terete ; panicle oblong subcund densefid, very pale, branches many short in many closely approximate whorls smooth sessile spikeles 0.4 cm, callus long obtuse bearded at the very base only with long fulvous hairs, glume first obtuse glabrous, keel ciliate towards the tip, second not awned, keel glabrous or ciliate, awn of fourth 0.3-0.8 cm, nearly straight pale, pedicelled spikelets narrowly lanceolate acuminate glabrous 7-nerved eciliate not awned, pedicels naked villous at the tip only.

*Flowers* : October.

*Occurrence* : Bhide reported it from Porbandar.

#### Coix Linn.

**Coix lacryma-jobi** Linn. Sp. Pl. 972. 1753 ; FBI 7 : 100 ; Cooke 3 : 517 ; Santapau, Pl. Saur. 880. 1953 ; Bor, 264. 1960 ; Santapau & Jan. 54. 1964. **Coix lachryma** Linn. Syst. Nat. ed. 10, 1261. 1759 ; Indraji 699. 1910.

Stem 90 - 150 cm high or more, stout, rooting at the lower nodes; internodes smooth, polished. Leaves 10 - 45 × 2.5 - 5 cm, narrowed from a broad cordate base to an acuminate tip, smooth on both surfaces, with slender nerves and spinulosely serrate margins; midrib stout, sheaths long, smooth, rachis within the bract, slender, above the bract stout notched at the nodes. Male spikelets 0.9 - 1.2 cm long, subsecund, imbricating. Lower invol. glume 0.9 cm long, elliptic lanceolate, acute, concave, many nerved with inflexed margins and with a narrow wing; upper invol. glume similar to the lower but not winged, 5 - 9 - nerved; lower floral glume oblong lanceolate, hyaline, paleate, triandrous, faintly 3 - 5-nerved; upper floral glume similar, paleate, triandrous or empty. Anthers 0.5 cm long, orange. Fruit from broadly ovoid to globose, bluish - grey, 0.6 - 0.9 cm long, smooth, polished.

*Local name* : Kasi, Kasai.

*Flowers* : October.

*Occurrence* : Collected from Shirvan, Hirasar, occasional, tall grass in stream beds and along stream banks.

*Uses* : The fruits are used in medicine either as tincture or as decoction, for catarrhal affection of the air passage and inflammation of the urinary passage. The fruits of the wild varieties are used in making necklaces, rosaries, bead curtains etc. The foliage may be used as fodder for cattle, horses and elephants. It can be turned into ensilage. The mature straw and leaves may be used for thatch. (WI)

#### CRYPSIS Ait.

*Crypsis schoenoides* (Linn.) Lamk. Tab. Encycl. Meth. Bot. 1 : 166, t. 42. 1791 ; Bor, 622. 1960 ; Raizada, Ind. For. 11, 57 ; Santapau & Jan. 54. 1967. *Phleum schoenoides* Linn. Sp. Pl. ed. 1, 60. 1753. *Heleochoea schoenoides* (Linn.) Host., Icon. Gram. Austr. 1 : 23, t. 30. 1801 ; FBI 7 : 235 ; Cooke 3 : 532.

Glaucous. Stems many, 2.5 - 25 cm, prostrate with ascending tips, leafy rigid. Leaves 2.5 - 5 cm, narrowly lanceolate, acuminate; sheaths deeply furrowed, margins glabrous or ciliate; ligule a short ring of hairs. Panicle 1.2 - 5 cm × 0.6 - 0.8 cm diam., green. Spikelets 0.3 cm; glume all 1 - nerved, keels ciliate; first and second narrowly lanceolate, acuminate; first shortest; third ovate lanceolate, acuminate; palea oblong, truncate, nerveless. Lodicules 2, oblique, cuneate. Stamens 2 - 3, filament very long, anthers small.

*Flowers* : December.

*Occurrence* : Raizada reported it from Okhamandal.

**CYMBOPOGON** Spreng.

Most of the grasses of this genus are aromatic and yield essential oils of commercial importance. The identification and classification of the species are difficult, not only because they hybridise freely and produce numerous transition forms, but also due to an irregularity in flowering, as they often do not flower at all.

**Blades** long, hard, rough-edged throughout, filiform to linear ; lower involucral glume of sessile spikelet flat or concave between the keels :

**Raceme-joint** villous all over, hairs long, more or less concealing the sessile spikelets, awn usually a straight, very short bristle :

**Basal leaf-sheaths** in dense tufts, tightly clasping, thickened below

*schoenanthus*

**Basal leaf-sheaths** ultimately loosened and curled

*parkeri*

**Raceme-joints** bearded along the sides, but hairs not concealing the sessile spikelets

*citratus*

**Blades** flat, 5 - 30 mm wide, rounded to sub-cordate and stem-clasping at the base of a soft texture; lower involucral glume of sessile spikelet with a narrow groove from the middle downwards corresponding to a keel inside

*martinii*

**Cymbopogon citratus** (DC.) Stapf in Kew Bull. 1906 : 357. 1906 ; Blatt. & McC. 103 ; FBI 7 : 210 ; Santapau, Pl. Saur. 881. 1953 ; Bor, 126. 1960 ; Santapau & Jan. 54. 1967. *Andropogon citratus* DC. Cat. Hort. Monsp. 78. 1813.

A tall perennial, stout erect culm up to over 1.8 m high, 7 - 8-noded and simple below the panicle. Leaf-blades linear 90 cm long by 16 - 18 mm wide, very firm, glaucous green, glabrous, smooth or more or less rough upwards and long the margins, midrib somewhat stout below, whitish on the upper side ; lateral nerves 4 - 6 on each side. Ligule very short, scarious, rounded or truncate. Sheaths terete. Spatheate panicle decompound to subdecompound, loose 30 to over 60 cm long, nodding ;

internodes 4 to over 6. Spatheoles very narrow, linear lanceolate, 14–18 mm long, acute or finely acuminate. Peduncles 6–10 mm long, glabrous. Racemes 2-nate, 14–25 mm long, pale. Homogamous pair of spikelets 1 at the base of the sessile raceme. Fertile spikelets linear to linear-lanceolate, acutely acuminate, 5–6 mm long, reddish, glabrous, callus short, obtuse, minutely bearded. Invol. glumes subequal, lower subchartaceous, slightly depressed towards the base, keels acute, scaberulous above, intracarinal nerve 0 or 1, short or distinct, upper boat shaped. Lower floral glume hyaline, linear-oblong, sub 2 nerved, slightly shorter than the invol. glumes, upper narrowly linear, acute about 4 mm long, awnless. Anthers 2 mm long. Pedicelled spikelets male or neuter, linear to subulate lanceolate; lower invol. glume 5-nerved, upper 3 nerved; lower floral glume shorter to much shorter than the involucral glumes, hyaline, ciliolate, upper very narrowly linear, nerveless if present at all.

*Local name* : Lilicha.

*Trade name* : West Indian Lemongrass oil.

*Flowers* : October.

*Occurrence* : Recorded from all over Saurashtra. It is a very common grass.

*Uses* : It is chiefly used for flavouring soups and curries. An infusion of the grass is sometimes taken as a refreshing beverage and this use gives it the name Lilicha or green tea. This grass is generally used in the form of an infusion. (WI)

**Cymbopogon martinii (Roxb.) Wats.** in Atkins. GAZET. N.W. PROV. IND. 392. 1882; Santapau, Pl. Saur. 882. 1953; Bor, 129. 1960; Santapau & Jan. 54. 1967. *Andropogon martinii* Roxb. Fl. Ind. 1: 277. 1820. *A. schoenanthus* var. *martinii* Hook. f. in Fl. Brit. Ind. 7: 204. 1896 (excl. Syn. afric.).

Root perennial, with long wiry fibres. Culms erect, from 90–180 cm high, often ramous, smooth, filled with a spongy pith. Leaves very long, tapering to a very fine point, smooth in every part and of a soft, delicate texture. Sheaths shorter than the joints on full grown plants, with a membranaceous stipular process at the mouth. Panicles axillary or terminal, spikelets paired, but with only three joints. Flowers also paired. Rachis jointed and woolly. Calyx one flowered, two valved, base girt with wool. Carol one valved, a long, black, awn occupies the place of the other, which has two small filaments near its base. Nectary two, minute.

*Local name* : Rauns.

*Trade name* : Palmarosa oil (motia), Ginger grass oil (sofia).

*Flowers* : October.

*Occurrence* : Recorded from Sasan high hill, north of village in Gir Forest ; Jamnagar, Junagadh and Paneli-vidi, Morvi.

*Uses* : Palmarosa or motia oil is extensively used in India for adulterating Attar of Roses. It is also used as a base for several perfumes and in cosmetics. Along with sandal wood oil, it is used in ointments for warding off mosquitoes. In medicine, it is used as a remedy for lumbago and stiff joints and in skin diseases. It is said to be cure for baldness. Taken internally, in small doses it serves as a remedy for bilious complaints. Gingergrass oil is chiefly used as a soap perfume. (WI)

*Note* : It has been known for a considerable time that there are two varieties of *Cymbopogon martinii* (Roxb.) Wats. One known as "motia" yields the valuable Palmarosa oil, also known as Rusha oil or East Indian Geranium oil. The other which bears the name "sofia", also yields an oil known as Ginger - grass oil. Burkhill [J.A.S.B.V. (1909) 89-93] says "the leaves of variety sofia make an acute angle with the culm, while those of motia a right or obtuse angle".

***Cymbopogon parkeri* Stapf in Kew Bull. 10. 1929 ; Bor. 131. 1960 ; Santapau & Jan. 54. 1967.**

A tall grass, up to 1.8 m high, with very aromatic roots, densely tufted. Leaves flat, up to 60 cm long and 5 mm broad, narrowly linear, filiform above and ending in a long capillary tip, ligule 0.5 mm long, membranous. Panicles long, narrow, interrupted, with very compressed, short, fascicled branches bearing spathes about 5 cm long and spatheoles 6-18 mm long. Racemes 1.4-1.8 cm long, often 5-jointed. Spikelets 3-4 pairs, green, half hidden by the 5 mm long, villi on the joints and pedicels. Sessile spikelets 5 mm long, lower involucral glume flat or concave between the keels, which are neither winged nor margined, (omitting the ordinary inflexed margins) or sometimes narrowly margined, scabrid or ciliolate, nerves 2-4 or 0 between the keels. Joints of rhachis and pedicels subclavate, with toothed tips. Pedicelled spikelets equal or rather longer than the sessile, narrowly lanceolate, purplish ; lower involucral glume 7-9 nerved.

*Local name* : Gandharu - Ghas.

*Flowers* : September.

*Occurrence* : Recorded from Paneli vidi, Morvi.

**Cymbopogon schoenanthus** (Linn.) Spreng. Pugill. 2 : 15. 1815 ; Santapau, Pl. Saur. 883. 1953 ; Bor, 131. 1960 ; Santapau & Jan. 54. 1967. **Andropogon schoenathus** Linn. Sp. Pl. ed. 1, 1046. 1753 ; FBI 7 : 204 ; Indraji 702. 1910 ; Cooke 3 : 511.

Annual. Stem 90–180 cm, erect. Leaves long, broad or narrow, finely acuminate glaucous or pruinose, smooth or margins scaberulous, base rounded or cordate and amplexicaul ; sheaths glabrous, ligule oblong, scarious. Panicle elongate, 30–60 cm long, dense or lax, compound or decompound, rarely subsimple ; proper spathes as long as the spikes, which are as long as the peduncle or shorter. Spikes unequal, one 3–4 jointed, the other 4–6-jointed, joints and pedicels narrowly clavate, half as long as the sessile spikelet, tip dilated and toothed, margins villosely ciliate with long hairs. Sessile spikelets 0.3–0.4 cm, callus obtuse shortly bearded ; glume first tip obtuse often irregularly toothed, dorsally 2-nerved or nerveless ; second lanceolate, 3-nerved, ciliate, third oblong, ciliate ; fourth small, narrow, 2-fid, lobes subulate, glabrous, awn slender, twice as long as the glume or longer. Pedicelled spikelets oblong-lanceolate, acute or obtuse ; glume first glabrous or puberulous, keels hardly ciliate ; second ovate acute 3-nerved ; third oblong, ciliate, 2-nerved.

*Local name* : Rush, Rosado, Rush ghas, Ronsh ghas.

*Flowers* : September.

*Occurrence* : Very common on Barda Hills ; particularly in Adityana forest.

*Uses* : This grass is acrid, bitter and pungent ; useful in fevers, bronchitis, pains, leprosy, heart and throat troubles, and epileptic fits in children, decoction of the plant is given as a febrifuge. The oil is considered a powerful stimulant. When applied externally, it is used as a liniment in chronic rheumatism and neuralgia and is believed to have the property of curing baldness. [Caius in JBNHS 38(3) : 554 1936]

#### CYNODON Rich.

**Cynodon dactylon** (Linn.) Pers. Syn. Pl. 1 : 85. 1805 ; FBI 7 : 288. Cooke 3 : 554 ; Indraji 706. 1910 ; Santapau, Pl. Saur. 884. 1953 ; Bor, 469. 1960 ; Santapau & Jan. 54. 1967. **Panicum dactylon** Linn. Sp. Pl. 58. 1753.

Stem perennial, prostrate, often creeping and rooting to a great extent, the flowering branches shortly ascending. Leaves short, rigid,

distichous. Spikes 2-5, sometimes 6-8, digitate at the end of long, slender, often purplish peduncle 2.5-3.7 cm long. Spikelets linear, smooth, sessile. Lower glumes narrow, acute, pointed persistent, keeled, nearly equal, less than one line long. Flowering glume rather longer and broader, boat-shaped, the keel minutely ciliate, hardening when in fruit and smooth on the sides.

*Local name* : Dhro, Dhrokhad.

*Flowers* : October.

*Occurrence* : Recorded from Rajkot near ditch ; Dwarka ; Gondal Road, Rajkot ; Jilla Park, subscandent, among iron pipes, erect above pipe, abundant ; Rajkot river bed and Pradumna Park.

*Uses* : A decoction of the plant is diuretic, and considered useful in dropsy and anasarca. The expressed juice is astringent, and is applied to bleeding cuts and wounds. The rhizomes and roots are used as adulterants and substitutes for couch grass, *Agropyron repens* Beauv. rhizomes used in genito urinary disorders. It is considered to be a good soil binder and is one of the plants recommended for checking soil erosion. (WI)

#### DACTYLOCTENIUM Willd.

Annual, grain subglobose	<i>aegyptium</i>
Perennial ; grain ovoid	<i>sindicum</i>

**Dactyloctenium aegyptium** (Linn.) Beauv. Agrost. Expl. 1 : 15. 1812 ; Santapau, Pl. Saur. 885. 1953 ; Bor, 489, f. 54. 1960 ; Santapau & Jan. 54. 1967. *Cynosurus aegyptius* Linn. Sp. Pl. 72. 1753. *Eleusine aegyptica* Desf. Fl. Atlant. 1 : 85. 1798 ; FBI 7 : 295 ; Cooke 3 : 560 ; Indraji 708. 1910.

Stem erect, 15-45 cm high, or prostrate spreading and rooting, often proliferously branched at the thickened nodes. Leaves distichous, acute or acuminate, ciliate ; sheaths compressed ; ligule 0. Spikes solitary or 2.5, 1.2-2.5 cm long, all terminal stout, rachis mucronate at the tip by the thickened excurrent midrib. Spikelets densely crowded 0.11-0.15 cm long, 3-4 fid, glabrous, glumes almost pungent. First ovate, acute ; second broadly ovate, obliquely cuspidately awned, as are the following, cups recurved ; palea very broad, 2 fid, keels hispid. Grain globose, very rough, pericarp evanescent. (Indraji 708. 1910)

*Flowers* : September onwards.

*Occurrence* : Recorded from Cattle Farm, Junagadh ; Jodiya Port ; Rajkot river bed ; Rajkumar College compound, Gondal Road, Rajkot ; Rozi near Jamnagar ; Paneli vidi, Morvi ; Junagadh, Sasan, and from Veraval Somnath.

*Uses* : The seeds of the grass are eaten in times of scarcity. They are ground into flour and made into cakes. They have an unpleasant taste and are reported to cause internal disorders. The grains are also used medicinally. (WI)

**Dactyloctenium sindicum** Boiss. Diagn. Ser. 2, 4 : 131. 1859 ; Bor, 489. 1960 ; Santapau & Jan. 54. 1967. *Eleusine aristata* Ehr. Ex Boiss. Fl. Orient. 5 : 557. 1881 ; FBI 7 : 296 ; Cooke 3 : 561 ; Indraji 708. 1910.

Stem smooth, stiff, widely spreading, rooting at the distant thickened woody leafy nodes, and sending up very slender branches 10–30 cm long, internodes 5–10 cm. Leaves 2.5–3.7 cm, acuminate or pungent, margins ciliate with long tubercle based hairs, basal sheaths hairy ; ligule obsolete. Spikes 3 or more, 0.6–1.2 cm long, spreading or decurved, ciliate or bearded at the base, midrib of rachis excurrent. Spikelets short, 3–4 fid ; rachilla glabrous ; glume first and second coriaceous, 1-nerved, margins membranous, first glume small, broadly oblong, apiculate ; second very broad, sometimes didymous when spread open ; awn stout, subulate, incurved or recurved ; third and following longer than second, very broadly ovate, subacute, glabrous ; palea broad, keels scaberulous. Grain ovoid, rugose.

*Flowers* : October.

*Occurrence* : Recorded from Ranjit Sagar, Jamnagar ; Okha sea shore ; Mithapur Talao ; and Dwarka neighbourhood of station, growing on sands, rare. Stems just floating, abundant locally.

*Uses* : It is a good fodder grass. (Indraji 708. 1910)

#### DENDROCALAMUS Nees

**Dendrocalamus strictus** (Roxb.) Nees, Linnaea 9 : 476. 1834 ; FBI 7 : 404 ; Cooke 3 : 572, Indraji 710. 1910 ; Santapau, Pl. Saur. 887. 1953 ; Santapau & Jan. 54. 1967 ; Stewart in Fl. W. Pak. 179. 1972. *Bambos stricta* Roxb. Coroman. Pl. 1 : 58, t. 80. 1795.

Stem 7-17 m × 2.5-7.5 cm diam., hollow in moist climates, solid in dry, young glaucous green, old yellowish, nodes swollen, lower often rooting, internodes, 30-45 cm, upper branches decurved. Stem sheaths variable, lower 7.5-30 cm glabrous or strigose with yellow brown hairs, striate, top rounded, ciliate, slightly auricled, blade triangular, hairy especially within, ligule narrow. Leaves deciduous, narrowed from the rounded petioled base to the twisted tip, midrib prominent, nerves 3-6 pairs with interposed pellucid glands, sheath striate hairy, callus prominent, auricle short ciliate with flexuous deciduous hairs; ligule narrow, serrate. Panicle large, heads dense, 2.5-3.7 cm, much smaller, rachis - smooth, internodes 3.7-5 cm. Spikelets usually hairy. Ovary stipitate, turbinate, style long; stigma simple feathery. Grain broadly ovoid, shining beaked, hairy above.

*Local name* : Vans, Nakor vans, Nar vans.

*Flowers* : August.

*Occurrence* : Recorded from Girnar forest roadside and Girnar Hill ; Junagadh.

*Uses* : A decoction of the leaves is given to aid parturition ; the juice in two ounce doses taken frequently is used as an abortifacient. [Caius in JBNHS 38(3) : 558. 1936]

#### DESMOSTACHYA Stapf

**Desmostachya bipinnata** (Linn.) Stapf in Dyer. Fl. Cap. 7 : 632. 1900 ; Santapau, Pl. Saur. 888. 1953 ; Bor, 491. 1960 ; Santapau & Jan. 54. 1967. *Briza bipinnata* Linn. Sp. Pl. ed. 2 : 104. 1762. *Eragrostis cynosuroides* (Retz.) P. Beauv. Ess. Agrost. 162. 1812 ; FBI 7 : 324 ; Cooke 3 : 550. *Poa cynosuroides* Retz. Obs. Bot. 4, 20. 1786.

Perennial, tall ; rootstock stout, creeping ; stolons very stout clothed with shining sheaths ; stems 30-90 cm, tufted, smooth, erect, stout. Leaves many, basal, fascicled, very long, rigid long acuminate tips filiform, margins hispid ; mouth of sheath with long hairs ; ligule 0. Panicle 15-45 cm by 2.5 rarely 5 cm broad, strict, erect, narrowly pyramidal or columnar, often interrupted ; rachis puberulous, branches 0.6-2.5 cm, very many crowded ; branchlets rigid, glabrous or hispidulous, spreading. Spikelets unilateral, 2 seriate and crowded, deflexed, pale brown, rather shining, internodes of rachilla very short ; glume first 0.05 cm : second about 0.10 cm, obtuse ; floral glume 0.15-0.2 cm, coriaceous, palea 0.5-0.4 cm shorter than its glume, rather coriaceous, keels minutely scabrid.

**Stamens** 3, anthers 0.1 cm. Grain less than 0.06 cm, obliquely ovoid, laterally compressed, obscurely trigonous.

*Local name* : Darbh, Kusha.

*Flowers* : December.

*Occurrence* : Recorded from Chotila Hill ; Dhunvao - vidi and Paneli vidi.

*Uses* : The grass has been tried as a raw material for paper manufacture. It gives a pulp, difficult to bleach. The fibre is weak and of short length. The grass may be used for thatching and rope making. The culms are considered diuretic and used in dysentery and menorrhagia. It is also used in Hindu religious ceremonies. (WI)

#### DICHANTHIUM Willemet.

Pedicels 1/3 as long as the sessile spikelets ; nodes of stem glabrous, ligule a short ciliate small membrane	<i>caricosum</i>
Pedicels 1/2 as long as the sessile spikelets ; nodes of stem bearded ; ligule large, oblong, obtuse, membranous	<i>annulatum</i>

**Dichanthium annulatum** (Forssk.) Stapf in Prain, Fl. Trop. Afr. 9 : 178. 1917 ; Santapau, Pl. Saur. 889. 1953 ; Bor, 133. 1960 ; Santapau & Jan. 54. 1967. *Andropogon annulatus* Forsk. Fl. Aegypt. Arab. 173. 1775 ; Hack. Mon. 570 ; FBI 7 : 196 ; Cooke 3 : 508 ; Indraji 703. 1910.

Stems usually woody at the base with strong wiry roots and tufted leaves, then geniculately ascending 15-90 cm, nodes bearded or not. Leaves 7.5-30 cm, rigid, glaucous, glabrous or hairy above with tubercle based hairs, margins scabrid ; sheath bearded at the tip ; ligule oblong, obtuse. Spikes 2.5-6.2 cm, straight or flexuous, usually inclined, pinkish or nearly white, joints and pedicels 1/2 the spikelets, slender, rigid ; margins shortly ciliate. Spikelets very variable in size, closely imbricating, callus shortly bearded ; glume first thin, nerves strong or faint, not reaching the tip ; second lanceolate, 3 nerved, glabrous or ciliolate, third narrow glabrous ; fourth awn 1.8-2.5 cm, column scabrid. Pedicelled spikelets about as the sessile, glume first obtuse or acute, 7-11 nerved, keels bristly second narrower, 3 nerved, third ciliate, fourth minute or 0.

*Flowers* : October.

*Occurrence* : Collected from Okha, in open fields, not abundant.

**Uses :** It is highly esteemed among the wild fodder grasses of India. Cattle eat the grass eagerly both when it is young and in flower. It is usually fed green. (WI)

**Dichanthium caricosum** (Linn.) A. Camus in Bull. Mus. Hist. Nat. Paris 27 : 549. 1921 ; Bor, 134. 1960 ; Santapau & Jan. 54. 1967. *Andropogon caricosus* Linn. Sp. Pl. ed. 2, 1480. 1763 ; FBI 7 : 196 ; Cooke 3 : 507.

Stem 30–60 cm, erect or ascending from a creeping base, often much branched, stout or slender, even capillary, grooved on one side, leaf; nodes bearded or not. Leaves 15–20 × 0.15–0.6 cm, finely acuminate, glabrous or ciliate, margins scabrous, sheaths smooth, ligule membranous. Spikes inclined, often flexuous, 0.3–0.6 cm broad, silvery, lower sometimes stipitate; joints and pedicels 1/3 the spikelet ciliate on one margin, callus short, broad. Sessile spikelets 5–7 nerved, margins glume first broadly incurved below, narrowly above; second narrow, 3-nerved; apiculate, margins ciliate, keel scaberulous; third ovate oblong, hyaline, nerveless, fourth awn 1.8–2.5 cm, column scabrid. Pedicelled spikelets smaller than the sessile; glume first broadly oblong, silkily ciliate, second ovate lanceolate, acute, ciliate.

*Local name :* Darbha.

*Flowers :* December.

*Occurrence :* Recorded from Dhunvao vidi, grassland; Jhonpur-vidi and Beyt (T.A. Rao 529).

**Uses :** Used as a fodder grass, locally it is used in religious ceremony.

#### DIGITARIA Heist, ex Fabr.

Racemes espiculate at the base, very long, numerous, pannately hairy at the base, straight, stiff, with distant pairs of spikelets

*pennata*

Racemes not as above, not pannately hairy, variously placed along a common axis if present, or umbellate :

Hairs on the spikelets clavate, with globular thickening

*abrudens*

Hairs on the spikelets, if any, without a globular thickening, not clavate :

Upper glume not more than three quarters the length of  
the spikelets

*microbachne*

Upper glume well developed, mostly one-half to three-quarters, at least one-third, the length of the spikelets :

Nerves of the lower lemma smooth, without minute triangular spines on nervee :

Spikelets without spreading hairs *ciliaris*

Spikelets with spreading hairs :

Hairs of one kind, no tubercle-based bristles present subsp. *marginata* var.  
*criniformis*

Tubercle-based bristles present subsp. *chrysoblephera*

Nerves of the lower lemma with minute triangular spine  
on the upper part of the nerves subsp. *sanguinalis*

**Digitaria abludens** (Roemer & Schultes) Veldkamp., Blumea 21 : 53. 1973 ; C. Saldanha & Nicolson. Fl. Hassan Dist. 723. 1976. *Panicum abludens* Roemer & Schultes. Syst. Veg. 2 : 457. 1817. *Paspalum granulare* Trin. ex Sprengel, Neue Entd. 2 : 47. 1821. *Digitaria granularis* (Spreng.) Henrard, Monogr. Digitaria 302. 1950 ; Bor, 301. 1960 ; Santapau & Jan. 54. 1967. *Paspalum pedicellare* Trin. (ex Steudel. Nom. Bot. ed. 2, 2 : 272. 1841, nom.) ex J. Hooker, Fl. Brit. India 7 : 19. 1896. *Digitaria pedicellaris* (J. Hooker) Prain, Beng. Plants 1182. 1903 ; Cooke 3 : 458.

Stems tufted, 15-45 cm long, leafy. Leaves 5-15 × 0.25-0.4 cm, linear-lanceolate, finely acuminate. Spikes 3-10, alternate, racemosely arranged on a very slender peduncle, suberect or spreading, 2.5-10 cm long, rachis capillary, trigonous; pedicels 0.10-0.3 cm long, those of the upper spikelet longer than the spikelet. Spikelets 2-5-nate, 0.12-0.15 cm long, elliptic, acute. Lower invol. glume obsolete; upper invol. glume elliptic, acute, very slightly hairy, 5-nerved, thinly membranous (almost hyalline), lower floral glume similar, upper floral glume elliptic, acuminate, thickly membranous, pale.

*Flowers* : October.

*Occurrence* : Recorded on the authority of H. Santapau and Janardhanan.

**Digitaria ciliaris** (Retz.) Koel., Descr. Gram. 27. 1802 ; Bor in Townsend et al. Fl. Iraq. 9 : 478. 1968 ; Blake, Proc. Roy. Soc. Queens-

land ser. 2, 81 : 14. 1969. *Panicum ciliare* Retz., Obs. Bot. 4 : 16. 1786 ; FBI 7 : 13 ; Cooke 3 : 458. *P. ascendens* H.B.K., Nov. Gen. Sp. 1 : 97. 1816. *Digitaria ascendens* (H.B.K.) Henrard in Blumea 1 : 92. 1934 ; Santapau, Pl. Saur. 890. 1953 ; Bor, 298. 1960 ; Santapau & Jan. 54. 1967.

Annual or perennial ; culms tufted, geniculately ascending or prostrate, often rooting at the lower nodes and much branched up to 60 cm tall, few to many noded, the peduncle long exserted ; sheaths loose and thin, glabrous or more or less hirsute by tubercle based, ligule truncate, glabrous up to 1.5 mm long, blades lanceolate to linear, from a slightly contracted or rounded base, flat, up to 15 cm long, 5-10 mm wide, flaccid, glabrous or hairy at the mouth. Racemes 4-9, rarely more, sessile, subdigitate ; solitary or binate or sub-whorled along a short common axis, erect or spreading, 5-15 cm long, the racemes finely puberulous at their insertion, rachis triquetrous, spikelets appressed, not or slightly imbricate, lanceolate elliptic, mostly 3-3½ mm long, lower glume distinct, an ovate, obtuse, upper one ovate lanceolate, acute, half the length of the spikelet often 2/3 to 3/4 its length, 3-nerved, with fine line of hairs between the hairs and along the margins ; sterile lemma gradually narrowed upwards, acute with 7 quite smooth nerves, the lateral ones rather distant from the mid nerve and congested along the submarginal flexure, fruit as long as the spikelet or a little shorter, oblong lanceolate acutely acuminate, yellowish or brown purplish when ripe.

*Flowers* : October.

*Occurrence* : Collected from Jilla Garden, Rajkot, Sadgi vidi, Junagadh ; Rozi Port near Jamnagar ; Rajkot.

*Uses* : It is used as a fodder grass. (WI)

**Digitaria ciliaris** (Retz.) Koeler, subsp. **chrysoblephera** (Fig. et de Not.) Henr., Monogr. Digitaria 998. 1950 ; Bor, 299. 1960.

Spikelets, at least the pedicelled ones or sometimes both of each pair with a sterile lemma, provided along the lateral nerves and the margins with soft hairs, intermixed with yellowish, stiff, smooth and shining bristles, from tubercles, spreading at maturity, spikelet somewhat longer, mostly 3½ mm long, second glume about 2½ mm long, fruit often very distinctly shorter than the spikelet.

*Flowers* : October.

*Occurrence* : New Jilla Garden, Rajkot ; Sasangir ; Cattle Farm, Junagadh.

**Digitaria ciliaris** (Retz.) Koeler, subsp. **marginata** Henr. var. **criniformis** Henr., Monogr. Digitaria 998. 1950.

Spikelets without stiff, tubercle based bristles along the margins of the sterile lemma, plants otherwise agreeing with the description of the typical species.

subsp. *marginata*

This is a variety with much longer pubescence along the margins of glume third, the hairs often spreading at maturity.

var. *criniformis*

*Flowers* : October.

*Occurrence* : Collected from Rozi near Jamnagar in August.

**Digitaria microbachne** (Presl) Henr. in Meded Rijke Herb. n. 16 : 13. 1930 ; Bor, 302. 1960 ; Santapau & Jan. 54. 1967. **Panicum microbachne** J. S. Presl ex C.B. Presl, Rel. Haenk. 1 : 298. 1830.

Sterile lemma 5 or sub 7 nerved, the lateral pairs of nerves very close to the margins, upper glume a nerveless, obtuse, minutely ciliate membrane, scarcely  $\frac{1}{10}$  the length of the spikelet. Basal parts unknown, culms ascending, geniculate or decumbent at the base, rooting at the lower nodes, many - noded, up to 1 m tall, sheaths hirsute by spreading tubercle based hairs, nodes glabrous, blades up to 20 cm long, 8-9 mm wide with long, sparse hairs on both surfaces. Panicle 20 cm long, cuneate racemes more than 15, along a common about 7 cm long axis, solitary or subdigitate below, erectly appressed, pilose at the axils and bearded there with long hairs, racemes up to 15 cm long, somewhat densely flowered with a few sparse hairs, spikelets bearing to the base, rachis narrow, distinctly winged, spikelets 2.2 mm long, lanceolate, acute, scarcely  $\frac{1}{2}$  mm wide, glabrescent, lower glume wanting, sterile lemma glabrous in front, very minutely shortly puberulous along the margins, fruit narrowly acuminate, yellowish greyish green.

*Flowers* : October.

*Occurrence* : Recorded from Sasan, Iran river up stream.

**Digitaria pennata** (Hochst.) Cooke, Fl. Bomb. 2 : 941. 1909 et Chiov. in Res. Sci. Miss. Stef. Paoli 1, Publ. 1st, Stud. Sup. Firenze, 183. 1916 ; FBI 7 : 16 ; Woodrow in JBNHS 13 : 433. 1901 ; Santapau,

Pl. Saur. 891. 1953 ; Bor, 303. 1960 ; Santapau & Jan. 54. 1967. *Panicum pennatum* Hochst. in Flora 38 : 197. 1955. *Paspalum pennatum* (Hochst) Hook. f., Fl. Brit. Ind. 7 : 16. 1896.

Stems 60 cm long, tufted, leafy. Leaves 2.5–15 × 0.3–0.6 cm, linear or linear lanceolate, finely acuminate, glabrous or sparsely hairy, distantly ciliate with long, fine, bulbous based hairs, sheaths long, striate, glabrous or with a few scattered hairs ; ligule long, oblong, membranous. Spikes several, radiating, 7.5–15 cm long, rhachis very slender, trigonous, with numerous long cilia. Spikelets erect, solitary or 2 nate, 0.3 cm long, narrowly lanceolate, acute, subsilky. Glumes normally 4 ; lower invol. glume minute, ovate, acute, (rarely absent) ; upper invol. glume lanceolate, acute, membranous ; lower floral glume similar to the upper invol. glume lanceolate, acute, membranous ; lower floral glume similar to the upper invol. glume, 3–5 nerved ; upper floral glume chartaceous, lanceolate, acuminate, nearly equal to the lower.

*Flowers* : October.

*Occurrence* : Recorded from Okha, Beyt in *Euphorbia* clumps ; Woodrow reported it from Morvi.

*Digitaria sanguinalis* (Linn.) Scop., Flor. Carn. ed. 2, 1 : 52. 1772 ; Cooke 3 : 457 ; Bor, 304. 1960 ; Santapau & Jan. 54. 1967. *Panicum sanguinale* Linn., Sp. Pl. ed. 1 : 57. 1753. *Digitaria sanguinalis* var. *ciliaris* Prain, Beng. Pl. 1181. 1903.

Annual, stems tall, 90 cm long or more, slender, ascending from a geniculate or prostrate branched base, glabrous. Leaves 5–15 × 0.4–0.8 cm, linear or linear lanceolate, acute flat, with scabrous margins, glabrous or more or less sparsely hairy ; sheaths long, loose, glabrous or rarely hairy except near the mouth. Spikes few (3–8), 7.5–15 cm long ; rhachis slender, triquetrous, narrowly winged. Spikelets oblong, acute, 0.25–0.4 cm long, bearded ; pedicels twin, one short, the other much longer, triquetrous with scabrid margins. Glumes 4 ; the lower invol. glume a minute scale ; the upper invol. glume about  $\frac{1}{2}$  as long as the lower floral glume, membranous ; the lower floral glum. ovate - oblong, acute, membranous, 3–5 nerved ; the upper floral glume as long, subcartaceous.

*Flowers* : October.

*Occurrence* : Recorded from Okha, on sand (T.A. Rao 457).

**DIMERIA R. Brown**

**Dimeria ornithopoda** Trin., Fund. Agrost. 167, t. 14. 1820 ; FBI 7 : 104 ; Cooke 3 : 462 ; Blatt. & McC. 8, t. 4 ; Bor, 142. 1960 ; Santapau & Jan. 55. 1967. *D. filiformis* (Roxb.) Hochst. ex Miq. in Verh. Nederl. Inst. (3) 4 : 35. 1851 ; Santapau in RBSI 16(1) : 275. 1960. *Andropogon filiformis* Roxb. Fl. Ind. 1, 260. 1820 (non Pers. 1805).

A slender annual tufted leafy grass 15 – 50 cm high. Leaves 2.5 – 7.5 × 0.15 – 0.3 cm, erect, linear, finely acuminate ; sheaths usually glabrous. Racemes 2 (rarely 3), very slender, 2.5 – 5 cm long, rachis flexuous, stout, angular. Spikelets about 0.15 cm long, sessile or subsessile, linear acuminate; callus villous with short white hairs. Glumes 4 ; lower invol. glume slender, linear, acute, 0.15 cm long, slightly pubescent or nearly glabrous ; upper invol. glume slightly longer than the lower one, linear ; acuminate, with hyaline margins, pubescent on the back ; lower floral glume 0.2 cm long, linear, acute ; upper floral glume 0.15 cm long, hyaline ; awn nearly 0.8 cm long, the column 0.3 cm long, brown, the upper part white ; capillary.

*Flowers* : October.

*Occurrence* : Recorded from Sasangir, Junwania Nes in Gir Forest, very abundant in open forest, in pure stands.

*Uses* : It is used as fodder grass. It is said to be an inferior grass. (WI)

**DINEBRA N. Jacquin**

**Dinebra retroflexa** (Vahl) Panz. in Denkschr. Akad. Wiss. Muenchen, 4 : 270, t. 12. 1814 ; Santapau, Pl. Saur. 892. 1953 ; Bor, 491. 1960 ; Santapau & Jan. 55. 1967. *Cynosurus retroflexus* Vahl, Symb. Bot. 2 : 20. 1791. *Dinebra arabica* Jacq., Fragm. 77, t. 121, f. 1. 1807 ; FBI 7 : 297 ; Woodrow in JBNHS 13 : 440. 1901 ; Cooke 3 : 562.

Stems 30 – 90 cm high, tufted, stout or slender, erect or geniculately ascending, leafy throughout ; nodes glabrous. Leaves 7.5 – 20 × 0.3 – 0.5 cm, linear, finely acuminate, flaccid, glabrous or sparsely hairy, contracted at the insertion ; sheaths thin, loose, glabrous ligule a narrow lacerate membrane. Spikes 1.2 – 3.7 cm long race mostly arranged along the axis of an inflorescence 10 – 30 cm long, alternate, single or in fascicles of 2 – 3 together ; rachis - dorsally flattened, ventrally trigonous. Spikelets 0.5 cm long (including the awns), alternate, sessile, invol. glumes

lanceolate, hyaline, keeled with slightly recurved minutely scaberulous awns, the lower invol.-glume shorter than the upper; floral glumes reaching 0.15 cm long, ovate oblong, trigonous, 0.12 cm long, pale brown.

*Flowers* : August.

*Occurrence* : Recorded from Sasan, Iran river up stream ; Rajkot river bed ; gregarious, Junagadh, Girnar and Fort of Girnar ; Dhunvav vidi Woodrow reported from Morvi.

*Uses* : The grass is considered to be an excellent fodder for cattle, particularly buffaloes, when fed green it is reported to increase the flow of milk. It is not suitable for making hay or for ensilage.

#### ECHINOCHLOA P. Beauv.

Racemes simple, rather distant; lower glume and upper lemma about equal

*colonum*

Racemes usually more or less branched; lower glume and upper lemma cuspidate or awned:

Annual; ligule 0, junction of blade and sheath glabrous, usually marked by a brown zone

*crusgalli*

Usually perennial; culms rooting and often branching from submerged nodes; ligule a fringe of stiff hairs, sometimes absent on the uppermost leaf

*stagnina*

**Echinochloa colonum** (Linn.) Link., Hort. Berol. 2 : 209. 1833 ; Blatt. & McC. 148, t. 94 ; Santapau, Pl. Saur. 893. 1953 ; Bor, 308, f. 34. 1960 ; Santapau & Jan. 55. 1967. *Panicum colonum* Linn., Syst. (ed. 10), 870. 1759 ; FBI 7 : 32, Woodrow in JBNHS 13 : 433. 1901 ; Cooke 3 : 447; Indraji 696. 1910.

Annual; stem 30-60 cm long, slender, decumbent or shortly creeping below; nodes glabrous or puberulous. Leaves 10-20 × 0.4-0.8 cm, narrowly lanceolate or linear, acuminate, flat, glabrous with scaberulous margins; sheaths up to 15 cm long, ligule 0. Spikes 8-20 suberect usually distant, 1.2-2.5 cm long; rachis stout, angular, scaberulous on the angles. Spikelets 0.20-0.25 cm long, globosely ovoid, acute or subcuspidate, more or less hispidly pubescent, secund, sessile, 3-5-seriate. Glumes 4; lower invol.-glume about  $\frac{1}{2}$  as long as the lower floral glume, broadly ovate or sub-orbicular, membranous, 3-nerved, ciliolate,

upper invol. glume about equal to the lower floral glume, broadly ovate, cuspidate, concave, 5-7 nerved, hairy; lower floral glume similar, empty, with a hyaline palea; upper floral glume coriaceous, broadly ovate, turgid, acute, finely striolate, polished, yellowish-white, with a coriaceous palea.

*Flowers* : October.

*Occurrence* : Collected from Rajkot river bed, beyond station, Sasan, Iran river up stream, Rajkot, Lakes; Rajkot near ditch, growing near water in moist soil, rather abundant in pools; Pradumna Park, Dhunvav vidi, Gondal Road, Rajkot; Ghumli. Woodrow reported from Morvi.

*Uses* : It is valued as a quick growing fodder grass. It is relished by cattle at all stages and its nutritive value is enhanced when in grain. It is said to fatten cattle and bring them into condition in a short time. The grains of this grass are eaten by poor people in times of scarcity. (WI)

**Echinochloa crusgalli** (Linn.) Beauv., Agrost. 53 : 161. 1812; Blatt. & McC. 150, t. 95; Santapau, Pl. Saur. 394. 1953; Bor, 310. 1960; Santapau & Jan. 55. 1967. *Panicum crusgalli* Linn., Sp. Pl. 56. 1753; FBI 7 : 30, p.p. Indraji 696. 1910.

Annual. Stem 30-90 cm, stout or slender, erect or decumbent below, simple or branched. Leaves flat, up to 2.5 cm broad, glabrous or hairy; ligule 0. Raceme 10-20 cm, usually inclined, or drooping. Spikes sessile or sub-sessile, upper gradually shorter, erect, erecto patent or rarely decurved. Spikelets densely packed in 3-5 rows, turgid; glume first not awned, second and third subequal, usually 5 nerved, awn of third sometimes 3.7 cm long; fourth from orbicular to broadly oblong.

*Flowers* : October.

*Occurrence* : Recorded from Rajkot, river bed, cattle Farm, Juna gadh; Rozi near Jamnagar; Joupur vidi, Dhunvav vidi.

*Uses* : The grass has been used for the reclamation of saline and alkaline areas. The grains are used as food in times of scarcity. They are also reported to be used for adulterating fennel. The plant is used for diseases of the spleen and for checking haemorrhage. (WI)

**Echinochloa stagnina** (Retz.) Beauv., Ess. Agrost. 53, 161, 171. 1812; FBI 7 : 31; Bor, 311. 1960; Santapau & Jan. 55. 1967. *Panicum stagninum* Retz., Obs. Bot. 5 : 17. 1789; Cooke 3 : 446. *P. crusgalli* Linn. Pro parte in Hook. Fl. Brit. Ind. 7 : 30. 1896.

Annual or perennial ; root fibrous many, long, wiry, with numerous filiform rootlets ; stem erect from a geniculate or prostrate base, reaching 150 cm (or more) long, sometimes rooting from the lower nodes. Leaves 15–45 × 0.3–1.2 cm, linear, tapering to a fine point : sheaths striate, glabrous, ligule a fringe of stiff hairs. Panicle 10–20 cm long, rachis slender, more or less flexuous, angular, grooved ; branches few or many, distant or close, alternate, usually suberect, 2.5–5 cm long, sessile or nearly so ; rachis of the branches angular, grooved. Spikelets crowded, ovoid lanceolate, 0.4–0.5 cm long (excluding the awn), hairy with bulbous based hairs, pale ; pedicels very short with enlarged tips. Glumes 4 ; lower invol. glume 0.25 cm long, broadly ovate or sub orbicular ; 3 nerved ; ciliate ; upper invol. glume 0.5 cm long, broadly ovate concave, ciliate, 7 nerved in the upper part with green nerves, acuminate or produced into a short compressed scabrid awn ; lower floral glume like the upper invol. glume with an awn, paleate, male, the palea hyaline, as long as the glume ; upper floral glume 0.4 cm long, ovate-lanceolate, straw coloured, shining, faintly striolate with involute margins, coriaceous ; palea as long as the glume, elliptic oblong, acute, striolate, with inflexed margins.

*Flowers* : October.

*Occurrence* : Recorded on the authority of H. Santapau & Janardhanan.

*Uses* : The grass is considered to be rich fodder, particularly for horses and cattle, both in the green state and as hay. The stems are rich in sugar. The grains are eaten in times of scarcity. (WI)

#### ELEUSINE Gaertn.

Annual, erect ; leaves 30-60 cm long

*indica*

Perennial, prostrate ; leaves 1.2-3.7 cm long

*compressa*

**Eleusine compressa** (Forssk.) Aschers & Schweinf ex C. Christensen in Dansk Bot. Archiv 4, No. 3, 12. 1922 ; Bor, 492. 1960 ; Santapau & Jan. 55. 1967. *Panicum compressum* Forssk., Fl. Aegypt. Arab. 18. 1775. *Eleusine flagellifera* Nees in Linnaea 16 : 220. 1842 ; FBI 7 : 294 ; Cooke 3 : 560 ; Indraji 708. 1910 ; Santapau, Pl. Saur. 895. 1953.

Perennial, prostrate, proliferously branched, glaucous ; stems smooth, stiff, widely spreading, rooting at the distant thickened leafy

nodes and sending up slender branches ; internodes 10 - 20 cm long. Leaves 1.2 - 3.7 × 0.15 - 0.3 cm, linear - lanceolate, acuminate, rigid, distant flat or tortuous, recurved, the upper very short, sheaths glabrous ; ligule a hairy line. Spikes 3 - 6, digitate, 1.8 - 3.7 × 0.4 - 0.8 cm, rachis slender, flexuous, pubescent. Spikelets imbricate, sub sessile or very shortly pedicellate, 4 - 6 flowered, 0.3 - 0.8 cm long. Lower invol. glume rather less than 0.3 cm long, ovate, acute, membranous, upper invol. glume 0.4 cm long, lanceolate, aristate, coriaceous, with broad membranous margins, floral glumes 0.5 cm long, ovate acute, apiculate, chartaceous, 3 nerved, the midnerve compound, the margins membranous, hairy below, palea oblong with ciliate keels. Anthers 0.15 cm long.

*Local name* : Ganthelo chamad choto, Khevan.

*Flowers* : September.

*Occurrence* : Collected from Saurashtra also recorded from Barda Hill.

*Uses* : It is grazed by cattle and used for making hay. (WI)

**Eleusine indica** (Linn.) Gaertn., Fruct. 1 : 8. 1789 ; t. 1 ; FBI 7 : 293 ; Cooke 3 : 560 ; Indraji 708. 1910 ; Santapau, Pl. Saur. 896. 1953 ; Bor, 493. 1960 ; Santapau & Jan. 55. 1967. *Cynosurus indicus* Linn., Sp. Pl. 72. 1753. *Eleusine tristachya* Lamk., Ill. 1 : 203, t. 203. 1791 ; FBI 7 : 263.

Annual, erect, stem 30 - 60 cm high, tufted, slightly compressed, glabrous ; roots of strong fibres. Leaves distichous, flat or folded, as long as the stem 0.3 - 0.6 cm broad, linear, glabrous or sparsely hairy, with nearly smooth margins ; sheaths compressed ; ligule a thin slightly hairy membrane. Spikes 2 - 7 or more, 5 - 12.5 cm long, with sometimes one or two detached spikes below the umbel, digitate, suberect, rachis flattened. Spikelets pointing forward at an acute angle with the rachis of the spike, variable in size 0.25 - 0.4 cm long, 3 - 6 flowered, glabrous. Invol. glume unequal, membranous ; lower 0.15 cm long, ovate - oblong, acute, 1 nerved ; upper 0.25 cm long, ovate oblong, subacute, very shortly apiculate with 3 - 7 green nerves ; floral glumes gibbously ovate oblong, obtuse, 0.3 cm long ; palea shorter than the glume, oblong - lanceolate, subacute. Anthers 0.08 cm long. Grain oblong, obtusely trigonous, obliquely striate, reddish brown.

*Local name* : Adbounagali.

*Flowers* : December.

*Occurrence* : Recorded from Barda Hill.

*Uses* : It is an esteemed grass. The seeds are used as food in times of scarcity. The culms are used for making hats. (WI)

ELYONURUS Humb.

**Elyonurus royleanus** Nees ex A. Rich., Tent. Fl. Abyss. 2 ; 471. 1851 ; FBI 7 : 161 ; Santapau, Pl. Saur. 897. 1953 ; Bor, 145. 1960 ; Santapau & Jan. 55. 1967.

Stems 10–30 cm, slender, leafy, geniculate. Leaves 10–25 cm, narrow, flat or convolute, glabrous or sparsely hairy, base fimbriate; lower sheaths terete, upper spathiform; ligule very short. Spikes 2.5–5 cm, erect, clustered towards the top of the stem, stout, green or purple, each enclosed in a long narrow flattened acute sheath; joints bearded below the tip. Sessile spikelets 0.6 cm, erect; callus densely bearded, glume first 2-fid at the top, lobes linear ciliate divergent, sides with a row of large tubercles each carrying a pencil of long hairs; second membranous, linear-lanceolate, acuminate, 1-nerved; third shorter, oblong, acute, nerveless, glabrous, epaleate, fourth much shorter, oblong, obtuse, 1-nerved or nerveless. Pedicelled spikelets 0.8 cm, narrowed almost from the base into a long subulate ciliate blade; second cymbiform, glabrous, narrowed into a scabrid awn; third and fourth 0, pedicel with one margin shortly ciliate.

*Flowers* : October.

*Occurrence* : Recorded from Rajkot and Jamnagar.

ERAGROSTIELLA Bor

**Eragrostiella brachyphylla** (Stapf) Bor in Indian For. 66 : 270. 1940 & Grass. Burma, Cey. Ind. Pak. 494. 1960 ; Santapau & Jan. 55. 1967. *Eragrostis brachyphylla* Stapf apud Hook. f. Fl. Brit. Ind. 7 : 327. 1896.

Stem densely tufted, 25–45 cm, slender. Leaves coriaceous, acute rarely flat and 0.25 cm broad. Spikes 7.5–15 cm, slender. Spikelets close-set, usually secund, slightly compressed, olive-green, empty glumes up to 0.2 cm, first acute, acutely keeled; second obtuse, dorsally rounded; floral glume up to 0.2 cm broadly ovate, obtuse, keel scaberulous below the tip; keels of palea narrow, scabrid. Anthers 0.07 cm. Grain 0.05–0.06 cm, shortly ellipsoid, obscurely triquetrous, almost terete, epicarp coarsely reticulate.

*Flowers* : October.

*Occurrence* : Recorded on the authority of H. Santapau & Janardhanan.

**ERAGROSTIS P. Beauv.**

Spikelets breaking up from above downwards ; rachis *fragile* :

Keels or palea more or less ciliate :

Panicles spiciform, compact or dense:

Panicle spiciform more or less interrupted *ciliaris*

Panicle short, thick compact *ciliaris* var. *brachystachya*

Panicle cylindric, compact *ciliata*

Panicles effuse :

Culms and leaves more or less viscous *viscosa*

Culms and leaves not viscous *tenella*

Panicles exceedingly variable *japonica*

Keels or palea smooth not ciliate *diarrhena*

Spikelets breaking up from below upwards ; rachis tough :

Lemmas upto 1.5 mm long :

Lowest branches of the panicle fascicled or sub-whorled, with pitted glands just above and below the lowest node *pilosa*

Panicles lax, branches slender, flexuous or flaccid *tenuifolia*

Lemmas over 1.5 mm long:

Plants with wart-like glands on pedicels and margins of leaves *cilianensis*

Plants devoid of glands:

Spikelets 2 mm or more wide, ovate or ovate-oblong *unioloides*

Spikelets 0.75-2 mm wide, often curved *tremula*

**Eragrostis cilianensis** (All.) Vig. Lutati in Malpighia 18 : 386. 1904;  
Blatt. & McC. 237, t. 157 ; Santapau, Pl. Saur. 898. 1953 ; Bor, 503. 1960;

Santapau & Jan. 55. 1967. *Poa ciliensis* All., Fl. Pedem. 2 : 246, t. 91, f. 2. 1785. *Eragrostis major* (Linn.) Host, Gram. Austr. 4 : 14, t. 24. 1809 ; FBI 7 : 320 ; Cooke 3 : 545 ; Woodrow in JBNHS 13 : 441. 1901.

**Annual.** Stem 30–60 cm, usually stout and branched, but very variable. Leaves flat, smooth, flaccid, narrow, rarely 0.6 cm broad ; sheath sparingly bearded. Panicle 5–20 cm, sometimes contracted, rachis glabrous, branches stiff or flexuous, ramifying from or near the base. Spikelets slightly narrowed upwards, dark olive grey ; glume first 1 or sub 1 3 nerved second 3 nerved ; floral glume 0.2 cm, uppermost usually empty and smaller nerves strong, palea 0.6–0.5 cm shorter than its glume. Anther about 0.4 cm. Grain 0.05–0.7 cm, loose within the turgid glume.

**Flowers :** November to January.

**Occurrence :** Recorded from Okha sea shore ; Dwarka, neighbourhood of station, Prostrate on sandy soil ; Rajkot Rajkumar College compound ; Rozi near Jamnagar ; Cattle Farm, Junagadh, Woodrow reported it from morvi.

**Uses :** Used as fodder grass. The straw is used for matting and thatching. (WI)

***Eragrostis ciliaris* (Linn.) R. Br.** in Tuckey, Narr. Exp. Congo, App. 478. 1818 ; Indraji 708. 1910 ; Santapau, Pl. Saur. 899. 1953 ; Bor, 506. 1960 ; Santapau & Jan. 55. 1967. *Poa ciliaris* Linn., Syst. Nat. ed. 10, 2 : 875. 1759. *Eragrostis ciliaris* var. *ciliaris* (Linn.) Stapf in Hook. Fl. Brit. Ind. 7 : 314. 1896.

Stem 30–60 cm, procumbent below and geniculately ascending, slender. Leaves very narrow, flat ; mouth of sheath with very long hairs. Panicle 7.5–15 cm, interrupted or lobed below, appearing hairy from the long cilia of the palea, branches very short, divided from the base, glabrous ; nodes of glabrous rachis naked. Spikelets very pale, as broad as long, much compressed ; floral glume subhyaline, scaberulous, often slightly recurved and elegantly distichous ; rachilla of spikelet persistent. Anthers 0.02 cm. Grain elongate ovoid, about 0.05 cm.

**Local name :** Marmar ; Marmarghas.

**Flowers :** November.

**Occurrence :** Recorded from Rozi near Jamnagar ; Rajkot river bed. Jodiya Port and Syke's Point, 6 m NE to Salaya near Jamnagar.

**Uses :** Eaten by cattle. (Indraji 708. 1910).

**Eragrostis ciliaris** var. **brachystachya** Boiss., Fl. Orient. 5 : 582. 1884 ; FBI 7 : 314 ; Cooke 3 : 545 ; Indraji 709. 1910 ; Santapau, Pl. Saur. 902. 1910 ; Bor, 506. 1960 ; Santapau & Jan. 55. 1967.

Stems 15-25 cm long, tufted, geniculately ascending, glabrous, smooth. Leaves 5-7.5 × 0.12-0.2 cm, linear, tapering to a fine point ; sheaths striate, usually bearded at the mouth with long hairs ; ligule a fringe of short hairs. Panicle short, 1.2-3.7 cm long, oblong, cylindric, appearing hairy from the long cilia of the paleae ; branches short, suberect. Spikelets 0.25 cm long, crowded, 6-12-flowered, strongly compressed ; rhachilla breaking up ; pedicels very short. Invol.-glumes subequal, ovate-lanceolate, acute, reaching 0.15 cm long ; floral glumes 0.12 cm long, oblong, subtruncate, mucronulate, spreading ; palea equal to their glumes and falling with them, the keels with long, rigid cilia. Stamens 3 ; anthers very short. Grain elongate-ovoid, about 0.05 cm long.

*Local name :* Kalangimarmar.

*Flowers :* October.

*Occurrence :* Collected from Rajkot behind station and Rozi near Jamnagar.

*Uses :* Eaten by cattle. (Indraji 709. 1910).

**Eragrostis ciliata** (Roxb.) Nees, Agrost. Bras. 512. 1829 ; FBI 7 : 313 ; Cooke 3 : 544 ; Bor, 506. 1960 ; Santapau & Jan. 55. 1967. **Poa ciliata** Roxb. Fl. Ind. ed. 1, 1 : 336. 1820. **Poa incurvata** Rottl. ex Stapf in Hook. f. Fl. Brit. Ind. 7 : 313. 1896 (nomen).

Perennial ; stems 30-75 cm long, erect or geniculately ascending, terete. Leaves linear-lanceolate, finely acuminate, spreading, 5-15 × 0.25-0.4 cm, flat or convolute, smooth, glabrous ; sheaths bearded at the mouth ; ligule of a few hairs. Panicle spiciform, 5-7.5 × 0.8 cm, cylindric, compact ; branches much shortened ; rhachis finely bearded at the nodes. Spikelets 0.25-0.4 cm long, much compressed, 6-12-flowered. Invol.-glumes ovate, acute, hyaline, ciliate ; floral glumes 0.15-0.3 cm long, broadly ovate, cuspidately acuminate, subhyaline, very minutely scaberulous, the margins ciliate and the nerves prominent ; palea shorter than its glume with ciliate keels. Grain ovoid to ellipsoid 0.05 cm long, terete.

*Flowers :* October.

*Occurrence :* Collected from Junagadh, Girnar, on earth banks up steps.

**Eragrostis diarrhena** (Schult.) Steud., Syn. Pl. Glum. 1 : 266. 1854 ; Bor, 507. 1960 ; Santapau & Jan. 55. 1967. *Poa diarrhena* Schult., Mant., 2 : 616. 1827. *Eragrostis interrupta* var. *koenigii* Stapf in FBI 7 : 316. 1896; Cooke 3 : 546.

A tall, glabrous annual or perennial, grass ; stem erect, 30–90 cm high or more, smooth and polished ; nodes glabrous. Leaves 7.5–25 cm long, narrow, flat ; sheaths glabrous, close ; ligule a fimbriate, membrane. Panicle erect, 15–45 cm long, contracted ; branches filiform, often distant, 2 or more proceeding from the same level and giving the panicle a verticillate appearance. Spikelets small, 0.2–0.3 cm long, usually 6–14-flowered, smooth often tinged with red, pedicellate ; rhachilla articulate between the flowering glumes, glabrous, disarticulating from above downwards. Invol.-glumes, subequal, about 0.08 cm long, ovate-oblong, obtuse; palea linear-oblong, with smooth or slightly scaberulous keels. Stamens 2 ; anthers small. Grain obovoid.

*Flowers* : November.

*Occurrence* : Recorded from Rajkot, near ditch.

*Uses* : Eaten by cattle. (WI)

**Eragrostis japonica** (Thunb.) Trin. in Mem. Acad. Sci. Petersb., Ser. 6, 1 : 405. 1831 ; Bor, 509. 1960 ; Santapau & Jan. 55. 1967. *Poa japonica* Thunb., Fl. Jap. 51. 1784. *E. interrupta* var. *tenuissima* Stapf in FBI 7 : 316. 1896.

A very variable slender grass from 5–90 cm, annual or perennial. Stems smooth and polished, tufted, geniculate and ascending from the base, branched or not, nodes glabrous. Leaves slender, up to about 25 cm long, narrow, flat, glabrous ; sheaths glabrous, close ; ligule a fimbriate membrane. Panicle exceedingly variable, up to 60 cm long, either contracted with branches or interrupted with many tiers of rather short spreading sub whorled branches. Spikelets usually very minute, from 1–6 mm long, ovate to linear, few to many flowered. Flowering glumes obtuse, nerves slender, green or pale brown, rarely coloured. Keels of palea scaberulous or smooth. Stamens 2. Grain obovoid.

*Flowers* : October.

*Occurrence* : Recorded from Ranjit Sagar, 6 m.s. of Jamnagar. Sasangir along river.

*Uses* : Grazed by cattle (WI).

**Eragrostis pilosa** (Linn.) Beauv., Agrost. 71. 1812 ; FBI 7 : 323 ; Cooke 3 : 550 ; Blatt. & McC. 241, t. 160 ; Santapau, Pl. Saur. 901. 1953 ; Bor, 512. 1960 ; Santapau & Jan. 55. 1967. *Poa pilosa* Linn., Sp. Pl. 68. 1753.

Annual ; stem 15–60 cm high, tufted, erect or geniculately ascending, slender, flaccid. Leaves usually short and narrow, generally convolute ; sheaths appressed, glabrous bearded at the mouth ; ligule a softly hairy ridge. Panicle 5–15 cm long, erect or inclined, oblong to pyramidal, open or contracted ; rhachis glabrous or hairy, filiform ; branches fascicled or whorled, capillary, much divided. Spikelets scattered, 0.3–0.5 × 0.08–0.2 cm, linear, 5–12 flowered, often purplish ; pedicels longer or shorter than the spikelets ; rhachilla tough, smooth, flexuous. Glumes all hyaline ; invol. glumes very unequal, lower ovate, nerveless ; upper much larger, ovate lanceolate, acuminate, 1 nerved ; floral glumes 0.15–0.25 cm long ; palea subpersistent, the keels scaberulous or nearly smooth. Grain ellipsoid, 0.13–0.16 cm long, laterally apiculate at the base.

*Flowers* : October (collected in August).

*Occurrence* : Collected from Rozi near Jamnagar ; Rajkot Rajkumar College compound ; Gondal Road Rajkot ; Cattle Farm Junagadh and Sasangir ; Sadgi vidi, Junagadh.

*Uses* : It is grazed by cattle, particularly buffaloes. (WI)

**Eragrostis tenella** (Linn.) Beauv. ex Roem. & Schult., Syst. 2 : 576. 1817 ; FBI 7 : 315 ; Cooke 3 : 545 ; Blatt. & McC. 232, t. 155 ; Bor, 513. 1960 ; Santapau & Jan. 55. 1967. *Poa tenella* Linn., Sp. Pl. 69. 1753. *E. amabilis* (Linn.) Wight et Arun. ex Hook. et Arn., Bot. Beechey Voy. 251. 1838 ; Indraji 710. 1910. *E. tenella* var. *plumosa* (Retz.) Stapf in Hook. f. Fl. Brit. Ind. 7 : 315. 1896.

Usually a small, very elegant and slender annual grass, very variable, rarely 45 cm high. Stems many slender, densely tufted. Leaves slender, narrow, acuminate, attaining 12 cm by 5 mm, usually much less ; sheaths long, ciliate, near the mouth. Panicles decompound, excessively branched, 5–20 cm long, contracted or spreading, pale green or purplish, oblong ovate or cylindric, never with the long interrupted rhachis and pseudoverticillate branches of *E. interrupta*. Spikelets innumerable, minute to small on capillary branchlets and pedicels, 1–4 mm by 1 mm or less, not strongly compressed, 3–9 flowered. Involucral glumes subequal or unequal. Flowering glumes oblique, not mucronate lateral nerves remote from the margins ; keels of palea usually obscurely ciliate. Stamens 3. Grain broadly ovoid, pale brown, polished.

*Flowers* : October.

*Occurrence* : Recorded from Ghumli near Barda Hill ; Somnath (T.A. Rao 576.)

*Uses* : The grass is eaten by cattle, both green and as hay, and the grain is said to be nutritious. (WI)

**Eragrostis tenuifolia** (A. Rich) Hochst. ex Steud., Syn. Pl. Glum. 1 : 268. 1854 : Stapf in Fl. Brit. Ind. 7 : 322 ; Cooke, 3 : 549 ; Bor, 514. 1960 ; Santapau & Jan. 55. 1967. *Poa tenuifolia* A. Rich., Tent. Fl. Abyss. 2 : 425. 1851.

Perennial ; stem 60-90 cm high, erect, slender, branched. Leaves long, very narrow ; mouth of sheath naked. Panicle 7.5-15 cm long, oblong to ovate, very narrow ; mouth of sheath naked. Panicle 7.5-15 cm long, oblong to ovate, very open ; rhachis glabrous, branches solitary or 2-nate, distant. Spikelets 0.6 cm long or less, linear, 5-15 flowered. Invol. glumes very unequal ; lower minute, hyaline ; upper remote from and larger than the lower, about 0.08 cm long, ovate, subacute, usually nerveless ; floral glumes 0.2 cm long, ovate, subacute or apiculate ; palea shorter than its glume, strongly curved, persistent, with scabrid keels. Stamens 3 ; anthers 0.1 cm long. Grain 0.2 cm long, obovoid oblong, slightly compressed, dorsally grooved.

*Flowers* : November.

*Occurrence* : Recorded from Targhari near Rajkot.

**Eragrostis tremula** Hochst ex Steud., Syn. Gram. 269. 1854 ; FBI 7 : 320 ; Woodrow in JBNHS 13 : 441. 1901 ; Cooke, 3 : 549 ; Santapau, Pl. Saur. 903. 1953 ; Bor, 514. 1960 ; Santapau & Jan. 55. 1967.

Annual. stems densely tufted, suberect, 15-60 cm long. Leaves 5-12.5 × 0.2-0.4 cm, linear lanceolate, tapering to a fine point ; sheaths bearded at the mouth ; ligule a minutely hairy line. Panicle, large, ovate, very diffuse ; branches solitary, filiforms ; pedicels very slender, from  $\frac{1}{2}$  the length of the spikelets to longer than them, rhachis glabrous or brearded at nodes. Spikelets 2.5 cm or more long, linear, narrower upwards, from 10-60 flowered. Invol. glumes subequal 0.12-0.15 cm long, subobtuse, thin 1 nerved ; rhachilla tough, glabrous ; floral glumes closely set, broadly ovate, subobtuse, 0.15-0.2 cm long, with strong nerves ; palea obovate oblong slightly shorter than its glume, persistent, with scabrid keels. Stamens 3 ; anthers minute. Grain scarcely 0.05 cm in diam., globose or nearly so.

*Flowers* : November.

*Occurrence* : Woodrow reported it from Gogo in Saurashtra.

*Uses* : It is considered to be nutritious but the foliage is too scanty to be of value as fodder. The grains are eaten in times of famine. (WI)

**Eragrostis unioloides** (Retz.) Nees ex Steud., Syn. Pl. Glum. 264. 1855 ; Blatt. & McC. 235, t. 156, Santapau, Pl. Saur. 905. 1953 ; Bor, 515. 1960 ; Santapau & Jan. 55. 1967. *Poa unioloides* Retz., Obs. 5 : 19. 1789. *Eragrostis amabilis* Wight & Arn. ex Nees in Hook. & Arn. Bot. Beech. Voy. 251. 1830 1841 ; FBI 7 : 317 ; Cooke 3 : 546 ; Indraji 710. 1910.

Annual, glabrous ; stems 15–45 cm long, tufted, slender, erect or geniculately ascending, leafy chiefly at the base, internodes long. Leaves 7.5–15 × 0.25–0.4 cm, narrowed from a broad subcordate base to an acute tip, smooth ; sheaths smooth, glabrous ; ligule 0, or obscure. Panicle oblong or ovoid, 5–10 cm long, compressed, ovoid elliptic or oblong, 20–50 flowered, shortly pedicellate, often purple ; rhachilla tough, internodes very short. Glumes elegantly distichous, spreading, keeled ; invol. glumes subequal or the upper slightly longer than the lower, 0.1–0.15 cm long, ovate, acute, 1 nerved ; floral glumes broadly ovate or suborbicular, mucronulate, 0.2 cm long, punctulate ; palea shorter than its glume and deciduous with it. Stamens 3 ; anthers minute. Grain obovoid or ellipsoid, laterally compressed, about 0.08 cm long, orange brown, smooth.

*Flowers* : November.

*Occurrence* : Recorded from Rajkot and Barda Hill.

*Uses* : It is grazed by cattle and horses. It is reported to be ploughed in as green manure when it occurs plentifully in paddy fields. (WI)

**Eragrostis viscosa** (Retz.) Trin. in Mem. Acad. Petersb. (ser. 6) 1 : 397. 1830 ; Blatt & McC. 233 ; Santapau, Pl. Saur. 904. 1953 ; Bor, 515. 1960 ; Santapau & Jan. 55. 1967. *Poa viscosa* Retz., Obs. 4 : 20. 1786. *Eragrostis tenella* var. *viscosa* (Retz.) Stapf in Hook. FBI 7 : 315. 1896.

Stems and rhachis of the panicle more or less viscid. Panicle stiff, stouter and with firmer and more strongly nerved glumes, oblong to linear, 5–7.5 × 1.2–2.5 cm ; branches spreading filiform, often very short ; rhachis usually glabrous (rarely obscurely bearded at the nodes). Spikelets 5–20 flowered, often purplish. Invol. glumes nearly equal or the lower very slightly shorter than the upper ; floral glumes 0.1–0.15

cm long. Anthers about 0.025 cm long. Grain ovoid, 0.04–0.05 cm long.

*Flowers* : November.

*Occurrence* : Collected from Sasangir to Junwania, found on earth banks, not abundant at both places. E. Blatter also reported it from Junagadh, Girnar up steps.

#### EREMOPOGON (Hack) Stapf

**Eremopogon foveolatus** (Del.) Stapf in Prain, Fl. Trop. Afr. 9 : 183. 1917 ; Santapau, Pl. Saur. 906. 1953 ; Bor, 148. 2960 ; Santapau & Jan. 55. 1967. *Andropogon foveolatus* Del., Fl. d'Egypte 16, t. 8, f. 2. 1812, FBI 7 : 168 ; Cooke 3 : 496 ; Indraji 701. 1910.

Stems 30–60 cm long, densely tufted, usually decumbent at the base, then geniculately ascending, very slender, glabrous ; nodes bearded. Leaves 7.5–15 × 0.12–0.25 cm, linear, scaberulous beneath, sheaths shorter than the internodes, scabrous or glabrous, the basal sheaths silvery-villous ; ligule short, truncate, hyaline, ciliate. Racemes 2.5–3.7 cm long, solitary ; peduncles capillary, erect, usually far exserted beyond the slender spathe ; joints and pedicels slender, ciliate on 2 opposite sides with long silky hairs, shorter than the sessile spikelets. Spikelets 0.4 cm long, oblong lanceolate, glabrous, purplish ; callus small, shortly hairy at the base ; lower invol. glume 0.4 cm long, flat, lanceolate oblong, subobtuse, with narrowly involute margins, 4 nerved, upper invol. glume equal to the lower, lanceolate, acute, 3 nerved ; lower floral glume much shorter, oblong lanceolate, glabrous, nerveless ; upper floral glume reduced to an awn 1.2–1.5 cm long. Anthers 0.25 cm long. Pedicellate spikelets. Pedicels 0.25 cm long. Glumes 2 ; lower invol. glume 0.4 cm long, lanceolate, acute, the keels above aculeately scabrid, 5 nerved, pitted or not ; upper invol. glume equalling the lower linear lanceolate, acute, 3 nerved.

*Flowers* : October.

*Occurrence* : Recorded from Jodiya Port, near Jamnagar ; Paneli vidi, Morvi and Jilla garden, Rajkot ; Targhari, near Rajkot.

*Uses* : It is a good fodder grass relished by cattle. It is considered to be a good desert fodder especially for camels. (WI)

## ERIOCHLOA Kunth

**Eriochloa procera** (Retz.) C. E. Hubbard in Kew Bull. 256. 1930 ; Bor, 312. 1960 ; Santapau & Jan. 55. 1967. *Agrostis procera* Retz., Obs. Bot. 4 : 19. 1786. *E. polystachya* Hook. f., FBI 7 : 20. 1896 non H. B. K. ; Nov. Gen. et Sp. 95. 1816 ; Cooke 3 : 461.

Perennial, densely tufted, 60–150 cm high ; root-stock short, creeping ; stems leafy, ascending from a creeping base, stout or slender, simple or branched, glabrous except the nodes. Leaves 7.5–20 × 0.4–0.5 cm, linear or linear-lanceolate, acuminate, glabrous ; sheaths glabrous, ligule a villous ridge. Panicles 5–12.5 cm long ; peduncles long or short ; rhachis slender, angular, smooth ; branches of panicle (spikes) alternate, 2.5–5 cm long, suberect, angular. Spikelets silvery, 0.3–0.4 cm long, loosely imbricate, shortly pedicellate, distichous, solitary or 2-nate, elliptic-lanceolate, acuminate. Lower invol.-glume 0 ; upper invol.-glume oblong-lanceolate, acuminate, obscurely 3-nerved, silky-hairy, membranous ; lower floral glume similar to the upper invol.-glume ; upper floral glume much shorter than the lower, elliptic-oblong, obtuse, apiculate, thinly coriaceous, pale, shining ; palea oblong with incurved margins. Anthers linear. Grain oblong, free within the hardened glume and palea.

*Flowers* : October.

*Occurrence* : Recorded from Dhunvao vidi.

*Uses* : It yields a good fodder relished by cattle. (WI)

## EULALIOPSIS Honda

**Eulaliopsis binata** (Retz.) C. E. Hubb. in Hook., Ic. Pl. Sub. tab. 3262. 1935 ; Santapau, Pl. Saur. 907. 1953 ; Bor, 158. 1960 ; Santapau & Jan. 56. 1967. *Andropogon binatus* Retz., Obs. Bot. 5 : 21. 1789. *Ischaemum angustifolium* (Trin.) Hack. in DC. Monogr. Phan. 6 : 241. 1889 ; FBI 7 : 129 ; Woodrow in JBNHS 13 : 436. 1901 ; Cooke 3 : 478, Indraji 699. 1910.

Perennial ; stems 60–90 cm, tufted, sparingly-branched slender, grooved on one side, smooth. Leaves 30–60 × 0.25–0.4 cm, concave or convolute, base obtuse fimbriate, margins scaberulous ; sheath glabrous, old basal forming with the wool a thickened mass ; ligule a ridge of hairs. Spikes 2.5–5 cm close together or placed apart, erect, golden or rusty villous ; joints and pedicels  $\frac{1}{2}$  the lower spikelet, slender, shortly ciliate, bearded at the base. Spikelets 0.3–0.4 cm, lanceolate ; callus hairs short,

glume first sub-chartaceous margined with long rufous hairs ; second rather longer, 3 5-nerved ; ciliate, keel bearded below ; third oblong, obtuse, tip ciliate, nerveless, paleate ; palea entire or 2-lobed, tip ciliate, fourth and second 1-nerved, awn as long as the spikelet ; palea short, ovate, obtuse tip fimbriate. Pedicelled spikelets like the sessile.

*Flowers* : December to February.

*Occurrence* : Woodrow reported it from Rajkot. Also found on Barda Hills.

*Uses* : Sabai grass is used for making ropes, mats and strings. It is also used for making soles and uppers of grass slippers. Sabai grass is not relished by cattle, though it may be eaten when tender. (WI)

#### HACKELOCHLOA O. Ktze.

**Hackelochloa granularis** (Linn.) O. Kuntze., Rev. Gen. Pl. 976. 1891 ; Santapau, Pl. Saur. 908. 1953 ; Bor, 159. 1960 ; Santapau & Jan. 56. 1967. *Cenchrus granularis* Linn., Mant. 2 (Append.) : 575. 1771. *Manisuris granularis* Linn. f., Nov. Gram. Gen. 40. 1779 ; FBI 7 : 159 ; Cooke 3 : 473 ; Indraji 700. 1910.

Stems 10-74 cm high, slender, compressed, softly hairy, leafy ; nodes hairy. Leaves 3.7-20 × 0.6-1.2 cm, linear-lanceolate, acute or acuminate, flat hairy on both surfaces or on the lower only with bulbous-based hairs, margin ciliate, base cordate ; sheath much shorter than the internodes ; ligule very short membranous ; densely ciliate. Recemes 0.4-2.5 cm long, solitary or seemingly fascicled in the axils of the leaves, but individually from shortened axillary branches. Sessile spikelets 0.15-0.20 cm long, subglobose ; callus tumid, glabrous. Glumes 4 ; lower invol.-glume irregularly foveolate on the back ; upper invol.-glume closing the cavity of the lower floral glume, elliptic-oblong, obtuse 1-nerved ; lower floral glume hyaline, shorter than the upper invol.-glume ; upper floral glume about equalling the lower, broadly ovate ; palea similar but a little shorter. Pedicellate spikelets equal in length to the sessile or longer, of 2 equal green glumes about 0.25 cm long, lower invol.-glume broadly ovate or suborbicular, 5-7-nerved ; upper invol.-glume boat shaped, laterally compressed, the keel with a dorsal hyaline, ciliolate wing.

*Local name* : Kasiunghas.

*Flowers* : October.

*Occurrence* : Recorded from Sasangir ; Cattle Farm, Junagadh and Chotila Hill ; Paneli vidi, Morvi ; Rajkot, disturbed and heavily grazed grasslands ; Dwarka and Mangrol.

### HALOPYRUM Stapf

*Halopyrum mucronatum* (Linn.) Stapf in Hook. IC. Pl. 25, t. 2448. 1896 ; FBI 7 : 328 ; Cooke 3 : 551 ; Indraji 710. 1910 ; Santapau, Pl. Saur. 909. 1953 ; Bor. 516. 1960 ; Santapau & Jan. 56. 1967. *Uniola mucronata* Linn., Sp. Pl. ed. 2, 104. 1762.

Rootstock sending up hard woody stems 30–45 cm high and as thick as a crow-quill, smooth, shining, with strict vermiform roots, the branches often fascicled and clothed at the base with pale coriaceous shining mucronate sheaths. Leaves 20–30 × 0.3–0.4 cm, convolute, very narrow, glaucous, coriaceous, striate, quite smooth ; sheaths ; terete, appressed, striate, hard, with villous mouth ; ligule a few hairs. Panicle 30–40 cm long, erect or nodding; rhachis and branches quite smooth, angular, wiry. Spikelets 1.2–1.5 cm long, flat, sessile or pale yellowish ; rhachilla very short, the hairs half as long as the glumes. Lower invol.-glume 0.6 cm long, scarcely longer than the lower flowering glume, ovate-lanceolate, apiculate ; upper invol.-glume 0.8 cm long, strongly 5-nerved.

*Local name* : Dariaikansado.

*Flowers* : November.

*Occurrence* : Collected from Saurashtra, particularly it was found abundantly from the coastal area. R. K. Bhide also reported from Porbandar in 1910.

### HEMARTHRIA R. Br.

*Hemarthria compressa* (Linn. f.) R. Br., Prodr. 207. 1810 ; Bor, 161. 1960 ; Santapau & Jan. 56. 1967. *Rottboellia compressa* Linn. f., Suppl. 114. 1781 ; FBI 7 : 153 ; Cooke 3 : 470.

Perennial ; stems erect from a decumbent rooting base, 60–150 cm long, branched, compressed, glabrous ; striate, leafy. Leaves 2.5–12.5 × 0.3–0.5 cm, linear, acuminate flat, glabrous, base rounded, sheaths shorter than the internodes, compressed ; ligule short, membranous, ciliate. Racemes few or many, often fascicled, 5–12.5 cm long, erect, straight or curved ; rhachis almost inarticulate ; internodes broad, striate, nearly as

long as spikelets. Sessile spikelets 0.4–0.5 cm long; callus small, naked. Glumes 4; lower invol.-glume coriaceous, bluntly acuminate, 7–9-nerved; upper invol.-glume as long as the lower, linear-oblong, acutely acuminate, 3-nerved, adhering to the cavity of the internodes; floral glumes subequal, 0.4 cm long, lanceolate, acute, nerveless, hyaline; palea linear, 0.25 cm long. Pedicellate spikelets rather longer and narrower than the sessile; lower invol.-glume acutely acuminate, upper invol.-glume chartaceous, 5–7-nerved; floral glumes as in the sessile spikelets.

*Flowers* : November.

*Occurrence* : Recorded on the authority of H. Santapau & Janardhanan.

*Uses* : It is liked by cattle and esteemed as a moist pasture grass. (WI)

#### HETEROPOGON Pers.

Lower invol.-glume dorsally deeply grooved; ligule a rounded membrane

*triticeus*

Lower invol.-glume not dorsally grooved :

Margins of lower invol.-glume of pedicellate spikelets equally winged, the keels studded with long yellow bristles

*ritchiei*

Margins of lower invol.-glume of pedicellate spikelets unequally winged, the keels not studded with bristles

*contortus*

**Heteropogon contortus** (Linn.) Beauv. ex Roem. & Schult., Syst. Vag. 2 : 836. 1817; Blatt. & McC. 109, t. 71; Santapau, Pl. Saur. 911. 1953; Bor, 163: f. 6. 1960; Santapau & Jan. 56. 1967. *Andropogon contortus* Linn., Sp. Pl. 1045. 1753; FBI 7 : 199; Cooke 3 : 510, Indraji 704. 1910.

Stems 30–150 cm, erect or decumbent below, densely tufted, simple or fastigiately branched, compressed towards the base. Leaves 15–45 cm, narrow, glabrous or hairy especially near the base, rather glaucous, rigid, margins and upper surfaces scabrid; sheaths compressed, keeled. Spikes with the lower 2–6 pairs of spikelets male with coherent joints, joints of upper (female) portion very short and curved callus bearded with brown hairs. Sessile (female) spikelets, 0.6 cm; glume first coriaceous, glabrous or hispid, many-nerved, tip membranous second coriaceous, 3-nerved; third oblong, hyaline, embracing the long slender ovary, tip ciliate;

fourth awn stout, column hirsute. Pedicelled spikelets 0.8–1.2 cm; pedicel very short, glume first lanceolate obliquely twisted, herbaceous, keels margined or unequally winged; second glume membranous; acute 3-nerved, ciliate, palea minute, ciliate-sessile spikelets of the homogamous pairs, like the pedicelled, more or less covered with tubercle-based hairs.

*Local name* : Dabhsuliyan.

*Flowers* : October.

*Occurrence* : Recorded from Jamnagar and Sasangir Panelividi, Morvi ; Rajkot ; Okha.

*Uses* : The culms of the grass are used for thatching, they are also sometimes woven into mats. The root is stimulant and diuretic, and sometimes used in rheumatism. (WI)

**Heteropogon ritchiei** (Hook. f.) Blatt. et McCann in J. Bombay Nat. Hist. Soc. 32, 623. 1928 ; Bor, 165. 1960. *Andropogon ritchiei* Hook. f., Fl. Brit. India 7 : 201. 1896 ; Cooke 3 : 509.

Stems stout, erect rigid, 1.2 m and more high. Leaves 45 × 1 cm, linear from a narrow base, bluntly acuminate, flat, rigid, shortly hairy on both sides with bulbous-based hairs, the margins spinulosely serrulate; sheaths glabrous; ligule 6 mm long, membranous, divided almost to the base into numerous narrow acute segments. Racemes 2.5–5 cm long, green, hispid, the lower 1–2 pairs of spikelets homogamous. Sessile spikelets rather more than 6 mm long; callus nearly 2.5 mm long, densely bristly with brown hairs; lower involucral glume broadly ovate when opened out, bluntly acuminate, truncate, hairy on the back, the margins narrowly incurved, keels bristly, not channelled, dorsally obscurely nerved; upper invol.-glume linear-oblong with rounded and shortly apiculate apex, 3-nerved, with a coriaceous hispid centre and membranous margins; lower floral glume 4 mm long, narrowly linear, subacute, hyaline, nerveless; upper floral glume — represented by the acute not dilated base of the awn; awn more than 3.8 cm long, tortuous, with a dark brown more or less pubescent column; the upper part very slender. Pedicellate spikelets 13 mm long pedicels short, glabrous; lower invol.-glume lanceolate, acute the margins equally winged and infolded, the keels with a row of long tubercular-based golden-yellow bristles; upper invol.-glume as long, lanceolate, 3-nerved; lower floral glume 10 mm long, narrowly oblanceolate, hyaline; upper floral glume shorter, narrowly linear, acute.

*Flowers* : October to December.

*Occurrence* : Tulshishyam in Gir Forest, it was found near the temple on Rukhmani Dungar ; fairly common.

**Heteropogon triticeus** (R. Br.) Stapf ex Craib in Kew Bull. 432. 1912; Bor, 165, 1960 ; Santapau & Jan. 56. 1967. *Andropogon triticeus* R. Br., Prodr. 201. 1810 ; FBI 7 : 200 ; Cooke 3 : 509. *Heteropogon insignis* Thw., Enum. 437. 1864 ; Blatt. & McC. 108, t. 69. 1935.

Stems 2-3.5 m, hard, smooth, leafy. Leaves 30-60 cm, narrowly linear, acuminate, glaucous ; above and margins scabrid ; sheaths compressed, keeled, smooth ; ligule ciliate. Spikes 0.8-1.2 cm very stout, green ; lower 12-15 pairs of spikelets homogamous, male or neuter, joints very short. Sessile spikelets 1.2 cm cylindric, obtuse, caudate long-bearded with rufous silky hairs ; glume first truncate ; second glume obtuse third glabrous ; fourth awn hirsute, very stout. Pedicelled spikelets 1.8 cm, green, pedicel very short ; glume first more or less twisted ; lanceolate many-nerved, one keel winged ; second linear-lanceolate, margins ciliate ; third and fourth hyaline short, glabrous. Sessile spikelets of the homogamous pair like the pedicelled.

*Flowers* : November.

*Occurrence* : Recorded on the authority of H. Santapau & Janardhanan.

#### IMPERATA Cyr.

**Imperata cylindrica** (Linn.) Beauv., Ess. Agrost. 165. 1812 ; Santapau, Pl. Saur. 912. 1953 ; Bor, 169. 1960 ; Santapau & Jan. 56. 1967. *Lagurus cylindricus* Linn., Syst. Nat. ed. 10, 878. 1759. *Imperata arundinacea* Cyrill, Pl. Rar. Neap. 2 : 26. 1792, FBI 7 : 106 ; Cooke 3 : 464 ; Indraji 699. 1910.

Rootstock stoloniferous, often creeping ; stem 30-90 cm high, stout or slender, nodes naked or bearded. Leaves 15-45 × 0.25-0.6 cm, linear, flat, tapering from the middle to a finely acuminate point, smooth above, scaberulous beneath and on the margins sheaths, loose, glabrous ; ligule of long soft hairs. Panicle 7.5-20 cm long, narrow, spike-like, subcylindric, silvery-white ; branches short, crowded, appressed. Spikelets 0.3 cm long, lanceolate ; pedicels 0.1-0.3 cm long, hairs of callus twice as long as the spikelet. Glumes 4 ; invol.-glumes ovate-lanceolate, subequal in length, obtuse or subobtuse, with ciliate tips, 3-7-nerved ; lower floral glume less than  $\frac{1}{2}$  as long as the invol.-glumes, oblong, obtuse, denticulate, ciliate, nerveless ; upper floral glume ovate, glabrous, nerveless or with 1 faint nerve. Anthers 0.25 cm long, orange. Stigmas 0.3-0.4 cm long, purple.

*Local name* : Dholisar, Sarghas.

*Flowers* : October.

*Occurrence* : Recorded from Rajkot ; Barda Hill, this grass was found growing on the river banks of Bileshwari, Krishnazar, Netar, Toranio and Rukmavati rivers. near Barda forest.

*Uses* : It has been tried in India as a raw material for paper pulp. Mature leaves are coarse and are not relished by cattle, the saw-like edges are known to cause sores. It is reported to be a good source of vitamins A & C. Feeding experiments on young and adult animals show that the grass at any stage of growth produces acidic urine. It is a good soil binder for railway embankments, river banks, dams and coastal sand dunes. It is suitable for the reclamation of dry and desert areas. The grass is used for making ropes, brushes, mats and cowry bags, for plait work and weaving into baskets and plates. A sugar is prepared from the rhizome. (WI)

#### ISACHNE R. Brown

**Isachne dispar** Trin., Sp. Gram. 1, t. 86. 1828 ; Bor, 580. 1960 ; FBI 7 : 26.

Stem short ascending from a branched creeping base, 5–15 cm long. Leaves 1.2–2.5 cm ovate, cordate to lanceolate acuminate, spreading, rather rigid, striated : midrib slender. Spikelets green or purplish, obtuse, smooth and polished or scabrid or setulose ; pedicels smooth or rough ; glume first and second scabrid or setulose, nerves many, faint ; third glume glabrous ; fourth glume pubescent.

*Flowers* : October.

*Occurrence* : Recorded from Sasan, across river on river banks.

*Uses* : It is grazed by cattle and horses.

#### ISCHAEMUM Linn.

Pedicel or upper spikelet less than 1/3 the length of the lower spikelet :

Lower invol.-glume of sessile spikelets with nodulose margins

*indicum*

Lower invol.-glume of sessile spikelets closely transversely ribbed

*rugosum*

Lower invol.-glume of sessile spikelets dorsally villous all over, not transversely ridged nor with nodulous margins

*molle*

Pedicels of upper spikelet 1/3 the length of the lower spikelet or more

*pilosum*

***Ischaemum indicum* (Houtt.) Merrill** in J. Arn. Arbor. 19 : 320. 1938; Bor, 180. 1960 ; Santapau & Jan. 56. 1967. *Phleum indicum* Houtt., Nat. Hist. II, 13 : 198, t. 90, f. 2. 1782. *Ischaemum aristatum* auct. non Linn., FBI 7 : 126 ; Cooke 3 : 476 ; Santapau in RBSI 16 (1) : 279. 1960. *Ischaemum ciliare* Retz., Obs. 6 : 36. 1791.

Perennial ; stems 30–120 cm high, stout, erect or decumbent at the base, simple or branched above, leafy, glabrous, thickened at the top below the spikes. Leaves 10–25 × 0.4–2.5 cm, linear-lanceolate, finely acuminate, glabrous, glaucous beneath, narrowed to the base ; sheaths loose, glabrous, the mouth naked, auricled ; ligule membranous. Racemes 1 or 2 stout or slender, 2.5–10 cm long. Spikelets 0.5 cm long, a sessile and a pedicellate closely pressed together ; callus of sessile spikelets broad, thick 0.1 cm long. Sessile spikelets ; lower invol.-glume 0.5 cm long, broadly oblong, cartilaginous, upper invol.-glume lanceolate, acuminate, 1-nerved, membranous, male 2-sexual, with an oblong palea; upper floral glume female, cleft 10 or below the middle into lanceolate acuminate lobes, with a brownish-red awn 1.2 cm or more long at sinus, twisted below, straight above ; palea linear-oblong. Pedicellate spikelets as long as the sessile, inarticulate on the very thick, amorphous pedicel ; lower invol.-glume gibbous or scimitar-shaped, acute, coriaceous, upper invol.-glume and lower floral glume as in the sessile spikelets, upper floral glume hyaline, with a mucro or very short awn.

*Flowers* : October.

*Occurrence* : Collected from Somnath (T.A. Rao 573).

*Uses* : It is grazed by cattle.

***Ischaemum molle*** Hook. f. in Fl. Brit. Ind. 7 : 128. 1896 ; Cooke 3 : 477 ; Bor, 183. 1960 : Santapau & Jan. 56. 1967.

Stem 90–120 cm long, solid, smooth, stout, leafy. Leaves 15–25 × 0.6–0.8 cm, linear, finely acuminate, sparsely hairy, base rounded ; cordate ; sheaths 10–15 cm long, smooth glabrous, the mouth villous. Racemes 1–2, axillary and terminal 7.5–12.5 cm long, densely villous with soft white hairs. Spikelets 0.5 cm long, callus of sessile spikelets very short and broad. Sessile spikelets : lower invol.-glume thinly

coriaceous, broadly ovate, obtuse, dorsally villous all over, many-nerved, upper invol.-glume chartaceous, obtuse, silky, keeled, the keel with a narrow ciliolate wing from the middle upwards ; lower floral glume ovate, obtuse, hyaline, 3-nerved, ciliolate, paleate, the palea as long as the glume, narrow, obtuse ; upper floral glume shorter than the lower one, cleft to the middle into 2 lanceolate, ciliolate lobes ; palea small, narrow ; awn nearly 1.8 cm long, the lower half dark brown, the upper half yellowish-white. Pedicellate spikelets rather smaller than the sessile, with similar glumes but awnless.

*Flowers* : October.

*Occurrence* : Recorded from Sasan along river.

**Ischaemum pilosum** (Klein ex Willd.) Wight in *Madras Lit. Sci. J.* 138. 1835 ; (Also reprint P. 2, t. 2) Bor, 183. 1960 ; FBI 7 : 130 ; Cooke 3 : 479. *Andropogon pilosus* Klein ex Willd., Sp. Pl. 4, 920. 1806 ; FBI 7 : 130.

Stem very stout, extensively creeping ; stolons sheathed ; branches 60 - 90 cm, much divided at the base, nodes glabrous. Leaves 15 - 30 cm, flat or convolute, often wiry, coriaceous, glaucous, finely acuminate, glabrous, base and mouth of sheath bearded, ligule membranous, rounded. Spikes fascicled, 1.2 - 3.7 cm yellow or brownish, rachis hairy, joints and pedicels slender, compressed, sub-clavate, shorter than the sessile spikelets, sparsely ciliate. Sessile spikelets 0.4 - 0.6 cm, callus minute bearded with long hairs, glume first chartaceous, narrowed from the middle upwards, dorsally hairy, nerves anastomosing, margins inflexed from base to tip ; second rather longer, chartaceous, laterally compressed, acuminate, 5-nerved ; third linear-oblong obtuse, ciliate above, paleate, male, palea glabrous ; fourth glume as third one, 3-nerved, lobes ciliolate, awn variable in length ; palea narrow or broad, ciliate. Peduncled spikelets smaller but like the sessile ; or imperfect, sometimes reduced to a single glume.

*Flowers* : October.

*Occurrence* : Recorded from Rajkot, Jonpur vidi and Rozi near Jamnagar. Generally found in the uncultivated and fallow land.

*Uses* : The grass is moderately relished by cattle. It is best fed before flowering or just when flowers appear. It is also suitable for silage and rough hay. (WI)

**Ischaemum rugosum** Salisb., Icon. Strip. 1. t. 1. 1791 ; FBI 7 : 127 ; Cooke 3 : 477 ; Santapau, Pl. Saur. 913. 1953 ; Bor, 184. 1960 ; Santapau & Jan. 56. 1967.

Stems 30–60 cm, tufted, glabrous or puberulous. Leaves 10–25 cm, ligule short. Spikes 2.5–7.5 cm, pale yellow; joints 2/3 spikelets, very stout, ciliate. Spikelets 0.3–0.4 cm, pale yellow; glume first veined in the upper membranous third; ridges of lower 2/3 often imbricating like folds; second acute, keeled, scaberulous third lanceolate, acute hyaline, paleate; fourth glume nearly as second glume; awn short or long, very slender, listening, palea ovate-lanceolate. Pedicelled spikelets like the sessile, or imperfect.

*Flowers* : October.

*Occurrence* : Recorded from Jodiya Park, near Jamnagar ; Hirasar, found on wet places.

*Uses* : The grass is grazed by cattle and horses and is considered to be a good fodder. (WI)

#### ISEILEMA Anders.

Keel and submarginal nerves of the spathes granulate or tuberculate

*prostratum*

Keel and submarginal nerves of the spathe smooth

*laxum*

**Iseilema laxum** Hack. in DC., Monogr. Phan. 6 : 682. 1889 ; FBI 7 : 218, Cooke 3 : 516 ; Bor, 188. 1960 ; Santapau & Jan. 56. 1967.

Perennial ; stems 15–50 cm, long, ascending from a stout hard root-stock, very slender, simple, branched ; root fibres wiry. Leaves all cauline or the lower radical with equitant sheaths, 7.5–15 × 0.12–0.3 cm linear obtuse or subobtuse, glabrous but often ciliate near the base, sheaths lax; ligule membranous, truncate. Panicle flexuous, narrow, branches short, distant ; spathes 0.6 cm, elliptic-lanceolate, reddish keel and nerves scabrid. Invol.-spikelets 0.4 cm ; pedicels glabrous ; glume first oblong-lanceolate subacute, 5-nerved ; second glume 3-nerved ; third linear. Bisexual spikelets ; pedicel ciliate ; glume first chartaceous, lanceolate, acuminate, tip truncate ; second glume acuminate, 1-nerved, fourth glume awn, 1.2–1.6 cm, very slender.

*Flowers* : October.

*Occurrence* : Recorded from Jamnagar ; Dhunvav vidi Hirasar.

*Uses* : It is considered to be a one of the best fodder grasses and is relished by cattle and horses both in the green state and as hay. It retains its nutritive value till the flowering stage. (WI)

**Iseilema prostratum** (Linn.) Anderss. in Nov. Act. Soc. Sci. Upsal. Ser. 3, 2 : 251. 1856 ; Santapau, Pl. Saur. 914. 1953 ; Bor, 188. 1960 ; Santapau & Jan. 56. 1967. *Andropogon prostratus* Linn., Mant. Alt. 304. 1771. *Iseilema wightii* Anderss. in Nov. Act. Soc. Sci. Upsal. Ser. 3, 2 : 251. 1856 ; FBI 7 : 218, Woodrow in JBNHS 13 : 439. 1901 ; Cooke 3 ; 516.

Perennial, stem often prostrate and rooting at base then ascending, 20-90 cm high, nodes often bearded. Leaves 10-20 cm, narrow, smooth or scaberulous, floral scabrid with tubercled margins, upper glabrous or hairy ; ligule membranous, truncate. Panicle long or short, more or less compound ; branches crowded or distant, strict or geniculate ; nodes bearded ; lower spathes foliaceous, floral 0.6-0.8 cm, keels and margins tubercled. Involucr. spikelets male or neuter, pedicelled, oblong-lanceolate, glume first 5-ribbed, scaberulous. Bisexual spikelets, glume first bicuspidate ; second glume 3-nerved, fourth a slender awn three times as long as the spikelet or longer.

*Flowers* : November.

*Occurrence* : Woodrow reported it from Morvi.

*Uses* : It is considered by some to be a fair fodder for cattle in the flowering and preflowering stages ; some regard it as useless because of its pungent and unpleasant odour, especially in the fresh stages. It makes fine hay. (WI)

#### LEPTOCHLOA P. Beauv.

**Leptochloa panicea** (Retz.) Ohwi in Bot. Mag. Tokyo 55 : 311. 1941; Bor, 517. 1960 ; Santapau & Jan. 56. 1967. *Poa panicea* Retz., Obs. Bot. 3 : 11. 1783. *Leptochloa filiformis* of the Fl. Brit. Ind. 7 : 298. 1896 (non P. Beauv.)

Stem 30-60 cm, slender geniculately ascending. Leaves 10-25 cm, flat, flaccid, finely acuminate ; ligule short. Panicle 10-20 cm, contracted or diffuse, branches very many almost capillary ; spikelets 0.12 cm, glume first and second oblong-lanceolate, acute ; third and fourth glume broadly ovate, nerves and palea ciliate. Grain oblong, closely invested with the glume and palea.

*Flowers* : October.

*Occurrence* : Recorded on the authority of H. Santapau & Janardhanan.

*Uses* : It is eaten by cattle when young.

**MELANOCENCHRIS Nees**

Cluster of spikelets including the awns 8 mm long *jacquemontii*

Cluster of spikelets including the awns 10 mm or more long *abyssinica*

**Melanocenchrus abyssinica** (R. Br.) Hochst. in Flora 38, 274. 1855 ; in Obs. Bor, 473. 1960. *Eutriana abyssinica* R. Br. ex Fresen in Mus. Sencken 2, 142. 1837. *Melanocenchrus plumosa* Jaub. et Spach, I11. Pl. Or. 4, 37. 1851 ; FBI 7 : 284 ; Cooke 3 : 553.

A tufted, slender annual 10–20 cm high. Stem erect, minutely pubescent. Leaf-blade 2.5–5 × 0.1–0.15 cm, linear-lanceolate, filiform, acutely pointed, glabrous, distantly ciliate; sheath 2–3 cm long, covered with scattered tubercle-based hairs, margins distantly ciliate; ligule a hairy ridge. Inflorescence 2.5–8 cm long; rachis trigonous, minutely scabridulous. Spikelets in fascicles on rachis, 10–11 mm long, including the awns. Glumes 4; outer involucral glume rigidly coriaceous, 10–11 mm long including the awn, gradually narrowed from a villous base into a scabrid awn, 1-nerved; inner involucral glume coriaceous, narrowed to an awn but with broad, hyaline margin near base; outer floral glume ovate-lanceolate, scabrid all over the back, 2-toothed, one tooth on each side of the awn, paleate; palea 2-toothed at apex, as long as glume; inner floral glume stalked, distinctly 3-toothed at apex, scabrid at back; rachilla produced into two small teeth, one slightly larger than the other.

*Flowers* : August.

*Occurrence* : Recorded from Rozi Port near Jamnagar.

**Melanocenchrus jacquemontii** Jaub. & Spach., I11. Pl. Or. 4 : 36. 1851 ; Santapau, Pl. Saur. 915. 1953 ; Bor, 473. 1960 ; Santapau & Jan. 56. 1967. *Gracillea royleana* Hook. f. in FBI 7 : 284. 1896 ; Cooke 3 : 553.

Annual; stems 7.5–20 cm high, densely tufted, very slender. Leaves 2.5–5 cm long, scarcely reaching 0.15 cm broad, flat or convolute, linear-lanceolate, acutely pointed, glabrous or nearly so, the margins ciliate; sheaths with a few long scattered hairs; ligule a hairy ridge. Spike filiform, 1.2–5 cm long, flexuous, often recurved; rhachis 3-gonous, smooth. Clusters of spikelets 0.6–0.8 cm long (including the awns), green or purple, awns of invol.-glumes longer than the glumes, awn of floral glumes short.

*Flowers* : August to October.

*Occurrence* : Recorded from Dwarka, neighbourhood of station ; Gondal Road, Rajkot ; Sasangir to Junwania Nees, in open parts of forests, mixed with other grasses. It was a very small grass growing on rocks in small tufts, common ; Dhunvao vidi ; Jilla garden and Pradumna Park, Rajkot.

*Uses* : It is grazed by cattle when young.

### OPHIUROS Gaertn.

**Ophiuros exaltatus** (Linn.) O. Ktze., Rev. Gen. Pl. 2 : 780. 1891 ; Bor, 199. 1960 ; Santapau & Jan. 56. 1967. *Aegilops exaltata* Linn., Mant. 2 : 576. 1771. *Ophiuros corymbosus* Gaertn. f., Fruct. 3 : 4, t. 181. 1805 ; FBI 7 : 160 ; Cooke 3 : 468 ; Santapau, Pl. Saur. 916. 1953.

Perennial. Stems erect from a tuberous base, 150–180 cm as thick as a goose-quill below, solid, branching upwards, leafy throughout. Leaves 15–60 cm by 1.2–2.5 cm flat (convolute in vernation), linear-lanceolate from a rounded base, finely acuminate, hairy above, margins spinulose ; sheaths short, terete, upper leafless ; ligule very short. Spikes corymbosely fascicled ; 5–12.5×0.2 cm diam., erect often in very dense fascicles, shortly peduncled ; joints as long and broad as the spikelets, tips obliquely truncate. Spikelets ovate-oblong, obtuse, glabrous ; glume first smooth or scrobiculate, at length recurved.

*Flowers* : November.

*Occurrence* : Recorded from Kota 4 m. SE, of Khambalia and Jamnagar, Hirasar, found on wet places.

*Uses* : This grass is much used for thatching. It is also eaten by cattle when young. (WI)

### OPLISMENUS P. Beauv.

**Oplismenus burmannii** (Retz.) Beauv., Agrost. 54 : 168-69. 1812 ; FBI 7 : 68 ; Cooke 3 : 443 ; Bor, 317. 1960 ; Santapau & Jan. 56. 1967. *Panicum burmanii* Retz., Obs. 3 : 10. 1783.

A very slender diffusely branched leafy grass ; stems 15–45 cm long; nodes glabrous or hairy. Leaves 1.8–5×0.6–1.2 cm ovate or ovate-lanceolate, acuminate, sheaths, glabrous or hairy. Panicle 2.5–6.2 cm long, peduncle slender, usually very ; branches of panicle spikelike, few,

distant, subsessile, 0.4–0.6 cm long, rhachis slender, angular, clothed with hairs, nearly as long as the spikelets. Spikelets 0.25 cm long, secund, solitary or 2-nate; pedicels short, hairy. Glumes 4; lower invol.-glume 0.15 cm long, ovate, obtuse, 3-5-nerved, hyaline, silky-hairy and ciliate; upper invol.-glume similar and subequal to the lower, 5-nerved, with an awn, 0.5 cm long; lower floral glume 0.25 cm long (excluding awn), broadly ovate, subobtuse, concave, hyaline silky-hairy and ciliate, 7–9 nerved; empty, epaleate; upper floral glume as long as the lower, ovate, acute, membranous, with incurved margins, palea as long as the glume, membranous, ovate oblong acute with strongly involute margins.

*Flowers* : October.

*Occurrence* : Recorded from Sansgir Junwania Nees, common and fairly abundant.

*Uses* : It is much relished by cattle, particularly when young and green; it also yields good hay. (WI)

### ORYZA Linn.

Spikelets persistent; awned or awnless	<i>sativa</i>
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Spikelets deciduous; always awned	<i>nivara</i>
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**Oryza nivara** Sharma & Shastri, Ind. J. Genet. & Pl. Breed. 25 : 161. 1965 ; Santapau & Jan. 56. 1967 ; Nayar et al. Bull. Bot. Surv. Ind. 15 (3-4) : 223. 1973. *Oryza sativa* var. *fatua* Prain in Beng. Pl. 1184. 1903.

An annual; growing in water or swampy places, culms up to 2 m high, often with rootlets developing on the nodes below the water surface; stems spongy below. Leaf-blades flat 18–40 cm long by 6 mm broad, prominently nerved, linear, finally tapering to a point, margins very scabrid, main nerves scabrid on both surfaces; sheaths smooth, many-nerved, striate, markedly inflated at the base of the plant; ligule membranous, up to 1 cm long, finally splitting. Panicles effuse, at first concealed within the spathe-like sheaths of the uppermost leaf. Pedicels long or short, minutely scabrid, the top of the pedicels is expanded into an annular ring or into two minute scales which represent the glumes. First and second lemmas empty, similar, 1-nerved keeled, scabrid on the margin near the apex, about 2.5 mm long. Fertile lemma with a conical callus, cymbiform, coarsely scabrid on the keel and ridges, at the apex glandular, terminating in an awn which may be 7 cm long or more; awn coarsely scabrid and jointed on the lemmas. Palea very similar to the lemma and as long or slightly longer.

*Local name* : Jungali chokha.

*Flowers* : October.

*Occurrence* : Given here on the authority of H. Santapau & Janardhanan.

*Uses* : The grain is edible and is eaten in times of want.

**Oryza sativa** : Linn., Sp. Pl. 333. 1753 ; FBI 7 : 92 ; Cooke 3 : 565 ; Santapau, Pl. Saur. 917. 1953 ; Bor, 605. 1960 ; Santapau & Jan. 56. 1967.

Stems 60-250 cm, creeping or floating. Leaves 30-60 × 0.6-0.8 cm or more, flat, striated, 1-nerved, scaberulous, sheaths smooth. Panicle at length drooping. Spikelets not imbricating, awn 7.5-12.5 cm long, yellow or reddish, shining.

*Local name* : Chokha.

*Flowers* : October.

*Occurrence* : Recorded from Veraval to Sasan, just within the Gir ; Rajkot ; Junagadh, Visavadar junction, in several fields.

*Uses* : Cultivated as a staple grain where sufficient irrigation is available.

### PANICUM Linn.

Lower invol.-glume as long as the lower floral glume or nearly so

*turgidum*

Lower invol.-glume shorter than the lower floral glume :

Annuals :

Leaves 2.5 cm broad ; panicle 25 cm long *maximum*

Leaves 0.8 cm broad ; panicle 10-25 cm long *trypheron*

Perennials :

Lower invol.-glumes very minute *sumatrense*

Lower invol.-glumes distinctly evident :

Spikelets laxly clustered on the branches *antidotale*

Spikelets solitary *notatum*

**Panicum antidotale** Retz., Obs. Bot. 4 : 17. 1786 ; FBI 7 : 52 : Woodrow in JBNHS 13 : 434. 1901 ; Cooke 3 : 453 ; Indraji 697. 1910 ; Santapau, Pl. Saur. 918. 1953 ; Bor, 322. 1960 ; Santapau & Jan. 56. 1967.

A tall glabrous perennial grass reaching 150 cm high ; rootstock creeping, stoloniferous ; stem solid, woody, terete, smooth ; nodes thickened, the lower sometimes rooting. Leaves 15–60 × 0.4–1.8 cm, linear very finely acuminate with capillary tips. Sheaths long, glabrous, striate, with naked margins ; ligule short, membranous. Panicle 15–22.5 cm long, effuse, pyramidal ; rhachis very slender angular, glabrous or slightly scaberulous ; branches usually fascicled, 7.5–10 cm long, filiform, spreading and drooping ; branchlets capillary. Spikelets laxly crowded on the branchlets, 0.3 cm long, ovoid, acute, glabrous. Glumes 4 ; lower invol.-glume  $\frac{1}{2}$  as long as the upper, broadly ovate, sub-obtuse, 3-nerved, hyaline ; upper invol. glume broadly ovate, acuminate 7–9 nerved, membranous ; lower floral glume equal and similar to the upper invol.-glume, paleate, empty or male, the palea oblong ; subacute, hyaline, as long as the glume ; upper floral glumes coriaceous, elliptic, obtuse, with incurved margins, dorsally smooth, yellowish white ; palea thinly coriaceous, ovate, acute, as long as the glume. Anthers linear-oblong. Styles 2, distinct, conspicuous, very plumose.

*Local name* : Dhunsado, Dhunsgas.

*Flowers* : March.

*Occurrence* : Recorded from Barda Hill, in the forest of Ghed and Naliyadhar ; Woodrow reported it for Kathiawar.

*Uses* : This grass is suitable for grazing and is said to be palatable to all animals at all stages of growth, except when mature (WI).

**Panicum maximum** Jacq., Collect. Bot. 1 : 76. 1786 ; FBI 7 : 49 : Bor, 327. 1960 ; Santapau & Jan. 56. 1967. *P. jumentorum* Pers., Syn. Pl. 1 : 83. 1805 ; Indraji 697. 1910 ; Santapau, Pl. Saur. 919. 1953.

Perennial 240–300 cm high ; stem branching, branches erect, nodes naked or bearded. Leaves 30–60 × 1.2–2.5 cm, gradually narrowed from a small rounded or auricled base to a long filiform point, quite smooth, nearly glabrous ; sheaths long, mouth villous ; ligule of long hairs. Panicle 30–60 cm, quite erect, branches erect, filiform, smooth ; pedicels usually shorter than the spikelets, glabrous or very sparsely pubescent, bright green, glistening, glumes thin.

*Local name* : Ginighas.

*Flowers* : During summer and monsoon.

*Occurrence* : Recorded from Barda Hill, near the water. Also growing in the garden near Porbander.

*Uses* : Guinea grass is used mainly as green fodder, but it also makes an excellent silage and hay (WI).

**Panicum notatum** Retz., Obs. Bot. 4 : 18. 1786 ; Bor, in Feddes, Report, 63 : 331. 1960 ; Santapau & Jan. 56. 1967. *P. montanum* Roxb., Fl. Ind. 1 : 313. 1820 ; FBI 7 : 53 ; Cooke 3 : 454.

Perennial. Stem 90-120 cm, or more, smooth, hard, sparingly branched. Leaves 12.5-17.5×1.8-3.1 cm, thin glabrous or pilose, smooth or scaberulous beneath, striate, base ciliate, midrib sometimes excentric ; sheath glabrous or pubescent, mouth hairy, ligule obscure. Panicle 20-45×20-25 cm branches whorled or alternate ; axils sometime glandular, lower strict and unbranched from 2.5-7.5 cm. Spikelets terete, glabrous or faintly hairy ; glume second fugacious seed smooth, brown with three stripes.

*Flowers* : January.

*Occurrence* : Recorded on the authority of H. Santapau & Janardhanan.

**Panicum sumatrense** Roth ex Roem. & Schult., Syst. 2 : 434. 1817 ; Bor, in Feddes Report. 63 : 328. 1960 ; Santapau & Jan. 56. 1967. *P. miliare* Lamk., Tab. Encycl. 1 : 175. 1791, nom. illegit. FBI 7 : 46 ; Cooke 3 : 456, p.p.

Annual, stem 30-90 cm, rather slender, erect or base geniculate, simple or branched, usually leafy up to the panicle. Leaves 30-60 cm×1.2-2.5 cm, flat and sheaths hirsute with tubercle-based hairs, acute or acuminate ; ligule a narrow row of hairs. Panicle 5-25 cm, lower branches long, pedicels of spikelets sometimes 1-2 cm. Spikelets glabrous, rather flattened, usually green or purplish ; glume first variable, white, membranous, margins overlapping at the base, nerves arching and anastomosing ; second and third glume herbaceous ; palea of third as long as its glume.

*Local name* : Gadro.

*Flowers* : August.

*Occurrence* : Recorded on the authority of H. Santapau & Janardhanan.

*Uses* : The husk is cooked like rice and eaten. It is also made into flour, used for making puddings or cakes (WI).

**Panicum trypheron** Schult., Syst. Veg. 2, Mant. 244. 1824 ; FBI 7 : 47 ; Cooke 3 : 452 ; Bor, 331. 1960 ; Santapau & Jan. 57. 1967.

Annual. Stem 30–90 cm high, tufted, erect or geniculate below, leafy chiefly near the base ; nodes rarely rooting. Leaves 7.5–25 × 0.3–0.6 cm, usually flat, thin, acuminate glabrous hairy or hirsute on both surfaces or beneath only ; ligule short, fimbriate. Panicle 10–25 cm, erect, often as broad as long. Spikelets green, yellow or purplish ; glume four ; variable in breadth, and in colouring, from pure white to greenish-brown, with 3–5 darker dorsal stripes.

*Flowers* : September.

*Occurrence* : Recorded on the authority of H. Santapau & Janardhanan.

(WI) *Uses* : The seeds are said to be used for bread in times of scarcity.

**Panicum turgidum** Forssk., Fl. Aegypt.-Arb. 18. 1775 ; FBI 7 : 44 ; Woodrow in JBNHS 13 : 434. 1901 ; Cooke 3 : 451 ; Santapau, Pl. Saur. 920. 1953 ; Bor, 331. 1960 ; Santapau & Jan. 57. 1967.

Perennial, glabrous, glaucous ; rootstock, sometimes as thick as the little finger ; root-fibres thick, velvety ; stem hard, solid smooth, and polished, 0.25–0.3 cm in diam., about the middle emitting from the nodes fascicles of branches in tufts from a swollen base. Leaves few, those at the base of the stem and branches 2.5–7.5 cm long, flat, coriaceous, linear lanceolate, acuminate, smooth, those of the upper nodes often reduced to open chartaceous sheaths with a setiform blade. Panicle terminal, subpyramidal, 3.7–10 cm long, branches at first erect, then more or less spreading, 1.2–3.7 cm long ; rhachis angular, grooved, glabrous. Spikelets 0.3–0.4 cm long, solitary or rarely 2-nate, subsecund ovoid, turgid, glabrous, white, pedicels short or long, with a cupular tip. Glumes 4, subcoriaceous ; lower invol.-glume scarcely shorter than the upper, and about equalling the lower floral glume, broadly ovate, acute, 5–7 nerved ; upper invol.-glume broadly ovate, acute 7 nerved, lower floral glume ovate, acuminate, 9 nerved, paleate, male ; upper floral

glume much smaller than the lower, ovate-oblong, acute, smooth polished. Anthers purple. Styles short ; stigmas short, pale purple.

*Flowers* : November.

*Occurrence* : Woodrow reported from Rajkot, also recorded from Beyt.

*Uses* : The grass is remarkably drought resistant and is very valuable as a sand binder. When green, the grass is largely eaten by all animals, but when dry only camels and donkeys browse on it (WI).

### PASPALIDIUM Stapf

Spikes shorter than the internodes	<i>flavidum</i>
Spikes longer than the internodes	<i>geminatum</i>

**Paspalidium flavidum** (Retz.) A. Camus in Lecomte, Fl. Gen. Indo-Chine 7 : 419. 1922 ; Santapau, Pl. Saur. 921. 1953 ; Bor, 333. 1960 ; Santapau & Jan. 57. 1967. *Panicum flavidum* Retz., Obs. 4 : 15. 1786 ; FBI 7 : 29 ; Woodrow in JBNHS 13 : 433. 1901 ; Cooke 3 : 445 ; Indraji 695. 1910.

Stem 30-120 cm, compressed, leafy, branches from the decumbent base. Leaves bifarious, 7.5-12.5×0.4-0.6 cm linear-lanceolate acuminate, or ligulate with a rounded tip ; sheaths compressed, lower tumid, smooth hairy ; ligule 0. Spikes few or many, distant 1.2-2.5 cm. Spikelets 2-20 ; very pale sessile. Glumes membranous, white with green nerves ; third glume neuter or male ; fourth glume sometimes almost orbicular, white or brownish, very minutely rough.

*Local name* : Zinko samo.

*Flowers* : October.

*Occurrence* : Recorded from Sasan Gir and Sadgi Vidi Junagadh ; Rajkot, heavily grazed grassland ; Woodrow reported it for Morvi and Porbander.

*Uses* : The grass is considered to be an excellent fodder and the grain is collected and eaten in times of scarcity. The leaves and roots are said to be slightly cyanogenetic (WI).

**Paspalidium geminatum** (Forssk.) Stapf in Prain, Fl. Trop. Afr. 9 : 583. 1920 ; Santapau, Pl. Saur. 922. 1953 ; Bor, 333. 1960 ; Santapau Jan. 57. 1967. *Panicum gaminatum* Forssk., Fl. Aegypt.-Arb. 18. 1775. *P. fluitans* Retz., Obs. Bot. 3 : 8. 1783 ; Cooke 3 : 446. *P. paspaloides* Pers., Syn. 1 : 81. 1805, FBI 7 : 30.

Perennial, stem glabrous ; prostrate, usually floating below and rooting at the nodes. Leaves spreading, linear, acuminate acute or obtuse, lower sheaths dilated. Spikes 1.2-2.5 cm appressed to the narrow ; compressed, setulose rachis. Spikelets subsessile, turgid. Glumes membranous, four, lower invol.-glume 0.12 cm long, broader than long, without nerves, white ; upper invol.-glume ovate, acute, concave, thinly membranous, 5-7 nerved, slightly shorter than the upper floral glume, lower floral glume subcoriaceous 5-7 nerved, paleate, empty or male ; upper floral glume broadly ovate, mucronate, thinly coriaceous, smooth or nearly so ; palea with inflexed membranous margins.

*Flowers* : October.

*Occurrence* : Recorded from Rajkot Pradumna Park ; Ranjit Sagar, Jamnagar ; Sasan, river up stream ; Mithapur talao, stems floating, abundant locally.

*Uses* : It is used as fodder grass.

#### PASPALUM Linn.

Annual ; leaves 15-45×0.2 - 0.8 cm a tall plant 60-90 cm high	<i>scrobiculatum</i>
Perennial :	

Leaves 5-10×0.12-0.4 cm	<i>distichum</i>
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Leaves 5-10×0.8-1 cm	<i>vaginatum</i>
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**Paspalum distichum** Linn., Syst. Nat. ed. 10, 2 : 855. 1759 ; FBI 7 : 12 ; Cooke 3 : 460 ; Indraji 695. 1910 ; Santapau, Pl. Saur. 923. 1953 ; Bor, 338. 1960 ; Santapau & Jan. 57. 1967.

Perennial, stems 2.5-15 cm, many noded, erect or inclined from the long creeping base, usually stout, compressed below. Leaves 5-10×0.12-0.4 cm, linear-lanceolate, acuminate strict, flat or involute, glabrous or sparsely hairy towards the flattened sheath, ligules very short, truncate. Spikes 2-nate, shortly pedunculate and articulate on the top of the stem ;

rhachis herbaceous, 0.12 cm broad. Spikelets subsessile, solitary or 2-nate, elliptic-oblong, 0.2 - 2.4 cm long, acute, dorsally flattened, imbricate and appressed to the rhachis, glabrous, pale. Lower invol.-glume 0 ; upper invol.-glume membranous, with a scarcely evident midnerve ; upper floral glume shorter, elliptic, concave, acuminate, subcoriaceous, smooth nearly white ; palea not or obscurely auricled. Anthers 0.12 - 0.15 cm long.

*Local name* : Moti Kodari, Jungali Kodari.

*Flowers* : October.

*Occurrence* : Recorded from Rajkot river bed.

*Uses* : It is said to be a useful soil binder and valuable pasture grass.

**Paspalum scrobiculatum** Linn., Mant. 1 : 29. 1767 ; FBI 7 : 10 (excl. Syn. *P. orbiculare* Forst.) ; Cooke 3 : 460 ; Indraji 695. 1910 ; Santapau, Pl. Saur. 924. 1953 ; Bor, 340. 1960 ; Santapau & Jan. 57. 1967.

Annual, stems 60 - 90 cm long, tufted on a very short rhizome, erect, leafy from the base upwards, glabrous. Leaves bifarious, erect or suberect, 15 - 45 × 0.2 - 0.8 cm, finely acuminate, glabrous or sometimes soft hairy ; sheath ; 10 - 20 cm long, compressed, loose, the mouth hairy with very short membranous ligules. Spike 2 - 6, sessile, distant, 2.5 - 15 cm long ; rhachis herbaceous ; 0.2 - 0.3 cm broad with ciliate margins. Spikelets usually 2-ranked, 0.2 - 0.3 cm in diam. Sessile or shortly pedicellate, broadly elliptic or suborbicular. Glumes 3 ; lower invol.-glume 0, the upper convex, 3 - 7 nerved, membranous ; lower floral glume flat, membranous ; upper floral glume thickly coriaceous, brownish, shining, striolate ; palea orbicular, tumid thickly coriaceous like the upper floral glume dorsally convex, ventrally strongly inflexed below the middle and forming 2 broad membranous auricles that embrace the grain.

*Local name* : Kodaro.

*Flowers* : During monsoon.

*Occurrence* : Recorded from Porbander, near creek water and in the field where rainy water accumulates.

*Uses* : The grain is cooked like rice and is also used for preparing a kind of bread. The grain should be well matured and stored for six months before use as food, as immature or newly gathered grains are reported to be poisonous. The straw is considered to be a good cattle fodder (WI).

**Paspalum vaginatum** Swartz, Prodr. Veg. Ind. Occ. 21. 1788 ; Bor, 341. 1960 ; Santapau & Jan. 57. 1967. *P. disticum* of FBI, 7 : 12. 1896 (non Linn.)

An extensive, perennial, aquatic grass; creeping and rooting from lower nodes. Stem glabrous, swollen at nodes, stout. Leaves numerous, distichous,  $5-10 \times 0.8-1$  cm linear-lanceolate, acuminate, spreading flat membranous ; sheaths 6-8 mm long, thin, glabrous, mouth bearded, base characteristically villous, usually shorter than internodes ; closely fitting ; ligule a short, truncate, membranous rim. Racemes 2-3 nate, 3-5 cm long, shortly pedunculate, articulate at top of stem; rachis herbaceous, 2-3 mm long, spikelets 3 mm long, solitary or 2 nate, elliptic, oblong, acute, dorsally flattened, imbricate, adpressed to rachis, glabrous, lower invol. glume 0 ; upper invol. glume membranous, glabrous ; lower floral ovate, midnerve distinct ; upper floral glume, elliptic, concave, sub-coriaceous, smooth, nearly white ; palea not or obscurely auricled.

*Flowers* : October.

*Occurrence* : Recorded on the authority of H. Santapau & Janardhanan.

*Uses* : It is an efficient sandbinder.

#### PENNISETUM Rich.

**Pennisetum typhoides** (Burm.) Stapf & C.E. Hubb. in Kew Bull. 271. 1933 ; Santapau, Pl. Saur. 926. 1953 ; Bor, 350. 1960 ; Santapau & Jan. 57. 1967. *P. typhoideum* Rich. in Pears. Syn. 1 : 72. 1805 P. P. ; FBI 7 : 82 ; Cooke 3 : 432. *Alopecurus typhoides* Burm., Fl. Ind. 27. 1768.

Annual. Stem 90-180 cm, erect, simple, or branched from the root, slender or stout, sometimes as thick as the middle finger, at the base, solid, leafy, upper nodes glabrous or woolly, lower rooting. Leaves 30-90 cm  $\times$  0.6-5 cm, lanceolate, spreading and drooping, flat, more or less hairy ; midrib stout or slender ; sheath rather inflated ; ligule of hairs. Peduncle more or less woolly below the spike. Spike 15-30  $\times$  0.6-3.7 cm diam., erect, cylindric, dense-fid ; rachis hairy or woolly, branchlets 1-8-fid, concealed by the densely packed spikelets ; bristles of involucel more or less unilateral, as long as the spikelets or longer, scabrid and ciliate, white-spikelets 0.4-0.5 cm, usually solitary in the involucel, oblong, ovate or ovate-lanceolate pedicelled, pedicel ciliate ; glume first minute or 0,  $\frac{1}{2}$ -orbicular or subquadrate, 1-3-nerved ; second very variable in length,

sometimes absent, usually 0.4–1.2 fourth, subquadrate, truncate, obtuse or retuse 3-nerved, very rarely as long as fourth and coriaceous, third ovate-oblong, obtuse or truncate and apiculate, 5-nerved, epaleate or paleate, and male or neuter, rarely bisexual, fourth coriaceous or herbaceous, ovate, 5–7-nerved; palea very broad, truncate, ciliate at the tip and dorsally, nerves and approximate excurrent. Lodicules 0. Anthers linear. Grain oblong, obovoid, or pyriform, smooth, free, and top exposed.

*Local name* : Bajari, Bajaro.

*Flowers* : September to October.

*Occurrence* : Recorded from Rajkot, Pradumna Park and Dwarka near station. It was found cultivated in fields.

*Uses* : Bajra serves as a staple food grain in many parts of Saurashtra. It is a nourishing food. Bajra straw is utilized as an inferior fodder in more or all the states. It is considered inferior to cereal straws. It is not relished by cattle.

#### PHRAGMITES Trin.

**Phragmites karka** (Retz.) Trin. ex Steud., Nom. Bot. ed. 2, 2 : 324. 1841 ; Santapau, Pl. Saur. 927. 1953 ; Bor, 416. 1960 ; Santapau & Jan. 57. 1967. *Arun lo karka* Retz., Obs. Bot. 4 : 21. 1786.

Culm erect, stout, perennial, piped, 15–30 cm high, covered with the leaf sheaths up to the inflorescence. Leaves lanceolate, in luxuriant plants 4–7 m long, and about 2.5 cm broad, margins scabrous. Panicle loose, 30–45 cm long, erect, composed of numerous filiform, scabrous branches, generally of a purplish-brown colour. Spikelets numerous, crowded, flowers 7.5–12.5 cm each. Glumes oblong, lanceolate, 4–5 line long. Inferior flower male, its flowering glume linear, subulate. Superior flowers hermaphrodite. Glumes glabrous, but they are covered with long silky hairs from the rachis.

*Local name* : Nairi, Nali.

*Flowers* : April.

*Occurrence* : Recorded from Junagadh, Burning Ghat, growing in dense clumps near water.

**Uses :** The reed stalks have been suggested as a potential source of rayon pulp. The reed when young is eaten by cattle. The roots are reported to be used also for fractured bones. (WI).

#### PSEUDANTHISTIRIA Hook. f.

**Pseudanthistiria heteroclita** (Roxb.) Hook. f., Fl. Brit. Ind. 7 : 219. 1897 ; Indraji 507. 1910 ; Bor, 203. 1960. *Anthistiria heteroclita* Roxb., Fl. Ind. 1, 253. 1820.

Stems 30–80 cm high, geniculate, slender, terete, smooth, subsimple or branched. Leaves linear, 15–30 cm long, 3–5 mm broad, glabrous or more or less ciliate on both surfaces, nerves distinct, margins with long, tubercle-based hairs or nearly glabrous, sheaths much shorter than the internodes, quite glabrous ; ligule short, membranous, exauriculate. Panicles 20–30 cm long, leafy, compound, with many shortly peduncled fascicles, fascicles of spikes about 12 mm broad, proper spathes 7–10 mm long; hardly longer than the spikes, towards the margin with long tubercle-based bristles ; spikes 6–8 mm long. Sessile spikelets 3–4 mm long, linear-oblong, hispidulous all over. Lower involucral glume furrowed. Upper floral glume awned, awn 18–24 mm long, thin. Pedicelled spikelets lanceolate, with a few long, tubercle-based bristles, keel ciliate.

*Local name :* Zinku-ful-ghas.

*Flowers :* November.

*Occurrence :* Collected from Mindha-Nes, 4 km. from Tulshishyam, from the river bed.

#### ROTTBOELLIA Linn.

**Rottboellia exaltata** Linn. f., Nov. Gram. Gen. 40, t. 1. 1779 & in Suppl. Pl. 114. 1781 ; FBI 7 : 156 ; Cooke 3 : 472 ; Bor, 206. 1960 ; Santapau & Jan. 57. 1967.

Stems 180–250 cm, stout, erect, spongy within, as thick as the little finger below and hispid above, margins scabrid, sheath hispid with tubercle-based hairs or glabrate. Spikes 7.5–15 cm, stout, cylindric below, much narrowed with imperfect spikelets above ; joints smooth, scaberulous. Sessile spikelets 0.4–0.5 cm. Glumes 4 ; glume first ovate-oblong, 2-fid ; keels scaberulous narrowly winged, entire or emarginate, second

broadly ovate, chartaceous ; convex, 9-11-nerved, keel scabrid ; third glume elliptic, 5-nerved, male, margins inflexed, fourth glume shorter, convex, ovate, acute or mucronate. Pedicelled spikelets with the pedicel usually adnate by one margin to the joint, 1-2-fid or neuter.

*Flowers* : October.

*Occurrence* : Recorded from Sasan, high hill north of village, only a few isolated small clumps at top of hill seen.

*Uses* : The grass is said to be excellent for hay when young and also for silage. Cattle and horses are said to relish it all stages of its growth, but it is not eaten by grazing animals because of its stiff sheath hairs. The almost pungent hairs on the leaf sheaths sometimes cause irritation of the skin.

### SACCHARUM Linn.

Stem silky below the panicle	<i>spontaneum</i>
Stem glabrous below the panicle :	
Lower glume dorsally villous	<i>bengalense</i>
Lower glume glabrous	<i>officinarum</i>

**Saccharum bengalense** Retz., Obs. Bot. 5 : 16. 1789 ; Bor, 211. 1960; Santapau & Jan. 57. 1967. *S. arundinaceum* Hook. f., Fl. Brit. Ind. 7 : 119. 1896 ; (in part non Retz.) Cooke 3 : 465, (non Retz.).

Perennial. Stem 4-7 m erect from a stout root-stock, branching after the second year. Leaves 90-12 cm × 5-7.5 cm, broadest about the middle, tapering to a slender point, midrib white ; sheath bearded about the mouth ; ligule short, hairy. Panicle 30-60 cm, erect, ovoid or oblong ; branches half-whorled, clothed with soft cream-coloured rarely purplish hairs. Spikes 2.5-7.5 cm, rachis capillary. Spikelets 0.25 cm, lanceolate, pale green violet or brownish. Glume 4, first glume dorsally flat or depressed, nerveless except the keels ; second glume lanceolate, shortly acuminate, third glume oblong lanceolate ; fourth glume mucronate.

*Local name* : Sarkhat.

*Flowers* : In winter.

*Occurrence* : Recorded on the authority of H. Santapau & Janardhanan.

**Uses :** This species is of great value for the fibre (Munj) extracted from the upper leaf sheaths of the flowering culms. For this purpose, only the two upper-most leaves are used, as they have longest sheaths. It is extensively employed in the manufacture of cordage and ropes and for making winnowing trays and cart covers and the thicker lower portions are used for making screens and small cheap chairs, stools, tables, and baskets. The grass is good source of furfural. It can also be tried as a potential source of alcohol. (WI)

**Saccharum officinarum** Linn., Sp. 1, 54. 1753; FBI 7 : 118; Cooke 3 : 466; Santapau, Pl. Saur. 929. 1953; Bor, 212. 1960; Santapau & Jan. 57. 1967.

Stem solid glabrous below the panicle, upper leaves long margins scabrid, joints of spikes and pedicels glabrous, hairs of callus about twice as long as the spikelet. Glumes 4; first glume glabrous subchartaceous, fourth very narrow or 0, palea small lanceolate.

**Local name :** Sheradi (Sugar cane).

**Flowers :** November.

**Occurrence :** Under cultivation in various parts.

**Uses :** Cultivated for producing gur and sugar.

**Saccharum spontaneum** Linn., Mant. Alt. 183. 1771; FBI 7 : 118; Cooke 3 : 465; Indraji 699. 1910; Santapau, Pl. Saur. 930. 1953; Bor, 214. 1960; Santapau & Jan. 57. 1967.

A tall erect grass, reaching sometimes 7 m high stem erect from a stout rootstock, solid, smooth, polished, silky beneath the panicle. Leaves 30–75 cm × 0.3–0.6 cm, narrowly linear, finely acuminate, rigid, coriaceous, usually glabrous, often with convolute margins; sheaths smooth, with fimbriate mouth; ligule ovate, membranous. Panicle 20–60 cm long, lanceolate, silky-hairy; rachis slender; branches 3–5-nate, 5–10 cm long, rhachis of racemes almost capillary, fragile. Spikelets 0.4 cm long, lanceolate; callus minute, bearded with spreading silky hairs 1.2 cm long. Glumes 4; lower invol.-glume lanceolate-subulate, acuminate; upper invol.-glume equal to the lower, lanceolate, obscurely keeled, 1-nerved, lower floral glume ovate-lanceolate, subacute, ciliate; hyaline, nerveless upper floral glume very slender, ciliate; palea minute, ciliate.

**Local name :** Kans, Kansado.

**Flowers :** April to October.

*Occurrence* : Recorded from Ranjit Sagar, Jamnagar, Bhavnagar, Sasan Iran river up stream and Kankai.

*Uses* : It is reported to cause sometimes pollen allergy. Kans is used for thatching of roofs and its leaves are used for making ropes. Pulps suitable for wrapping, writing printing and grease-proof papers can be produced from the grass.

#### SCHOENFFELDIA Kunth

**Schoenfeldia gracilis** Kunth, Rev. Gram. 1 : 283, t. 53. 1830 ; FBI 7 : 289 ; Bor, 474. 1960 ; Santapau & Jan. 57. 1967. *Chloris pallida* (Edgew.) Hook. f. in t.l. Brit. Ind. 7 : 289. 1896. *Schoenfeldia pallida* Edgew. in J. Asiat. Soc. Beng. 21, 183. 1852.

Stem 25-45 cm, simple or branched, almost filiform. Leaves 15-20 cm, golden yellow, erect, rachis flattened, serrulate. Spikelets 0.20 cm, subsessile. Glumes 4; first and second glumes ovate-lanceolate, subaristately acuminate, 1-nerved, keels ciliate; first glume 1/4 shorter than second glume, third glume rather longer than first, sessile, ovate, 1-nerved, hairy, base bearded, tip minutely notched; awn 1.6-2.5 cm long, capillary, curved; palea narrow, keels ciliate, tip 2-toothed. Grain very slender, acute, pericarp loose.

*Flowers* : October.

*Occurrence* : Recorded from Jamvali in Saurashtra, abundant heavily grazed grassland.

*Uses* : The grass is used for thatching and sometimes for cordage. It is good fodder for sheep and camels.

#### SEHIMA Forssk.

Lower invol.-glume of sessile spikelets 6-nerved	<i>nervosum</i>
Lower invol.-glume of sessile spikelets 2-nerved	<i>sulcatum</i>
Lower invol.-glume of sessile spikelets 3-5-nerved	<i>ischaemoides</i>

**Sehima ischaemoides** Forssk., Fl. Aegypt.-Arab. 178. 1775 ; Bor, 218. 1960 ; Santapau & Jan. 57. 1967.

Annual ; culms usually in small fascicled, rarely over 45 cm high, slender, terete, simple, 2- or 3-noded, glabrous. Leaves glaucous, sheath terete, tight, or the upper somewhat inflated, smooth or slightly rough, glabrous ; ligules a fringe of stiff hairs ; blades linear, tapering to a long fine point, up to 12.5 cm long, 2-4 mm wide. Racemes solitary or sometimes an additional 1 or 2 from the upper nodes, 2.5-7.5 cm long, erect, joints and pedicels parallel, sublinear, 4 mm long, very densely ciliate. Sessile spikelets linear; 9.5-15 mm long, pale green, with a shortly bearded callus ; lower invol.-glume sub-chartaceous to chartaceous with long beak, 2-keeled, 3-5-nerved upper invol.-glume subchartaceous, boat-shaped, sublinear, keeled above 5-nerved ; upper floret hermaphrodite, lower floret floral glume faintly 2-nerved hyaline, ciliate, paleate male. Pedicelled spikelets narrowly lanceolate, long-acuminate, pale green, up to 17 mm long, glabrous, lower invol.-glume with 2 long setaceous teeth, hairy on back.

*Flowers* : September.

*Occurrence* : Recorded from Morvi, Halar District.

**Sehima nervosum** (Rottl.) Stapf, in Prain, Fl. Trop. Afr. 9 : 36. 1917; Santapau, Pl. Saur. 931. 1953 ; Bor, 218. 1960 ; Santapau & Jan. 57. 1967. *Andropogon nervosum* Rottl. ex Willd. in Verh. Naturf. Fr. Berlin 4 : 218. 1803. *Ischaemum laxum* R. Br., Prodr. 205. 1810 ; FBI 7 : 136, P.P. Cooke 3 : 482.

Perennial, forming dense tufts. Culms erect, 60 to over 90 cm high, slender terete, simple, or nearly so, 4-noded. Leaves glaucous ; sheaths tight, terete, striate, smooth or nearly so ; ligule a line of short stiff hairs, blades linear, up to over 30 cm long and up to 5.2 mm wide, rigid, more or less scabrid, glabrous, lateral nerves about 3 cm each side. Racemes solitary, 7.5-11.5 cm long, erect, slightly curved ; joints and pedicels parallel, sublinear, slightly compressed, 4.2-5.2 mm long, ciliate. Sessile spikelets lanceolate-linear to linear, acuminate, 8.4-9.4 mm long, pale green with a shortly bearded callus. Invol.-glumes sub-equal ; lower sub-chartaceous to chartaceous, with 2-toothed beak, 2-keeled ; upper invol.-glume subchartaceous, boat-shaped, sublinear, keeled above, 5-nerved, ciliate. Lower floret ; floral glume faintly 2-nerved, hyaline, ciliate, 6-3 mm long, paleate, male. Upper floret hermaphrodites floral glume oblong-lanceolate, 5 mm long, 2-fid, hyaline, 3-nerved, ciliate palea as long as floral glume, linear, subacute, 2-nerved. Anthers 4 mm long. Styles and stigmas pale, 2-6 mm long. Pedicellate spikelet lanceolate, acuminate green or purple, 9.5-11.5 mm long, glabrous ; lower invol.-glume slightly 2-toothed, long-ciliate, keels narrowly winged ; upper invol.-glume lanceolate, long and finely acuminate, hyaline, ciliate, 3-nerved lower floret as in

the sessile spikelet, upper floret very like the lower. Stamens smaller in the lower floret or both florets reduced and empty.

*Flowers* : September.

*Occurrence* : Recorded from Rajkot.

*Uses* : It is one of the best hill fodder grasses and is eaten by cattle even after shedding of the spikes. It is both palatable and nutritious. Cattle grazing on this grass are reported to improve rapidly. The grass can be made into hay and silage and is reported to be used for thatching. The grass can be used for paper pulp along with *Cymbopogon martinii* (WI).

**Sehima sulcatum** (Hack.) A. Camus in Bull. Mus. Hist. Nat. Paris 27 : 373. 1921 ; Bor, 219. 1960 ; Santapau & Jan. 57. 1967. *Ischaemum sulcatum* Hack. in DC., Monogr. Phan. 6 : 248. 1889 ; FBI 7 : 137 ; Cooke 3 : 483.

Stems geniculate, ascending 50 cm long, weak ; terete glabrous, not ribbed, much branched from the base ; nodes glabrous. Leaves 10–20 cm × 3–4 mm, linear or lanceolate, setaceous acuminate, many-nerved, glaucous, glabrous ; sheaths lax, glabrous ; ligule a narrow ciliate, membrane. Raceme solitary, 5–7.5 cm long, joints and pedicels shorter than the sessile spikelet, slender, ciliate. Sessile spikes 1 cm long, callus about 1.5 cm long, shortly hairy at the base cuneate ; lower involucral glume 1 cm long, subchartaceous, bicuspitate, lanceolate, scabro-punctate ; upper invol.-glume rather shorter than the lower, chartaceous. 3–5-nerved shortly 2-dentate, ciliate in the upper part and with a capillary awn 1 cm long from the sinus ; lower floral glume 6 mm long, linear, subacute, with incurved margins, hyaline, paleate, the palea as long, oblong : upper floral glume 6 mm long, divided into 2 acute lobes ; palea as long as the glume ; awn 2–3.8 cm long, the column brown, twisted geniculate above the column. Pedicellate spikelets smaller than the sessile, awnless ; lower invol.-glume lanceolate, bicuspitate ; not furrowed, 7-nerved, upper invol.-glume not awned ; lower floral glume as in the sessile spikelets ; upper floral glume acute, awned.

*Flowers* : October.

*Occurrence* : Recorded from Sagadi vidi Junagadh.

*Uses* : It is one of the most valuable fodder grasses and is valued both as a green fodder as well as hay and silage. The grass is fed to the stock in flowering stage as at that time the nutrients are at the maximum (WI).

## SETARIA P. Beauv.

Bristles retrorsely barbed	<i>verticillata</i>
Bristles autororsely barbed :	
Inflorescence a narrow panicle, lobed, especially in the lower part, tapering upwards	<i>tomentosa</i>
Inflorescence a cylindric false-spike :	
Spikelets 3 mm long	<i>glaucha</i>
Spikelets up to 2.5 mm long	<i>pallide-fusca</i>

**Setaria glauca** (Linn.) Beauv., Agrost. 51. 1812 ; FBI 7 : 78, P. P. ; Cooke 3 : 435 ; Indraji 698. 1910 ; Santapau, Pl. Saur. 932. 1953 ; Bor, 360. 1960 ; Santapau & Jan. 57. 1967. *Panicum glaucum* Linn., Sp. Pl. 56. 1753.

Annual. Stem 30–60 cm, erect or ascending, simple or branched. Leaves broad or narrow, sometimes 45 × 0.8 cm, flat, glabrous or sparsely hairy, margins scabrid. Spiciform panicles cylindric, 2.5–17.5 cm, dense-fid., usually yellow, rarely purplish or green, rarely interrupted; sometimes reduced to an ovoid head with very few spikelets; bristles of involucel 6–12, very variable in length, from a little longer to four times as long as the ovoid spikelet. Glumes 4; first glume minute; second glume rather shorter than third glume, subacute, third glume usually empty, sometimes paleate and male; fourth glume broadly ovoid, very convex.

*Local name* : Kolat, Kunchi, Zipatighas.

*Flowers* : October.

*Occurrence* : Recorded from Dhunvao vidi, Jamnagar, Junagadh, and Dwarka.

*Uses* : It is regarded as a fairly good green fodder for cattle. The grains of the wild as well as cultivated types are used as food. They are either boiled and eaten whole or more rarely ground to flour. A bread is made out of these grains. (WI)

**Setaria pallide-fusca** (Schum.) Stapf & C. E. Hubb. in Kew Bull. 259. 1930 ; Bor, 363. 1960 ; Santapau & Jan. 57. 1967. *Panicum pallide-fusca* Schumach., Beskr. Guin. Pl. 58. 1827.

Tufted annual. Culms slender, usually geniculate at the base, up to 75 cm high. Leaf-blades narrow, 5–30 cm long, 0.2–0.6 cm wide, glabrous except for a few long hairs near the base. Spikelets alike, awnless, each supported by about 8 persistent bristles, falling entire from their very short stalks, on the axis of the dense cylindrical golden-brown spike up to 7.5 cm long, × 0.6–1.2 cm wide; bristles 0.6–0.8 cm long. Spikelets 0.20–0.25 cm long, 2-flowered, upper floret alone perfect.

*Flowers* : October.

*Occurrence* : Recorded from Jonpur vidi.

*Uses* : It is reported to be an excellent fodder for all stock. The grain of this crop is reported to be edible. (WI)

**Setaria tomentosa** (Roxb.) Kunth, Rev. Gram. 1 : 47. 1829 ; Bor, 365. 1960 ; Santapau & Jan. 57. 1967. *Panicum tomentosum* Roxb., Fl. Ind. 1 : 301. 1820. *Setaria intermedia* (Roth) R. & S., Syst. 2 : 489. 1817 ; FBI 7 : 79 ; Cooke 3 : 436, Santapau in RBSI 16(1) : 283. 1960. *Panicum intermedium* Roth, Nov. Pl. Sp. 47 (1821) non *P. intermedium* Vahl ex Hornem. (1813)

Culms, ascending, compressed towards the base, branchy from 30–45 cm high. Leaves soft, covered with much long, soft hair; sheaths half the length of the joints; mouth bearded. Spikes compound, terminal, consisting of ten or twelve, (generally alternate though sometimes in pairs) spikelets of six or eight flowers, intermixed with hispid bristles, they are not placed on one side, but round the common rachis, which is generally three-sided. Calyx, the two interior valves five-nerved; the second, half the length of the carol. Carol has a third neuter valve. Seed transversely wrinkled.

*Flowers* : October.

*Occurrence* : Recorded from Rajkumar College Compound and Jilla garden, Rajkot ; Gondal Irrigation lakes ; Sasan Iran river up stream ; Sasangir to Junvania Nes and Cattle Farm Junagadh ; Dhunvao vidi, abundant.

*Uses* : The grass is reported to be liked by cattle.

**Setaria verticillata** (Linn.) Beauv., Ess. Agrost. 51 : 178. 1812 ; FBI 7 : 80 ; Woodrow in JBNHS 13 : 435. 1901 ; Cooke 3 : 436 ; Indraji 698. 1910 ; Santapau, Pl. Saur. 933. 1953 ; Bor, 365. 1960 ; Santapau & Jan. 57. 1967. *Panicum verticillatum* Linn., Sp. Pl. 2, 82. 1762.

Annual ; stems erect or ascending, 30-90 cm long, stout or slender, leafy more or less branched, glabrous. Leaves 7.5-25 × 0.4-1.8 cm, thin, flat glabrous, linear or linear-lanceolate, tapering to a fine point, base narrow ; sheaths smooth, striate ; ligule a fringe of hairs. Panicle 2.5-12.5 cm, erect or curved, spike-like, coarsely bristly ; bristles of the involucel 1 or few, 0.4-0.8 cm long. Spikelets 0.20 cm long, ellipsoid, obtuse, glabrous. Glumes 4 ; lower invol.-glume about as long as the spikelet, ovate, subacute, 5-nerved ; lower floral glume similar to the upper invol.-glume, 5-nerved, empty paleate or not, the palea when present hyaline, very small, upper floral glume elliptic oblong, plano-convex, subobtuse, coriaceous, straw-coloured, faintly striatulate and with incurved margins ; palea as long as the glume, coriaceous, elliptic, faintly striatulate.

*Local name* : Motikunchi.

*Flowers* : October.

*Occurrence* : Recorded from Rajkot Residency Park ; Jilla Garden Rajkot ; Sasan Iran river up stream. Rozi Port near Jamnagar. Woodrow reported from Morvi.

*Uses* : The grass is grazed by cattle when young. The grain is eaten. The grass is reported to be used for weaving hats. It is included in the list of poisonous plant of India. The bristles of the spikes become rigid on maturity, and such spikes are used to cover grain in granaries, to repel rats. (WI)

### SORGHUM Moench

Wild species :

Primary branches of panicle divided	<i>halepense</i>
Primary branches of panicle simple	<i>purpureo-sericeum</i>
Cultivated species	<i>bicolor</i>

**Sorghum bicolor** (Linn.) Moench, Meth. Pl. 207. 1794 ; Bor, 227. 1960 ; A. Bullock in Kew Bull. 15 : 390-391. 1961. *Holcus bicolor* Linn., Mant. alt. 301. 1771. *Sorghum vulgare* Pers., Syn. 1 : 101. 1805 ; Blatt. & McC. Bomb. Grass. 58. 1935. *Andropogon sorghum* Brot., Fl. Lus. 1 : 88. 1804 ; FBI 7 : 183 ; Cooke 3 : 511. *Holcus sorghum* Linn., Sp. Pl. 1047. 1753.

A tall, stout, annual grass. Leaves broad, linear with a prominent white midrib. Panicles dense, thyrsiform decompound, with crowded whorls of erect branches and branchlets. Spikelets large, broad, hairy ; pedicellate ones usually neuter.

*Local name* : Juvar.

*Flowers* : October.

*Occurrence* : Collected from Junwania Nes, Sasan on river banks. Very common under cultivation.

*Uses* : One of the staple cereals in Saurashtra.

*Note* : A. Bullock (Kew Bull. 1. c.) provides the following notes on the change of the name *Sorghum vulgare* Pers.

"The genus *Sorghum* was segregated from *Holcus* and described by Moench [Meth. Pl. 207 (1794)]. His circumscription of the genus included two species, namely *S. bicolor* (Linn.) Moench and *S. saccharatum* (Linn.) Moench, based respectively upon *Holcus bicolor* Linn. and *H. saccharatum* Linn. Moench did not mention *Holcus sorghum* Linn.

Persoon [Syn. Pl. 1: 101 (1805)] accepted the genus *Sorghum* Moench and Gaertner's circumscription of *Holcus sorghum* Linn., which had reduced *H. bicolor* Linn. to varietal rank. Avoiding the tautonym '*Sorghum sorghum*' in accordance with Article 70(4). He provided the new name *Sorghum vulgare* Pers. Since this included (Article 25) *S. bicolor* (Linn.) Moench, it was superfluous and hence illegitimate under Article 64(1). The correct name for the species with Persoon's circumscription is undoubtedly *Sorghum bicolor* (Linn.) Moench, the type of which is the same as the type of *Holcus bicolor* Linn."

*Sorghum halepense* (Linn.) Pers., Syn. 1 : 101. 1805 ; Santapau, Pl. Saur. 934. 1953 ; Bor, 246. 1960 ; Santapau & Jan. 57. 1967. *Holcus halepensis* Linn., Sp. Pl. 1047. 1753. *Andropogon halepensis* Brot., Fl. Lus. 1 : 89 ; 1804 ; FBI 7 : 182 ; Cooke 3 : 502 ; Indraji 704. 1910.

Perennial ; stems erect, tall up to 5-6 m high, stout, simple or sparingly branched, glabrous, leafy, nodes minutely silvery. Leaves 30-60 × 1.8-5 cm, linear-lanceolate, tapering, glabrous, serrulate, midrib stout base narrowed or sometimes rounded ; sheaths glabrous, ligule short, membranous, ciliate. Panicle 15-45 cm long, decompound ; rachis smooth ; branches mostly alternate ; suberect, filiform the lower branches up to 20 cm long or more, the axils often bearded, racemes 1.2-2.5 cm

long, oblong ; joints 3–7, more than 1/2 as long as the sessile. Spikelets; pedicels similar. Sessile spikelets, 0.4–0.5 cm long, ovoid-lanceolate, dorsally compressed, green or purplish ; callus small, shortly bearded. Glumes 4 ; lower invol.-glume subchartaceous, ovate, acute, silky-hairy, 5–13 nerved, with involute margins ; upper invol.-glume as long as the lower, lanceolate, chartaceous, 5–7-nerved ; lower floral glume almost as long as the upper invol.-glume, elliptic-oblong, obtuse, hyaline, upper floral glume 0.20 cm long, oblong, 2-lobed, hyaline, ciliate ; awn 1.2 cm long, sometimes reduced to a bristle. Pedicellate spikelets about as long as the sessile but much narrower, not awned, male or barren ; lower invol.-glume similar, 3–5-nerved ; lower floral glume as in the sessile spikelets; upper floral glume linear-oblong, hyaline.

*Local name :* Baru, Baruva.

*Flowers :* November.

*Occurrence :* Collected from Hirasar, found on wet places and along road side.

*Uses :* It is injurious to cattle when eaten young or when stunted by drought ; cases of poisoning and death due to eating the grass have been reported. The seeds of the grass are diuretic and demulcent. They are reported to be used as food in times of scarcity. (WI)

**Sorghum purpureo-sericeum** (Hochst.) Aschers. & Schweinf. in Schweinf., Beitr. Fl. Aethiop. 310. 1867 ; FBI 7 : 186 ; Bor, 246. 1960 ; Santapau & Jan. 57. 1967. *Andropogon purpureo-sericeus* Hochst. ex A. Rich, Tent. Fl. Abyss. 2 : 469. 1851 ; FBI 7 : 185 ; Cooke 3 : 503.

Annual, robust ; stem 90–120 cm high ; erect, stout or slender, smooth; nodes villous. Leaves 20–25 × 0.6–0.8 cm, linear, finely acuminate, hairy on both sides, the margins scabrous ; sheaths subcompressed ; ligule very short, ciliate. Panicle 10–20 cm long, erect, rhachis glabrous; branches filiform, subflexuous, 1.2–2.5 cm long ; racemes 2.5–3.7 cm long, rarely of 3 joints, sometimes of 1 sessile and 2 pedicellate spikelets ; joints about 1/2 as long as the sessile spikelets. Sessile spikelets 0.6 cm long, densely villous with red or white hairs ; callus small, densely villous. Glumes 4 : lower invol.-glume ovate, acuminate, coriaceous, 7-nerved with the margins involute ; upper invol.-glume as long as or rather longer than the lower, oblong-lanceolate, coriaceous, acuminate, 5-nerved ; lower floral glume as long, membranous densely ciliate, oblong lanceolate, glabrous on the back ; upper floral glume very fragile, 0.25 cm long, hyaline, 2-lobed, ciliate ; awn 3.7 cm long, the column twisted, and ciliate. Pedicellate spikelets equalling the sessile but paler and narrower, lower invol.-glume

linear-lanceolate, acute 5 9-nerved, shortly silky ; upper invol. and lower floral glumes as in the sessile spikelets ; upper floral glume a little shorter, lanceolate, acuminate, hyaline, ciliate.

*Flowers* : October to November.

*Occurrence* : Recorded from Valadhari, near Rajkot, abundant in the reserved grassland.

*Uses* : The grass is relished by cattle in green or dry form ; it is useful also for silage. It is reported to be suitable for growing in flower pots. (WI)

### SPINIFEX Linn.

**Spinifex littoreus** (Burm. f.) Merr. in Philip. J. Sci. Bot. 7 : 229. 1912; Bor, 366. 1960 ; Santapau & Jan. 57. 1967. *Stipa littorea* Burm. f., Fl. Ind. 29. 1768. *Spinifex squarrosus* Linn., Mant. 2 : 300. 1771 ; FBI 7 : 63 ; Cooke 3 : 428.

A squarrose gregarious bush, several cm high and broad. Leaves 10-15 cm, smooth, tapering from the base, concave-convex; sheaths often imbricating, ligule very short, hirsute. Peduncles of male 5-7.5 cm, scaberulous, tips naked, pungent. Male spikelets 0.8-1.2 cm. Glumes 4 ; thin, all glabrous, first and second glume, subequal, oblong-lanceolate, acuminate, 7-9-nerved, nerves scaberulous ; third glume rather longer, 5-nerved, paleate ; fourth glume shorter, ovate-lanceolate, acuminate, 5-nerved : paleas third and fourth glume narrowly lanceolate, keels ciliate. Female spikelets 1.6 cm, narrowly lanceolate ; all glumes glabrous, first glume oblong lanceolate; acuminate, many-nerved, nerves scaberulous ; second glume rather shorter, acute, 7-nerved ; third glume is as the second glume, 5-nerved ; fourth glume ovate-lanceolate, abruptly narrowed above the middle and acuminate, 5-nerved ; palea shorter but broader than the glume, acute, 2-nerved, keels smooth, style very long, branches slender.

*Flowers* : November.

*Occurrence* : Recorded from Somnath, Chorwad, Mangrol.

*Uses* : Very valuable as a sand binding grass.

## SPODIOPOGON Trin.

**Spodiopogon rhizophorus** (Steud.) Pilger in Pfam. (ed. 2) 14e : 119. 1940, Bor, 246. 1960 ; Santapau & Jan. 57. 1967. *Andropogon rhizophorus* Steud., Syn. Pl. Glum. 381. 1855. *Spodiopogon albidus* Benth. in JLS 19 : 66. 1881 ; FBI 7 : 108 ; Cooke 3 : 464.

A weak struggling tufted branched annual, 60–120 cm high, stem very slender, much branched, leafy. Leaves 15–20 × 0.6–1.8 cm, flaccid, linear-lanceolate, acuminate, 1-nerved, usually suddenly narrowed into a slender petiole 2.5–7.5 cm long, sheaths 7.5–12.5 cm, ligule oblong, glabrous. Panicle at first enclosed in a long narrow spathaceous leaf-sheath ; rachis compressed, ciliate. Spikelets 0.6 cm long, lanceolate, one pedicellate, the other sessile, pedicels 0.25 cm long, spathulate, flattened, ciliate. Glumes 4 ; invol.-glumes equal ; ovate-lanceolate, finely mucronate, silky-hairy, 1-nerved ; lower floral glume truncate, hyaline, upper floral glume 0.4 cm long, deeply divided at the apex into 2 very acute lobes ; awn 1.2 cm long, slender.

*Flowers* : October.

*Occurrence* : Recorded from Sasangir to Junwania, along the roadside, abundant locally.

## SPOROBOLUS R. Br.

Involucral glumes both shorter than the floral glume :

Stamens 2, panicle 25 × 5 cm; spikelets 1.4 mm long *diander*

Stamens 3; panicle narrow, 45 cm × 20 mm spikelets reaching 2.5 mm long *fertilis*

Lower involucral glume as long as the floral glume or nearly so :

Spikelets 2.5–2 mm long. Leaves very pale *virginicus*

Spikelets 1.5 mm long. Leaves glaucous *helvolus*

Lower involucral glume much shorter than either of the two others :

Panicle-contracted :

Margins of leaves smooth *tremulus*

Margins of leaves serrulate	<i>maderaspatanus</i>
<b>Panicle effuse :</b>	
Spikelets 2.5 mm long	<i>marginatus</i>
Spikelets 1-1.5 mm long	<i>coromandelianus</i>

**Sporobolus coromandelianus** (Retz.) Kunth, Rev. Gram. 1 : 68. 1829;  
 FBI 7 : 252 ; Cooke 3 : 542 ; Bor, 627. 1960 ; Santapau & Jan. 58. 1967.  
*Agrostis coromandeliana* Retz., Obs. Bot. 4 : 19. 1786.

Stems many, 10-30 cm, spreading from the root, leafy. Leaves 2.5-7.5 × 0.4-0.8 cm, narrowed from the subcordate base to the finely acuminate tip, spinulosely toothed especially towards the base, mouth of sheath villous. Panicle very large for the size of the plant, 4-15 × 2.5-10 cm, branches 4-5 in subsecond whorls 1.2-5 cm long, branchlets drooping 1-2-fid. Spikelets subglobose; glumes hyaline, all 1-nerved or first glume nerveless. Stamens 2, anthers very short. Grain obliquely oblong or subglobose, enclosed in the loose somewhat fleshy reticulate pericarp, pale reddish-brown.

*Flowers* : November onwards.

*Occurrence* : Recorded from Rozi port near Jamnagar, Dhunvao vidi; Jonpur vidi; Jilla garden, Rajkot and beyond station; Jodiya Port, near Jamnagar; Targhari. Found abundant in heavy grazed grassland, also on rocks, rare.

**Sporobolus diander** (Retz.) Beauv., Agrost. 25. 1812 ; FBI 7 : 247 ; Cooke 3 : 539 ; Bor, 629. 1960 ; Santapau & Jan. 58. 1967. *Agrostis diandra* Retz., Obs. 5 : 19. 1789.

Annual or perennial; stems tufted 30-90 cm high; slender, smooth, nodes glabrous. Leaves 10-25 × 0.1-0.15 cm, with filiform tips, flat, strongly nerved, sheaths smooth, ribbed, ligule a few hairs. Panicle 25 × 5 cm rachis very slender, sometimes capillary strict; branches 0.6-2.5 cm, sometimes flowerless at the base. Spikelets 1.2-1.4 mm long, pedicels very short. Glumes 3; lower invol.-glume very short, scarcely 0.05 cm long, broadly oblong, nerveless, hyaline; upper invol.-glume about 0.08 cm long, broadly elliptic-oblong, hyaline, obscurely 1-nerved; floral glume 0.12-0.13 cm long, broadly ovate-oblong, subacute, 1-nerved; palea plicate in the median line. Stamens 2. Grain obovoid, truncate, obtusely quadrangular, umbonate, by the loose pericarp, red-brown, rugulose.

*Flowers* : November.

*Occurrence* : Recorded from Jamnagar, near Rozi Port, Beyt. (T. A. Rao 528).

**Sporobolus fertilis** (Steud.) W. D. Clayton, Kew. Bull. 19 : 291. 1965 ; Santapau & Jan. 58. 1967. C. J. Saldanha & H. Nicolson, Fl. Hassan dist. 754. 1976. *Agrostis fertilis* Steudel, Syn. Pl. Glum. 1 : 170. 1854. *Sporobolus indicus* auct. 'non (L.) R. Br.' FBI 7 : 247 ; Indraji 706. 1910 ; Bor. 630. f. 76. 1960.

Perennial ; stems 60–90 cm high, densely tufted, stout, internodes long ; nodes glabrous. Leaves mostly crowded near the base, 30–60 cm long, very slender, wiry, flexuous, convolute, with long filiform tips, quite smooth ; sheaths smooth ribbed ; ligule a ridge of minute, hair. Panicle 30–45 cm long by 13–20 mm broad, often interrupted ; rachis slender, smooth, branches very short, densely crowded, erect, covered to the base with imbricate green spikelets. Spikelets 2–2.5 mm long ; pedicels very short. Glumes 3 ; lower invol.-glume about 0.5 mm long, broadly oblong, nerveless, hyaline, upper invol.-glume 1 mm long, broadly oblong, hyaline, nerveless, floral glume 2–2.5 mm long, broadly ovate, 1-nerved ; palea plicate in the median line. Stamens 3. Grain 1.2 mm long, obovoid, quadrangular, truncate, umboonate by the loose pericarp, red-brown, rugulose.

*Local name* : Velari-marmar.

*Flowers* : November.

*Occurrence* : Recorded from Barda Hill, in Ghed area.

*Uses* : It is considered a good fodder grass especially when young [Watt Dict. Eco. Prod. 6(3) : 341. 1893].

*Note* : The taxonomic status of the present plant, hitherto included in the *Sporobolus indicus* complex, is far from clear. Clayton (l. c. p. 287) while recognising 11 taxa in the complex remarked, "In every attempt to formulate exact and mutually exclusive diagnosis one is bound to stumble over the question of intermediates and much cytogenetic investigation will be required before we have a sound understanding of the complex."

**Sporobolus helvolus** (Trin.) Dur. & Schiz., Consp. Fl. Afr. 5 : 820. 1895 ; Bor. 629. 1960 ; Santapau & Jan. 58. 1967. *Vilfa helvola* Trin. in Mem. Acad. Sci. Petersb. Ser. 6, 5, 2 : 52. 1839. *Sporobolus glaucifolius* Hochst. ex Steud., Pl. Glum. 154. 1854 ; FBI 7 : 250 ; Cooke 3 : 540.

Perennial ; stems 30–45 cm long, densely tufted, leafy ; nodes glabrous. Leaves 3.7–12.5 × 0.25–0.3 cm, narrowed from a subcordate base to an acuminate tip, strict, glaucous, flat or undulate, not pungent ; sheaths ribbed, glabrous ; ligule a line of hairs. Panicle 7.5–12.5 cm long, contracted, interrupted, pale yellowish-white ; branches short, erect. Spikelets crowded, 0.2 cm long ; pedicels very short. Glumes 3 ; lower invol.-glume 0.15 cm long, lanceolate, hyaline, acutely acuminate, 1-nerved ; upper invol.-glume 0.2 cm long, broader than the lower, ovate-lanceolate, acutely acuminate, hyaline, 1-nerved ; floral glume 0.15 cm long, ovate, acute, 1-nerved ; palea as long as the glume. Stamens 3 ; filaments very short ; anthers 0.08 cm long.

*Flowers* : November.

*Occurrence* : Recorded from Jodiya Port near Jamnagar, Okha.

**Sporobolus maderaspatanus** Bor in Kew Bull. 1957, 234. 1957 ; & Grass Burma, Cey. Ind. Pak. 632. 1960 ; Santapau & Jan. 58. 1967. *S. orientalis* (Nees) Kunth of the Fl. Brit. Ind. 7 : 251. 1896 (nomen illegitimum), Cooke 3 : 541.

Annual ; stems 7.5–30 cm high, tufted, erect ; roots fibrous. Leaves 2.5–10 × 0.15–0.25 cm, chiefly radical, narrowed from the base to a fine point, flat ; sheaths hairy at the mouth ; ligule a minute narrow line. Panicle linear, 2.5–7.5 cm long, strict, erect, dense-flowered, often interrupted ; branches very short, erect. Spikelets 0.15–0.2 cm long, pale brown ; pedicels short. Glumes 3 ; lower invol.-glume 0.12 cm long, ovate-lanceolate, hyaline, nerveless ; upper invol.-glume 0.2 cm long, oblong-lanceolate, 1-nerved, slightly longer than the floral glume : floral glume 0.15 cm long, oblong, obtuse, 1-nerved ; palea oblong. Stamens 2. Grain ellipsoid, compressed, with a very loose pericarp, reddish-brown.

*Flowers* : November.

*Occurrence* : Recorded from Mangrol.

**Sporobolus marginatus** Hochst. ex A. Rich., Tent. Fl. Abyss. 2 : 397. 1851 ; Bor, 632. 1960 ; Santapau & Jan. 58. 1967. *S. arabicus* Boiss., Diagn. Ser. 1 : 13 ; 47. 1853 ; FBI 7 : 252 ; Cooke 3 : 541.

Perennial ; stems many form a woody stoloniferous base, sometimes as thick as the middle finger, and sending out rigid often geniculate stolons and stout or slender flowering branches 15–60 cm high. Leaves 2.5–25 × 0.3–0.4 cm, rigid, narrowed to the tip from the rounded base, flat or convolute, scaberulous above, with finely ciliate-serrulate margins ;

sheaths glabrous ; ligule a fringe of hairs. Panicle 5–15 cm long, effuse ; branches whorled, capillary, 3.7 cm long, naked below, with spikelets spicately arranged on the short branchlets. Spikelets 0.25 cm long ; pedicels short. Glumes 3, lower invol.-glume 0.08 cm long, ovate, subobtuse, hyaline, nerveless, upper invol.-glume 0.25 cm long, oblong, obtuse, 1-nerved, floral glume as long as the upper invol.-glume, oblong, obtuse, 1-nerved, palea as long as the glume. Grain sub-globose.

*Flowers* : November.

*Occurrence* : Recorded from Rozi Port near Jamnagar ; Veraval to Somnath, it was found on bare ground, sandy soil ; Junagadh ; Sasan ; Dwarka near station ; Paneli vidi and Jodiya Port near Jamnagar.

**Sporobolus tremulus** (Willd.) Kunth, Rev. Gram. 1 : 67. 1829 ; FBI 7 : 250 ; Bor, 633. 1960 ; Santapau & Jan. 58. 1967. *Agrostis tremula* Willd., Sp. Pl. 1 : 372. 1798.

Stems 5–15 cm high ; many from a hard knotted stoloniferous stock, erect or prostrate, wiry, stolons 15–45 cm, stout or slender, leafy flexuous. Leaves 1.2–5 cm, rigid, narrowed from the usually hairy base to the tip ; ligule a few hairs. Panicle 2.5–10 cm, subspiciform, sometimes longer flexuous and interrupted, branches short rarely a few spreading ; pedicels short. Spikelets crowded, subpersistent on the very short pedicels; very pale, glumes all 1-nerved ; palea as long as its glume. Stamens 3.

*Flowers* : November.

*Occurrence* : Recorded from Okhamandal.

**Sporobolus virginicus** (Linn.) Kunth, Rev. Gram. 1 : 67. 1829 ; FBI 7 : 249 ; Santapau, Pl. Saur. 939. 1953 ; Bor, 634. 1960 ; Santapau & Jan. 58. 1967. *Agrostis virginica* Linn., Sp. Pl. ed. 1, 63. 1753.

Perennial. Stem thick, branched, hard and often tortuous at the base, then erect or ascending 15–25 cm high. Leaves close-set, erecto-patent, 2.5–7.5 cm long or more, narrow and almost terete from the involute margins, very pale, glabrous or scaberulous above, striate ; sheaths terete, short or long ; ligule of long soft hairs. Panicle 2.5–10 cm subspiciform, very pale narrow but more or less interrupted. Spikelets very shortly pedicelled ; glumes all 1-nerved, keels glabrous or obscurely scabrid towards the tip, palea oblong, narrowly truncate. Grain with the pericarp loosened if moistened.

*Flowers* : October.

*Occurrence* : Recorded from Porbander.

### TETRAPOGON Desf.

Annual; lower floral glume broadly cuneiform	<i>tenellus</i>
Perennial ; lower floral glume ovoid, hirsute all over	<i>vilosus</i>

**Tetrapogon tenellus** (Roxb.) Chiov. in Ann. 1st Bot. Roma 8 : 352. 1908 ; Bor, 475. 1960 ; Santapau & Jan. 58. 1967. *Chloris tenella* Roxb., Fl. Ind. 1 : 330. 1820 ; FBI 7 : 290 ; Cooke 3 : 555.

Annual, very slender ; stem 25-45 cm long, weak, branched from the base. Leaves 15-25 × 0.3 - 0.6 cm flaccid, linear-lanceolate ; sheaths glabrous ; ligule short, truncate. Spike 2.5-6.2 cm, erect, flat. Spikelets large, 0.4 cm long, and more bifarious. Glumes 5 or 6 ; lower invol.-glume 0.4 cm long, strongly 1-nerved ; upper invol.-glume longer and broader with a strong mid-nerve, which is produced into a short awn ; glume of hermaphrodite floret 0.5 cm long, broadly cuneate, the upper margin truncated, naked, and with a scaberulous awn 0.4 cm long from the back below the apex, the palea elliptic with ciliate margins, and the callus densely hairy, the second floral glume smaller but similar, with 9 similar, palea, the other still smaller fan-shaped awned. Sometimes one or more of the normally infertile glumes are found to be fertile, at other time all barren.

*Flowers* : September.

*Occurrence* : Recorded from Gondal Road, Rajkumar College Compound ; Rajkot ; Dwarka near station ; Dhunvao vidi and Paneli vidi, Morvi, frequent.

*Uses* : It is considered to be a good fodder.

**Tetrapogon villosus** Desf., Fl. Atlant. 2 : 389, t. 255. 1799 ; Bor, 475. 1960 ; Santapau & Jan. 58. 1967. *Chloris villosa* (Desf.) Pers., Syn. 1 : 87. 1805 ; FBI 7 : 291 ; Cooke 3 : 556.

Perennial, stout ; stems 15-25 cm long from a densely tufted stout woody base, clothed with equitant leaf-sheaths. Leaves 2.5-7.5 × 0.15

0.25 cm, linear, acute, flat, convolute or twisted, rigid, ligule obscure. Spikes 1-3, erect, pale yellow,  $3.7 - 5.2 \times 0.8 - 1.2$  cm. Spikelets 0.3 cm long, obconic, with 4 unequal awns. Glumes 5; lower invol.-glume 0.3 cm long, oblong-lanceolate, hyaline, upper invol.-glume 0.4 cm long, oblong, hyaline, 2-toothed at the tip and shortly awned; glume of the hermaphrodite floret 0.3 cm long, broadly ovate or suborbicular, concave, with an awn 0.6 cm long or more, and broad, hyaline margins bounded by the lateral nerves, hirsute all over with long silky hairs which are much longer than the glume, the palea elliptic-obovate with ciliate margins, hyaline; the next-fourth glume barren, about 1/2 as long, also hirsute, the fifth glume small, cuneate, the sixth reduced to an awn.

*Flowers* : September.

*Occurrence* : Recorded from Rajkot, it was found on distributed grassland.

#### THEMEDA Forssk.

Involucral spikelets truly verticillate :

Perennial

*triandra*

Annual

*quadrivalvis*

Involucral spikelets in closely superposed pairs

*cymbaria*

**Themedia cymbaria** Hack. in DC., Monogr. Phan. 6 : 668. 1889 ; Cooke 3 : 514 ; Santapau, Pl. Saur. 940. 1953 ; Bor, 251. 1960 ; Santapau & Jan. 58. 1967. *Anthistiria cymbaria* Roxb., Hort. Beng. 6. 1814 ; FBI 7 : 215 ; Indraji 705. 1910.

Perennial : stems 90-240 cm high; erect, branched, smooth, puberulous beneath the nodes. Leaves 60-120 cm  $\times$  0.4-0.6 cm, not overlapping the panicle, scaberulous above, glaucous beneath, margins scabrid; sheaths subcompressed, keeled; ligule very short. Panicle tall, 30-60 cm, branches smooth or scaberulous, spikes in oblong fascicles 1.2-0.8 cm long. Involucral spikelets 0.4-0.6 cm long, contiguous in superposed pairs, glabrous. Pedicellate spikelets with glabrous pedicels. Bisexual spikelets solitary (rarely 2), subsessile; callus short, bearded with white hairs; lower invol.-glume 0.6 cm long, dorsally convex, not channelled, smooth, polished, dark brown; awn 1.2 cm long, slender, smooth.

*Local name* : Ratadun ; Ratadun-ghas.

*Flowers* : October.

*Occurrence* : Recorded from Barda Hill, in Ranavau forest near Gared.

*Uses* : A coarse grass eaten by cattle, also fit for hay. (Blatt. & McC B'bay grass 118. 1935).

**Themedia quadrivalvis** (Linn.) O. Ktze., Rev. Gen. Pl. 2 : 794. 1891 ; Bor, 252. 1960 ; Santapau & Jan. 58. 1967. *Andropogon quadrivalvis* Linn., Syst. (ed. 10) 758. 1774. *Themedia ciliata* Hack., Mon. 664. 1889 ; Cooke 3 : 514. *Anthistiria ciliata* Linn. f., Suppl. 113. 1781 ; FBI 7 : 213.

Annual ; stem suberect or geniculately ascending and rooting from the lower nodes, very slender, terete, 30-90 cm high, glabrous, simple or branched. Leaves 15-30 cm by 4-6 mm, linear, acute, flat, flaccid, glabrous ; sheaths glabrous or upper with scattered bulbous-based hairs towards the mouth; ligules membranous, rounded 2 mm, long, glabrous. Panicle erect, occupying 1.2-1.8 of the stem, usually dense ; lower branches solitary or 2-3-nate, filiform, glabrous, undivided ; spathes linear to subulate from a broad lanceolate base, 1.7-2.5 cm long, glabrous or with bristles, racemes 8-13 mm long, erect. Involucral spikelets whorled, sessile persistent, linear-lanceolate, 4-6 mm long, barren or imperfectly male, lower invol.-glume baset along the winged keels with stiff bristles. Pedicellate spikelets narrow, not winged, glabrous. Bisexual spikelet solitary not exserted, 4-5 mm long, narrow, linear-lanceolate, callus very short ; lower invol.-glume obtuse, brown, 6-7 nerved ; upper invol.-glume glabrous lower floral glume shorter than the invol.-glumes, sometimes 2-toothed ; upper floral glume awned ; awn 2.5-3.8 cm long, slender. Anthers 1 mm long. The lower invol.-glume of the bisexual spikelet is shining but beset all over with rather stiff hairs. Callus densely bearded with long brown hairs. Lower invol.-glume brown when mature.

*Flowers* : October.

*Occurrence* : Recorded from Sasan; Iran river up stream, abundant near river ; Timbarva Nes near Tulshishyam, in dry fields.

**Themedia triandra** Forsk., Fl. Aeg.-Arab. 178. 1775 ; Santapau, Pl. Saur. 941. 1953 ; Bor, 254. 1960 ; Santapau & Jan. 58. 1967. *Anthistiria imberbis* Retz, Obs. 3 : 11. 1783 ; FBI 7 : 211. *Themedia imberbis* Cooke, Fl. Pres. Bomb. 3 : 513.

Perennial, densely tufted ; stem 30-90 cm high, stout or slender, erect, or geniculate and ascending, subsimple or branched glabrous ;

**nodes glabrous.** Leaves 7.5 - 20 cm by 2.5 - 5 mm, narrowly linear, coriaceous, flat ; sheaths compressed, keeled, smooth ; ligule a narrow ciliolate membrane. Panicle narrow, raciform, 7.5 - 20 cm long, branched ; branches solitary or the upper 2-3-nate, filiform, bearing dense distant fascicles of racemes, spathes lanceolate, about 2.5 cm long, racemes 1.3-2 cm long. Involucral spikelets whorled, sessile, persistent lanceolate, acute, 6-16 mm long, glabrous, male, glumes 3. Pedicellate spikelets linear-lanceolate. Bisexual spikelet solitary, 6 mm long ; callus 3 mm long, pungent. Lower invol.-glume obtuse or notched, smooth except the tip, 7-9-nerved ; upper invol.-glume glabrous ; lower floral glume glabrous, rather shorter than the involucral glumes ; upper floral glume awned ; awn 3.8 - 6.3 cm long with a stout hispid column. Anther 2 mm long. Grain 2.5 mm long, oblong, grooved ventrally.

*Flowers* : October.

*Occurrence* : Recorded from Valadhari, Hirasar near Rajkot, it was found on road sides and under the trees like *Butea*.

*Uses* : A very good fodder and hay.

#### TRAGUS A. Haller

**Tragus roxburghii** : Panigrahi, Kew Bull. 29 (3) : 495-96. 1974. *Lappago biflora* Sensu Roxb., Hort. Beng. 82. 1814. nomen nudum, & Fl. Ind. ed. Carey & Wall. 1 : 284. 1820, quoad descript., excl. Typo. *Tragus biflorus* Sensu Schultes Mant., Syst. Veg. 2 : 205. 1824; Santapau Pl. Saur. 942. 1953 ; Bor, 682. 1960 ; Santapau & Jan. 58. 1967. *T. racemosus* Sensu Hook. f. in FBI 7 : 97. 1896 (non Scop 1775) Woodrow in JBNHS 13 : 435. 1901. Cooke 3 : 535.

Stem tufted, leafy below, simple or branched, the branches densely leafy, geniculate, ascending from a decumbent base or wholly decumbent ; from a 10-30 cm long ; nodes glabrous. Leaves variable in length, 0.6 - 3.7 × 0.25 - 0.4 cm, linear-lanceolate, acuminate, flat, very glaucous, ciliate, striate ; lowest sheaths short, broad, pale. The intermediate ones more or less herbaceous, the upper most tumid ; ligule a slender ciliate rim. Inflorescence a cylindric spike-like panicle 1.8 - 7.5 cm long, rachis slender, straight, pubescent. Spikelets 0.3 cm long. Glumes 3 or 2 ; lower invol.-glume very minute, about 0.05 cm long, hyaline : upper invol.-glume 0.3 cm long; slightly curved, involute, enveloping the floral glume, strongly 5-ribbed, with rows of stout hooked spines along the ribs ; thin between the ribs, floral glume solitary, 0.20 cm long, oblong-lanceolate, shortly apiculate.

*Local name* : Vandariyun ghas.

*Flowers* : October.

*Occurrence* : Recorded from Jilla garden and Gondal Road, Rajkot ; Rajkot along river bed and Mithapur Talao ; stem just floating, abundant locally. Woodrow reported from Rajkot.

*Uses* : This grass is said to be nutritious and much grazed in the rains. (Blatt. & McC. 217. 1933).

*Note* : Panigrahi (l.c.) has proposed a new name for the common Indian grass *T. biflorus*. He argues that *T. biflorus* cannot designate the Indian plant since Roxburgh cited the earlier *Phalaris muricata* Forsk., as a direct nomenclatural synonym of *Lappago biflora*.

### TRILOBACHNE Schenck

*Trilobachne cookei* (Stapf) Schenck ex Henr. in Meded. Rij Herb. No. 67 : 4. 1931 ; Santapau, Pl. Saur. 943. 1953 ; Bor, 268, f. 31. 1960 ; Santapau & Jan. 58. 1967. *Polytoca cookei* Stapf in Hook. Icon. 23 : t. 2333. 1894 ; FBI 7 : 101, Cooke 3 : 518. Blatt & McC. 5, t. 2. 1935.

Annual. Stem 90 cm, and leaves more or less hispid with tubercle-based hairs. Leaves 3.7-5×5-7.5 cm, linear-lanceolate, margins thickened ; sheaths rather loose, striate ; ligule short, sub-hyaline. Flowering branches crowded in the axile, each with a linear bract at the base. Male panicle 7.5 cm long. Male spikelets 0.8 cm long, geminate, one longer than the other, shortly pedicellate or sessile. Glumes 4 ; lower invol.-glume lanceolate, acuminate, many-nerved, upper invol.-glume slightly shorter and thinner than the lower one, with slender nerved. Floral glumes slightly shorter than the lower invol.-glume, glabrous, few-nerved. Anthers 3, linear. Female spikelets 0.8 cm long, lower invol.-glume crustaceous, oblong, closely embracing the upper invol.-glume, the apex with a 3-lobed crest ; upper invol.-glume slightly shorter than the lower oblong, acuminate ; lower floral glume about equaling the upper invol.-glume, oblong, 13-15-nerved ; upper floral glume shorter than the lower, hyaline, nerveless, sometimes 2-fid.

*Flowers* : September.

*Occurrence* : E. Blatter recorded from the foot of Girnar, Junagadh.

*Uses* : Rosaries are made of the stony fruits. (Blatt. & McC. 5. 1935).

## TRIPOGON Roem. et Schult.

**Tripogon jacquemontii** Stapf in Kew Bull. 1892 : 85. 1892, FBI 7 : 286 ; Cooke 3 : 559 ; Bor, 522. 1960 ; Santapau & Jan. 58. 1967.

Perennial, 30-60 cm high. Leaves filiform, 5-20 cm long, convolute, glabrous. Spikes 10-20 cm long, narrow. Spikelets 0.8-1.8 cm long, narrow, oblong 10-20 flowered. Glume subcoriaceous, the upper most empty, invol.-glumes very dissimilar, lower invol.-glumes 0.3 cm long, acute, with a large projecting blunt tooth or lobe at one extending 1/2 way up, upper invol.-glume 0.4 cm long, lanceolate-oblong, acute, floral glume 0.4 cm long, elliptic, shortly 2-fid at the apex ; without lateral awns but with a median awn 0.12 cm long. Grain narrowly oblong, terete, glabrous.

*Flowers* : September.

*Occurrence* : Recorded from Jamvali, it was found in heavily-grazed grassland.

## TRITICUM Linn.

**Triticum aestivum** Linn., Sp. Pl. 85. 1753 ; Cooke 3 : 574 ; Bor, 679. 1960 ; Santapau & Jan. 58. 1967. *T. vulgare* Vill, Hist, Pl. Dauph. 2 : 153. 1787 ; FBI 7 : 367.

Tufted, annual grasses. Culms tufted ; sheaths - striate ; ligule a lanceolated membranous ring. Leaves glabrous or hairy on one or both surfaces. Spike glabrous or hairy ; awned or awnless ; spikelets 2-ranked, compressed, parallel to the rhachis, closely or loosely imbricate. Glume first keeled upwards ; glume second sometimes paleate ; glumes third and fourth paleate and hermaphrodite, larger than fifth succeeding glumes when present. Stamens 3 ; stigmas short and never protruded ; ovary truncate and hairy on top. Grains in each spikelet, usually 3, the 2 lateral larger than the single terminal one, oblong, swollen more or less according to the quality ; with a groove on one face, blunt at both ends or pointed, surrounded by a hairy tuft.

*Local name* : Chavun.

*Flowers* : February.

*Occurrence* : Under cultivation, almost all over Saurashtra as a winter crop.

*Uses* : One of the staple cereals in Saurashtra.

## UROCHLOA P. Beauv.

Lower invol.-glume, obtuse, 3-nerved or nerveless *panicoides*

Lower invol.-glume subobtuse, 5-nerved *panicoides* var. *velutina*

**Urochloa panicoides** Beauv., Ess. Agrost. 53, t. 11, fig. 1. 1812 ; Bor, 372. 1960 ; Santapau & Jan. 58. 1967. *Panicum javanicum* Hook. f. in FBI 7 : 35. 1896 (non Poir. partim) ; Cooke 3 : 450 (partim).

Annual ; stem 30-60 cm high, rooting below geniculately ascending, frequently branched from the lower nodes, 4-30 nodes, notes pubescent. Leaf-blades lanceolate to linear-lanceolate from a wider and semi-amplexicaul base, 3.5-15 cm by 8-12 mm, softly hairy on both sides, with scaberulous margins ; sheaths loose, softly hairy, the mouth villous, ligule a beard. Panicle erect, branches 6-12 rather distant ; rachis of racemes compressed, glabrous or pubescent. Spikelets laterally contiguous or subcontiguous, ovate to elliptic-oblong, very acute, 4.5 mm long, greenish, glabrous or pubescent. Glumes 4 ; lower invol.-glume ovate, acute or obtuse, not 1/2 as long as and similar to the lower floral glume, ovate, acute, 7-nerved, lower floral glume similar, 5-nerved, empty or male, with membranous palea ; upper floral glume crustaceous, broadly ovate-oblong, ruglose, the tip rounded, 2.5-3 mm long, palea finely transversely rugose or granular, mucro up to 1 mm long, sparingly barbellate.

*Flowers* : August to October.

*Occurrence* : Collected from Sagadi-vidi, Junagadh, Rajkot along river bed ; Sasangir.

*Uses* : Considered to be a good fodder both for cattle and horses. (Blatt. & McC. 146. 1935).

**Urochloa panicoides** Beauv. var. *velutina* (Henr.) Bor, Grass. Burma, Cey. Ind. Pak. 373. 1960 ; Santapau & Jan. 58. 1967. *Urochloa marathensis* Henr. in Meded. Rijks. Herb. Leiden, n. 43, 2. 1922 ; Blatt. & McC., Bombay Grasses 146. 1935.

Annual, dwarf, glaucous, branching from the lower geniculation. Stem low, striate; quite glabrous, few-noded. Leaf-sheaths terete or slightly compressed, striate, lower ones gaping, upper once tight, shorter than the internodes, hirsute with bulbous-based hairs. Ligule very short, covered with long hairs. Blade cordate at the base, linear-lanceolate. Racemes 2-3, distant from each other more or less 1 cm, 2 cm, long, stout, erect-patulous

or finally reflexed. Spikelets biseriate, broadly elliptic, very acute, 4 mm long, anteriorly almost flat, posteriorly very convex, green glabrous. Involucral glumes very unequal. Lower almost 1/3 of the spikelet, subobtuse, 5-nerved, upper as long as the spikelet, very acute, distinctly 7-9 nerved. Lower floral glume equal in shape to the upper involucral glume, flat, 5-nerved. Upper floral glume shorter than the preceding glume, elliptic with a rounded tip, rigid, brown-straw-coloured, rugulose, long caudate, 5-nerved.

*Flowers* : August.

*Occurrence* : Collected from Gondal Road, Rajkot.

#### UROCHONDRA C. E. Hubb.

**Urochondra setulosa** (Trin.) C. E. Hubb. in Hook. IC. Pl. Sub. tab. 3457. 1947 ; Bor, 634. 1960 ; Santapau & Jan. 58. 1967, *Vilfa setulosa* Trin. in Mem. Acad. Sci. Petersb. Ser. 6, 6, Sci. Nat. 55. 1840. *Heleochnloa dura* (Boiss.) Boiss., Fl. Orient. 5 : 477. 1884 ; FBI 7 : 236 ; Woodrow in JBNHS 13 : 439. 1901 ; Cooke 3 : 532. *Crypsis dura* Boiss., Diagn. Ser. 2, 4, 125. 1859.

Perennial, pale, clothed all over with minute-velvety pubescence ; stems stout, ascending, 15-25 cm long, densely fastigiate 0.25 cm in diam., hard, few-leaved ; nodes glabrous. Leaves 7.5-15 cm long, involute, terete, pungent, sheathes short, coriaceous, glabrous ; ligule a narrow line of hairs. Inflorescence a spike-like panicle, 8.7×0.4 cm, solitary. Spikelets densely imbricate ; 0.25 cm long. Glumes 3, all one-nerved and with ciliate keels ; lower invol. glume 0.15 cm long, linear-ob lanceolate, spiculate ; floral glume 0.25 cm long, elliptic-oblong, obtuse ; palea 0.20 cm long, 2-fid, with obtuse ciliate lobes, 2-nerved. Stamens usually 2, less commonly 3 ; filaments very long, thickened at the base ; anthers short.

*Flowers* : December.

*Occurrence* : Borgesen reported from Dwarka. It was very abundant in almost pure stands in open salty ground. Woodrow also reported from Dwarka.

#### VETIVERIA Lem-Lisanc.

**Vetiveria zizanoides** (Linn.) Nash in Small. Fl. Southeast U.S. 67. 1903 ; Santapau, Pl. Saur. 947. 1953 ; Bor. 258. 1960 ; Santapau & Jan.

58. 1967. *Phalaris zizanioides* Linn., Mant. 2 : 183. 1771. *Andropogon squarrosus* Hook. f. in FBI 7 : 186. 1896 (non Linn. f.) ; Cooke 3 : 511, Indraji 703. 1910.

Stems 60-150 cm, high, in large, dense tufts with stout spongy aromatic roots, sparingly branched. Leaves 30-60 cm, subbifarious, narrow, acute, erect, keeled, glabrous ; margins scabrid, sheaths equitant, glabrous ; ligule obscure. Panicle 10-30 cm, conical, erect, rachis stout and erecto-patent filiform flexuous branches glabrous or scaberulous. Spikes slender joints and pedicels about as the sessile spikelets. Spikes slender, joints and pedicels about as the sessile spikelets. Sessile spikelets grey green yellow or purplish, 0.4 -0.6 cm, slightly curved, glabrous, callus obscurely bearded ; glume first coriaceous, acute, 2-4-nerved ; glume second coriaceous, 1-nerved, margins hyaline, keel muricate ; third glume lanceolate, acuminate, 2-nerved, margins inflexed ciliolate ; glume fourth as glume third, ciliate ; palea very small, obtuse, glabrous. Pedecelled spikelets like the sessile but first glume smooth, glume fourth awnless.

*Local name* : Valo ; Valoghas ; Khasghas.

*Flowers* : October.

*Occurrence* : Recorded from the Girnar Hill, Junagadh ; Barda Hill in Adityana forest and in the gardens.

*Uses* : The roots are aromatic and yield an important essential oil for perfumery industry. Also woven into screens and tatties to be hung over doors or set in windows in hot weather, when sprinkled with water, they cool and perfume the air. (Blatt. & McC. 65. 1953).

An infusion of the root is given as a febrifuge, and a powder in bilious complaints. It is regarded as stimulant, sudorific, stomachis, and refrigerant. (Caius, in JBNHS 38, 583. 1936).

#### ZEA Linn.

*Zea mays* Linn., Sp. Pl. ed. 1, 971. 1753 ; FBI 7 : 102 ; Cooke 3 : 574 ; Santapau, Pl. Saur. 948. 1953 ; Bor, 270. 1960 ; Santapau & Jan. 58. 1967.

Culms up to 3 m high, sometimes more. Leaf sheaths terete, more or less hairy upwards along the margin, ligule short, truncate, thinly membranous more or less pubescent ; blades linear-lanceolate, up to over 90 cm long and 10 cm, wide, glabrous or almost so, tips often drooping. Male

panicle up to over 20 cm long ; rhachis pubescent ; spikelets up to 12 mm long ; anthers 6 mm long. Female spike (cob) and grains varying much in size and shape, the grains also in colour.

*Local name* : Makai.

*Flowers* : July to September.

*Occurrence* : It was found under cultivation in the villages of Saurashtra, Gondal ; Junagadh and nearby areas ; Kotda ; Mangrol.

*Uses* : Cultivated as a food crop. The stems and leaves are used as fodder. The grain is nutritive.

#### ZOYSIA Willd.

*Zoysia matrella* (Linn.) Merr. in Philipp. Jour. Sci. Bot. 7 : 230. 1912 ; Bor, 684. 1960 ; Santapau & Jan. 58. 1967. *Agrostis matrella* Linn., Mant. Pl. 2 : 185. 1771. *Zoysia pungens* Willd. in Ges. Naturf. Freunde Berlin. Neue Schr. 3 : 441. 1801 ; FBI 7 : 99 ; Cooke 3 : 537.

Rootstock rigid, wiry, up to 60-90 cm long, the branches interlaced and rooting, sending up short leafy stems 15-25 cm high. Leaves 2.5-7.5 cm long ; coriaceous, dorsally rounded, subulate, concave, pungent ; sheaths short ; ligule a narrow ciliolate membrane. Racemes 2.5-3.8 cm long, strict erect. Spikelets 3.2 mm long, erect ; pedicels usually short, angular. Involucral glume biconvex, much compressed at the membranous tip, smooth and shining, thickly coriaceous ; floral glume shorter and much narrower, hyaline ; palea linear-oblong, nerveless.

*Flowers* : October.

*Occurrence* : Recorded from the sea-shore at Veraval, Somnath.

*Uses* : As it creeps to a great length it is a good sandbinder. (Blatt, & McC. 219. 1935).

#### CYCADACEAE

##### CYCAS Linn.

*Cycas rumphii* Miq. in Bull. Sc. Phys. Nat. Neerl, 45. 1839 ; FBI 5 : 657 ; Cooke 3 : 169. *C. circinalis* Roxb. ; Dalz. & Gibbs., Suppl. 83 non Linn. 1753.

A palm-like tree, evergreen, 3-6 m high ; trunk rough, sometimes producing bulbils or branchlets. Leaves pinnate, in a terminal crown, 1.2 - 1.5 m long ; rachis subterete, with numerous small spines ; leaflets 50 - 60 pairs, linear-lanceolate, acuminate, pale-green,  $15 - 25 \times 1.2 - 1.6$  cm, glabrous, rigid, flats, margins not revolute. Male cones erect, 45 cm long. Microsporophylls obovate-cuneate, long-acuminate, 3 cm long. Female cone subglobose. Megasporophylls densely tawny-villoose, up to 30 cm long ; triangular to ovate-lanceolate, dentate ; ovules 3-5 pairs. Seeds ovoid or subglobose, compressed, orange-yellow,  $5 - 6 \times 3 - 4$  cm.

*Local name* : Cycas.

*Flowers* : November.

*Occurrence* : Collected from Mangrol Amrut baug, found near the bathing pool ; also found at Junagadh.

## GNETACEAE

### EPHEDRA Linn.

**Ephedra peduncularis** Boiss., Fl. Orient. 5 : 717. 1881 ; FBI 5 : 641 ; Santapau & Jan. 47. 1967. **E. foliata** Boiss., Fl. Orient. 5 : 716. 1881 ; Cooke 3 : 166.

A dioecious or monoecious climbing reaching 5 m long or more ; branches often fascicled, slender ; bark green or glaucous, smooth, striate ; bud terminal, minute, shortly ovate or more or less elongate. Leaves 2, 3 or 4 shortly connate at the base. Male flowers : Spikelets ovate, obtuse, tetragonal, in pairs, or 3 together, or solitary, of various lengths, often with a peduncle ; flowers 6-24. Perianth obovate. Staminal-column equalling the perianth or shortly exserted. Female flowers : Floral galbuli in depauperate usually nodding cymes, ovate, on long peduncles or in short fascicles, with 3 pairs of bracts. Flowers usually in pairs, equalling the bracts. Integument at first oblong, obtusely trigonous ; tubilus exserted, straight, short. Fruit globose, 0.6 cm in diam., semi transparent, red or milky-white.

*Flowers* : October.

*Occurrence* : Collected from Okha, climber on *Euphorbia* clumps. Rather abundant locally.

*Uses* : Ephedra is used mainly as a source of ephedrin, official in the Pharmacopoeias. Tincture of ephedra is a valuable cardiac stimulant in

toxic conditions of the heart produced by such infections as pneumonia and diphtheria. The juice of the berries is given in affections of the respiratory passage. (WI)

## ARAUCARIACEAE

### ARAUCARIA Juss.

**Araucaria columnaris** (Forst.) Hook. in Bot. Mag. t. 4635. 1852 ; Santapau & Jan. 47. 1967. *Cupressus columnaris* Forest., Fl. Austr. 351. 1786, ex parte. *Araucaria cookii* R. Br. ex D. Don in Trans. Linn. Soc. 18 : 164. 1841 (nom. tant.) ; Cooke 3 : 168.

An evergreen tree, 9-10 m high, conical in outline ; main branches whorled ; horizontally spreading ; branchlets pinnately arranged, deciduous. Leaves acicular, pointed upwards, 4-12 mm long. Male catkin cylindric, 5-7.5×1.2-2 cm - Cone ellipsoid, up to 15 cm long, 11.2 cm wide ; scales 3 cm across, with 1 cm broad, lateral wings 8 mm long terminal spine, the seed central.

*Flowers* : September.

*Occurrence* : Collected from Chorwad, Suman baug ; Veraval ; planted in a garden.

*Uses* : An ornamental plant.

## CONIFERAE

### THUJA Linn.

**Thuja orientalis** Linn., Sp. Pl. 1002. 1753 ; Santapau & Jan. 47. 1967.

A small, compact, evergreen tree or shrub. Monoecious, conical ; branchlets green, flattened, much ramified and branch in one plane giving a frond-like, appearance. Leaves opposite, decussate, scale-like green, adpressed, 2 mm long, the leaves of the front pairs flat, the laterals folded. Catkins, solitary, rarely 2, terminating short branches of definite growth. Male catkins, numer, 3×2 mm, of 4 or 5 pairs of decussate peltate concave scales, each containing 2 or 3, globose, unlobed pollen-sacs. Female cones 3 mm, long, greyish-green, of 2 or 3 pairs of decussate, closely connivent, horn-like scales, each of the lower 1 or 2 pairs of scales subtending 1 or 2 ovules which are angular and are borne on the main axis. Fruit ovoid-oblong, 1.2-2 cm long.

*Local name* : Morpankh.

*Flowers* : October.

*Occurrence* : Collected from Rajkot Jilla Park ; Chotila ; Mangrol, Amrut baug.

*Uses* : An ornamental plant, usually planted in the Garden.

#### APPENDIX

Addenda and Corrigenda to Part I of the flora of Saurashtra by H. Santapau published by Saurashtra Research Society, Rajkot, 1962.

Revision of plant names with critical notes on nomenclature and addition to plant species since 1962.

It is hoped that this appendix will bring the status of Part 1 in line with that of Part 2 presented herewith.

#### ANNONACEAE

**Polyalthia cerasoides** (Roxb.) Bedd., Fl. Sylvat. t. 1. 1869 ; Santapau Fl. Saur. 1 : 3. 1962 ; Santapau & Wagh, Bull. Bot. Surv. Ind. 5 : 107. 1964 ; FBI 1 : 63. *Uvaria cerasoides* Roxb., Pl. Cor. 1 : 30 ; t. 33. 1755.

*Note* : In the first part of the Flora of Saurashtra H. Santapau has attributed the combination to Benth. & Hook. f. ex Hook. f. & Thoms. in Fl. Brit. Ind. 1 : 63. 1872, but this combination was made by Beddome, based on *Uvaria cerasoides* Roxb.

**Polyalthia longifolia** (Sonn.) Thw., Enum. 398. 1864 ; Santapau, Fl. Saur. 1 : 3. 1962. *Uvaria longifolia* Sonn. Voy. Ind. 2 : 233, t. 131. 1782.

*Note* : The basionym was not cited in the 1st part of the Flora of Saurashtra. The correct citation is as above.

#### MENISPERMACEAE

**Cocculus** A. P. de Candolle (nom. cons.) Syst. 1 : 515. 1817. (I.C.B.N. 332. 1978).

**Tinospora malabarica** Miers in Ann. Mag. Nat. Hist. Ser. 2, 7 : 38. 1851 ; Siddiqui in Nasir & Ali's, Fl. W. Pakistan No. 74, 5. 1974. *Tinospora cordifolia* auct. [non (DC.)] Miers 1864, Santapau, Fl. Saur. 1 : 6. 1962 ; Santapau & Jan. 7. 1967.

## NYMPHAEACEAE

**Nymphaea** Linn. (nom. cons.) Sp. Pl. 510. 1753 ; Gen. Pl. ed. 5, 227. 1754. (I.C.B.N. 331. 1978).

**Nymphaea nouchali** Burm. f., Fl. Ind. 120. 1768 ; Van Royen in Nova Guinea Bot. No. 8 : 110, f. 2. 1962 ; Santapau, Fl. Saur. 1 : 8. 1962 ; Backer & Bakh. f., Fl. Java 1 : 149. 1963 ; Santapau & Jan. 7. 1967. **Nymphaea stellata** Willd., Sp. Pl. 2 : 1153. 1799 ; Santapau, Fl. Saur. 1 : 8. 1962 ; Santapau & Jan. 7. 1967.

*Note* : Backer & Bakh. (loc. cit.) follow Van Royen (loc. cit.) who on examination of type specimens showed that *N. stellata* Willd., is conspecific with *N. nouchali* Burm. f.

BRASSICACEAE (*Cruciferae*)

**Brassica juncea** (Linn.) Czernajew, consp. Pl. Chark. 8. 1859 ; Backer & Bakh. f., Fl. Java 1 : 189. 1963 ; Saldanha, Fl. Hassan distr. 188. 1976. **Sinapis juncea** Linn., Sp. Pl. 668. 1753.

*Note* : Some authors (Bailey, Man. Cult. Pl. 438. 1949 ; Index Kewensis, Santapau, Fl. Saur. 1 : 12. 1962) attribute the binomial *B. juncea* to Consson (Bull. Soc. Bot. France 6 : 609. 1859).

**Coronopus** Zinn. (nom. cons.) Cat. Pl. Hort. Golt. 325. 1757. (I.C.B.N. 335. 1978).

## CAPPARACEAE

**Cadaba** Forskal

*Note* : In the first part of the Flora of Saurashtra H. Santapau has attributed genus *Cadaba* to Linnaeus but the genus *Cadaba* is created by Forskal in Fl. Aeg.-Arab 67. 1775.

**Cleome gynandra** Linn., Sp. Pl. 671. 1753 ; Jacobs in Fl. Males. ser. 1, 6 : 101. 1960 ; Santapau & Jan. 8. 1967. **Gynandropsis gynandra** (Linn.) Briq. in Ann. Cons. Jard. Bot. Geneve 17 : 382. 1914 ; Santapau, Fl. Saur. 1 : 15. 1962.

**Cleome scaposa** DC., Prodr. 1 : 239. 1824 ; J. Elffers et al., Fl. Trop. E. Afr. 4. 1964 ; Santapau & Jan. 8. 1967 ; Jafri in Nasir & Ali's Fl. W. Pakistan No. 34, 30. 1973. **Cleome papillosa** Steud., Nomencl. ed. 2, 1 : 382. 1840 nom. nud. ; Santapau, Fl. Saur. 1, 14. 1962.

**Cleome simplicifolia** (Camb.) Hook. f. & Thoms. in Fl. Brit. Ind. 1 : 169. 1872 ; Santapau, Fl. Saur. 1 : 14. 1962 ; Santapau, & Jan. 8. 1967. **Polanisia simplicifolia** Camb. in Jacquemont. Voyage dans Inde 4 : 20, t. 20, 1844.

*Note* : The basionym was not cited in the first part of the Flora of Saurashtra. The correct citation is as above.

**Maerua oblongifolia** (Forsk.) A. Rich. in Guill. et Perr. Fl. Seneg. Tent. 1 : 32, t. 5. 1831 ; Santapau & Jan. 8. 1967 ; Keay in Hutch. et Dalz. Fl. W. Trop. Afr. ed. 2, 189. 1974 : Saldanha, App. II, Fl. Hassan distr. 3. 1976 ; Bhandari, Fl. Ind. Desert 43. 1978. **Capparis oblongifolia** Forsk., Fl. Aeg.-Arab. 99. 1775. **Maerua arenaria** var. *glabra* Hook. f. & Thoms. in Fl. Brit. Ind. 1 : 171, 1872 ; Santapau, Fl. Saur. 1 : 16. 1962. **M. ovalifolia** Camb., Jacquem. Voy. Bot. 22, t. 24. 1844. **M. arenaria** (DC.) J. Hooker & Thoms. in J. Hooker, Fl. Brit. Ind. 1 : 171. 1872. **Niebuhria arenaria** DC., Prodr. 1 : 244. 1824.

*Note* : According to C. Saldanha (loc. cit.) and M. Bhandari (loc. cit.) **Maerua arenaria** (DC.) Hook. f. & Thoms. and **M. oblongifolia** (Forsk.) A. Rich have been treated by some authors as distinct species whereas others have treated these as synonyms. Bhandari adds that a study of the type material is required to confirm the present treatment. This author was unable to locate the type.

## CARYOPHYLLACEAE

**Polycarpaea** Lamk. (nom. cons.) Journ. Hist. Nat. Par. 2 : 3, t. 25. 1792. (I.C.B.N. 330. 1978).

**Vaccaria pyramidata** Medik., Phil. Bot. 1 96. 1789 ; Santapau & Jan. 9. 1967, Santapau, Fl. Khandala 12. 1967. **Saponaria vaccaria** Linn., Sp. Pl. 409. 1753 ; Santapau, Fl. Saur. 1 : 24. 1962.

## TAMARICACEAE

**Tarmarixa aphylla** (Linn.) Karst., Deutsche Fl. 641. 1880-83 ; Santapau & Jan. 10. 1967. **Thuya aphylla** Linn., Cent. Pl. 1 : 32. 1755. **Tamarix articulata** Vahl, Symb. 2 : 48, t. 32. 1791 ; FBI 1 : 249 ; Cooke 1 : 75.

A shrub or small tree, reaching 7 m high. Leaves reduced to a short sheath, the free part to a small triangular tooth. Flowers hermaphrodite, in slender, usually interrupted spikes ; bracts sheathing, acute, shorter than

the flowers. Sepals 5, much shorter than the petals, entire or minutely toothed. Petals oblong. Stamens 5; filaments filiform, inserted in alternate notches of the 10-lobed disk. Capsules trigonous, rounded at the tip.

*Flowers*: October onwards.

*Occurrence*: Usually found on moist spots and near water. Collected from Dhandhuka (F. Borgesen 63605).

### ELATINACEAE

*Bergia suffruticosa* (Delile) Fenzl. in Denks. Bot. Gesel. Reg. 3 : 183. 1841; Rech. f. Fl. Iran. 16 : 4. 1966; B. verdcourt in Fl. Trop. E. Afr. 5. 1968. Bhandari, Fl. Ind. Desert 57. 1978. *Lanceretia suffruticosa* Delile, Fl. Egypt. 69. 1812. *Bergia odorata* Edgew. in Journ. Asiat. Soc. Beng. 7 : 765. 1838; FBI 1 : 251; Santapau, Fl. Saur. 1 : 29. 1962; Santapau & Jan. 10. 1967.

### MALVACEAE

#### *Abutilon* Miller

*Note*: In the first part of the Flora of Saurashtra H. Santapau has attributed genus *Abutilon* to Linnaeus, but the genus *Abutilon* is created by P. Miller in Gard. Dict. Abr. ed. 4. 1754.

*Abutilon pannosum* (Forst. f.) Schlect. Bot. Zeit. 9 : 828. 1851; Borssum, Blumea 14 : 160. 1967; T.P. Ramamoorthy, Fl. Hassan distr. 149. 1976; *Sida pannosa* Forst. f. Comm. Phy. & Soc, Reg. Goetting 1787 : 62. 1789. *Sida glauca* Cav. Ic. 1 : 8, t. 11. 1791. *Sida mutica* Delile (1813, nom.) ex DC., Prodr. 1 : 470. 1824. *Abutilon glaucum* (Cav.) Sweet, Hort. Brit. 54. 1826; Santapau, Fl. Saur. 1 : 40. 1962; Santapau & Jan. 10. 1967. *Abutilon muticum* (DC.) Sweet, Hort. Brit. ed. 2, 65. 1830.

*Abutilon hirtum* (Lamk.) Sweet, Hort. Brit. 53. 1826, Santapau & Jan. 10. 1967. *Sida hirta* Lamk., Encycl. 1 : 7. 1783.

*Note*: H. Santapau in Flora of Saurashtra (1 : 41. 1962) has attributed the combination to G. Don (1831), but this combination was made earlier by Sweet.

*Abutilon indicum* (Linn.) Sweet, Hort. Brit. 1 : 54. 1827; Santapau, Fl. Saur. 1 : 40. 1962; Santapau & Jan. 10. 1967. *Sida indica* Linn.. Cent. Pl. 2 : 26. 1756.

**Note :** The basionym was not cited in the first part of the Flora of Saurashtra. The correct citation is as above.

**Abutilon persicum** : (Burm. f.) Merr. in Philip. J. Sci. 19 : 364. 1921 ; Borssum, Blumea 14 : 163. 1966. *Sida persica* N. Burman, Fl. Ind. 148, t. 47. f. 1. 1768. *Sida polyandra* Roxb., Fl. Ind. 3 : 173. 1832. *Abutilon polyandrum* Schlecht. in Link. Enum. Hort. Berol. 2 : 264. 1822 ; Santapau, Fl. Saur. 1 : 38. 1962 ; Santapau & Jan. 10. 1967.

**Abutilon ramosum** (Cav.) Guill. & Perr. in Guill., Perr. & Rich. Fl. Senegamb. 1 : 68. 1831 ; Santapau, Fl. Saur. 1 : 39. 1962 ; Santapau & Jan. 10. 1967. *Sida ramosa* Cav., Diss. 1 : 28. t. 6, f. 1. 1785.

**Note :** The basionym was not cited in the first part of the Flora of Saurashtra. The correct citation is as above.

**Azanza lampas** (Cav.) Alef. in Bot. Zeit. 19 : 298. 1861 ; Santapau, Fl. Khandala 19. 1967 ; Santapau & Jan. 10. 1967. *Hibiscus lampas* Cav., Diss. 3 : 154, t. 56. f. 2. 1787. Santapau, Fl. Saur. 1 : 47. 1962.

According to A.E. Exell [Fl. Zamb. 1 (2) : 420. 1961] *Azanza* differs from *Hibiscus* in following characters :

Style not distinctly branched, clavate at apex with coherent stigmas, epicalyx fused with calyx, cupuliform with 5-15 caducous teeth or lobes

*Azanza*

Style 5-branched ; bracts of epicalyx not 3, rarely absent

*Hibiscus*

**Gossypium arboreum** subsp. **neglectum** (Tod.) Macer, Sredne Aziat. Gosud. Univers. Trudy, Nov. Ser. 28 : 18. 1950 ; C.E. Smith, Taxon 13 : 213. 1964. *Gossypium neglectum* Todaro, Oss. 95. 1877-8. *G. arboreum* var. *neglectum* Cooke 1 : 118. 1901, Santapau, Fl. Saur. 1 : 58. 1962 ; Santapau & Jan. 11. 1967.

**Hibiscus** Linn. (nom. cons.) Sp. Pl. ed. 2, 693. 1753 ; Gen. Pl. ed. 5. 310. 1754 (I.C.B.N. 365. 1978).

**Hibiscus ovalifolius** (Forsk.) Vahl, Symb. 1 : 50. 1790 ; Santapau & Jan. 11. 1967. *Urena ovalifolia* Forsk., Fl. Aegypt.-Arab. 124. 1775. *Hibiscus micranthus* Linn. f., Suppl. 308. 1781 ; Santapau, Fl. Saur. 1 : 44. 1962.

**Hibiscus obtusifolius** Gärcke in Bot. Zeit. 7 : 837. 1849 ; Bhandari, Fl. Ind. Desert 65. 1978. *Hibiscus punctatus* Dalz. ex Dalz. et Gib. Bombay

Fl. 20. 1861 ; Santapau, Pl. Saur. 70. 1953 ; Santapau, Fl. Saur. 1 : 47. 1962 ; Santapau & Jan. 11. 1967.

**Malva verticillata** Linn. var. **chinensis** (Miller) Hu, Fl. China Malv. 6. 1955 ; Santapau & Jan 11. 1967 ; *Malva verticillata* Miller, Dict. ed. 8, 670. 1768. *M. parviflora* auct. (non Linn. Demonstr. Pl. 18. 1753) Santapau, Fl. Saur. 1 : 55. 1962.

**Malvastrum** A. Gray (nom. cons.) Mem. Amer. Acad. Sci. N.S. 4 : 21. 1849. (I.C.B.N. 364. 1978).

**Pavonia** Cav. (nom. cons.) Diss. 2. App. 2 ; (2), 1786 ; Op. Cit. 3 : 132, t. 45. 1787. (I.C.B.N. 364. 1978).

**Pavonia procumbens** (Wight & Arn.) Walp., Rep. Bot. Syst. 1 : 301. 1824 ; Borss. in Blumea 14. 1966. *Lebretomia procumbens* Wight & Arn. Prod. 47. 1834. *Pavonia patens* (Andr.) Chiov. in Ann. Bot. 13 : 409. 1915; Santapau, Fl. Saur. 1 : 51. 1962 ; Santapau & Jan. 11. 1967. *Sida patens* Andr., Bot. Rep. 9 : t. 571. 1809.

**Pavonia zeylanica** (Linn.) Cav.. Diss. 3 : 134, t. 48, f. 2. 1787 ; Santapau, Fl. Saur. 1 : 52. 1962 ; Santapau & Jan. 11. 1967. *Hibiscus zeylanicus* Linn. Sp. Pl. 697. 1753.

*Note* : The basionym was not cited in the first part of the Flora of Saurashtra. The correct citations as above.

**Sida cordata** (Burm. f.) Borss. in Blumea 14 : 182. 1966. *Melochia cordata* Burm. f., Fl. Ind. 143. 1768. *Sida veronicaefolia* Lamk., Encycl. 1 : 5. 1783 ; Santapau, Fl. Saur. 1 : 37. 1962 ; Santapau & Jan. 12. 1967.

**Sida mysorensis** Wight & Arn., Prodr. 59. 1834 ; Masters in Fl. Brit. Ind. 1 : 322. 1874 ; Hu, Malv. Fl. China 23, t. 16, f. 2. 1955 ; Borssum, Blumea 14 : 180. 1966 ; Santapau & Jan. 12. 1967. *Sida glutinosa* auct. (non Cav. 1785) ; Santapau, Pl. Saur. 85. 1953 & in Fl. Saur. 1 : 37. 1962.

**Sida retusa** Linn., Sp. Pl. ed. II, 961. 1763 ; Santapau & Jan. 12. 1967. *Sida rhombifolia* var. *retusa* Masters in Fl. Brit. Ind. 1 : 324. 1874 ; Santapau, Fl. Saur. 1 : 35. 1962.

**Thespesia** Solander ex Correa (nom. cons.) Ann. Mus. Hist. Nat. Paris 9 : 290. 1807.(I.C.B.N. 365. 1978).

**Thespesia populnea** (Linn.) Sol. ex Correa, Ann. Mus. Hist. Nat. 9 : 290, t. 8. f. 1. 1807 ; Santapau, Fl. Saur. 1 : 32. 1962 ; Santapau & Jan. 12, 1967. *Hibiscus populneus* Linn., Sp. Pl. 694, 1753.

*Note* : The basionym was not cited in the first part of the Flora of Saurashtra. The correct citation is as above.

### STERCULIACEAE

#### **Byttneria** Loefling (nom. cons)

Iter Hisp. 313. 1758.

(I.C.B.N. 365. 1978)

**Waltheria indica** Linn. Sp. Pl. 673. 1753 ; Masters in Fl. Brit. Ind. 1 : 374. 1874 ; Santapau, Fl. Saur. 1 : 64. 1962, Santapau & Jan. 12. 1967. **Waltheria americana** Linn., Sp. Pl. 673. 1753 ; T.P. Ramamoorthy in Saldanha's Fl. Hassan distr. 144. 1976.

*Note* : In Flora of Hassan distr. (loc. cit.) T.P. Ramamoorthy has preferred name *Waltheria americana* Linn. for this species, because that name happens to be the lectotype of generic name of the genus. According to I.C.B.N., article No. 57, when a taxon is published under different names in the same publication, the correct name is that which is changed by the author who merges them under one valid name. The name *W. americana* has been merged with *W. indica* by M.T. Masters in Fl. Brit. Ind. (loc. cit.). Therefore *W. indica* is the valid name for this taxon.

### TILIACEAE

**Corchorus trilocularis** Linn., Mant. 77. 1767 ; FBI 1 : 397 ; Cooke 1 : 158 ; Indraji 110. 1910 ; Santapau, Pl. Saur. 108. 1953 ; Santapau & Jan. 13. 1967. **Corchorus aestuans** auct. (non Linn. 1758) ; Forsk., Fl. Aegypt.-Arab. 101. 1775.

Annual ; stems and branches more or less hairy. Leaves elliptic or oblong-lanceolate, acute or obtuse, serrate, somewhat rough below, base rounded or cuneate ; stipules lanceolate-subulate. Flowers in short cymes ; buds ovoid or obovoid apiculate ; bracts lanceolate-subulate ; peduncles very short, leaf-opposed, hairy, pedicells very short, pubescent. Sepals linear-oblong, acuminate. Petals oblong, slightly longer than the sepals. Capsules 5-7.5 cm long, with a short erect beak, hairy when young with stiff stellate hairs, scabrous when old, 3-4 angled, 3-4 valved. Seeds trigonous, black.

*Local name* : Lambi-chhunchh, Kadvi-chunchadi.

*Flowers* : June onwards.

*Occurrence* : Collected from various places in Saurashtra. Gondal irrigation lake ; Rozi and Bapu's Vav near Jamnagar ; Pradumna Park, Jilla Park and in cultivated fields, Rajkot and from Junagadh to Sasan, Somnath.

*Uses* : Ash of the plant is applied on the blotches, leaves are used as a poultice, infusion of the seeds is given in fever and rheumatism. (Indraji, 110. 1910).

### RUTACEAE

**Aegle Correa** (nom. cons.)

Trans. Linn. Soc. 5 : 222. 1800.

(I.C.B.N. 355. 1978).

**Murraya Koenig ex Linn.** (nom. cons.)

Mant. 2 : 554. 1771 ('*Murraea*') ; Corr. Murray in Linnaeus, Syst. Veg. ed. 13, 331. 1774.

(I.C.B.N. 355. 1978).

### SIMAROUBACEAE

**Ailanthus Desf.** (nom. cons.)

Mem. Acad. Sci. Par. 265. 1789.

(I.C.B.N. 355. 1978).

**Balanites Delile** (nom. cons.)

Fl. Egypte 77. 1813.

(I.C.B.N. 353. 1978).

### BURSERACEAE

**Commiphora wightii** (Arnott) Bhandari in Bull. Bot. Surv. Ind. 6 : 327. 1964 & in Fl. Ind. Desert 95. 1978. *Balsamodendron wightii* Arn. in Ann. Nat. Hist. 3 : 86. 1839. *Commiphora mukul* (Hook. ex Stocks) in DC. Mon. Phan. 4 : 12. 1883; Santapau, Pl. Saur. 138. 1953 ; Santapau &

Jan. 14. 1967. *Balsamodendron mukul* Hook. ex Stocks in Hook. Kew Journ. Bot. 1 : 259, t. 8. 1849. *Commiphora roxburghii* (Stocks.) Engler in Pfam. ed. 2, 19A : 436. 1931 ; Santapau, Fl. Saur. 1 : 86. 1962. *Balsamodendron roxburghii* Stocks in Journ. As. Soc. Bomb. 2 : 391. 1848 (non Arnott 1839).

### CELASTRACEAE

#### **Maytenus** Molina

*Note* : In first part of the Flora of Saurashtra H. Santapau has attributed genus *Maytenus* to HBK, but the genus *Maytenus* is created by Molina in Saggio Chile 177, 349. 1782.

**Maytenus emarginata** (Willd.) Ding Hou in Fl. Males. ser. 1, 6 (2) : 241. 1962 ; Santapau & Jan. 15. 1967. *Celastrus emarginatus* Willd., Sp. Pl. 1, 2 : 1128. 1798. *Maytenus senegalensis* auct. (non Exell 1952) ; Santapau, Fl. Saur. 1 : 90. 1962.

### VITACEAE

#### **Ampelocissus** Planch. (nom. cons.)

Vigne Am. 8 : 371. 1884.

(I.C.B.N. 363. 1978).

#### **Cayratia** A. Jussieu (nom. cons.)

Dict. Sc. Nat. 10 : 103. 1818.

(I.C.B.N. 363. 1978).

**Cayratia trifolia** (Linn.) Domin in Biblioth. Bot. 89 : 37. 1927 ; Suessenguth in Engler & Prantl, Pfam. ed. 2, 280. 1953. *Vitis trifolia* Linn., Sp. Pl. 203. 1753. *Cayratia carnosa* (Lamk.) Gagnep. in Nat. Syst. 1 : 347. 1911 ; Santapau, Pl. Saur. 162. 1953 ; Gir. 62 ; Santapau, Fl. Saur. 1 : 98. 1962 ; Santapau & Jan. 15. 1967. *Cissus carnosa* Lamk., Encycl. 1 : 31. 1783.

*Note* : In some Indian floras *C. carnosa* (Lamk.) Gagnep. has been treated as distinct from *C. trifolia* (Linn.) Domin. We however, follow Suessenguth (loc. cit.) in treating them conspecific.

## LEEACEAE

**Leea macrophylla** Roxb. ex Hornem. Hafn. 1 : 231. 1813 ; Clarke in Trim. J. Bot. 19 : 137. 1881 ; FBI 1 : 664 ; P.P. ; Cooke 1 : 276 ; Santapau & Jan. 16. 1967.

Herbaceous, erect, 30-90 cm high ; root tuberous, perennial, red. Leaves simple, broadly ovate, cordate, acute or acuminate, coarsely serrate or sublobed, nearly as broad as long, the lower leaves up to 60 cm, the upper 15-22 cm long dark green and glabrous above, cano-pubescent beneath ; main nerves opposite, 8-10 pairs, very prominent ; petioles 5-12 cm long, deeply striate, glabrous. Flowers white, in terminal much-branched puberulous corymbose cymes often 30 cm long. Calyx divided about 1/3 of the way down ; lobes triangular-ovate, tipped with a small hard point. Petals oblong. Staminal-tube deeply divided ; lobes oblong, entire or emarginate ; anthers laterally united in bud. Berry black, 3-6-celled; depressed-globose, usually 3-6-lobed.

*Flowers* : July to September.

*Occurrence* : Recorded from Jamnagar.

(CIRISM-Jamnagar F. Borgesen 268).

*Uses* : The root is employed in native medicine, being used for the cure of Guinea-worm. (Watt. Dict. Econ. Prod. 4 : 617).

## SAPINDACEAE

**Dodonaea** P. Miller

*Note* : In first part of the Flora of Saurashtra H. Santapau has attributed genus *Dodonaea* to Linnaeus. The genus *Dodonaea* is created by P. Miller in Gard. Dict. Abr. ed. 4. 1754.

**Schleichera** Willdenow (nom. cons.)

Sp. Pl. 4 : 1096. 1806.

(I.C.B.N. 362. 1978).

## ANACARDIACEAE

**Rhus mysorensis** G. Don, Gen. Sys. 2 : 74. 1832 ; Santapau, Fl. Saur. 1 : 104. 1962 ; Santapau & Jan. 16. 1967. (*mysorensis*).

*Note* : H. Santapau in first part of the Flora of Saurashtra has attributed the combination to Heyne ex Wight & Arn. (Prodr. 172. 1834), but this combination was made by G. Don. (1832).

## FABACEAE

**Alysicarpus Desv. (nom. cons.)**

Journ. Bot. ser. 2, 1 : 120. 1813 ; J. Leon in B.J.B.B. 24 : 84.  
1954.

(I.C.B.N. 348. 1978).

**Alysicarpus rugosus** (Willd.) DC., Prodr. 2 : 354. 1825 ; Verdcourt,  
Kew Bull. 24 : 67. 1970. *Hedysarum rugosum* Willd., Sp. Pl. 3 : 1172. 1802.  
**Alysicarpus violaceus** (Forsk.) Schindler in Fedde, Repert. 21 : 13. 1925 ;  
Santapau, Fl. Saur. 1 : 149. 1962. *Hedysarum violaceum* Forsk., Aegyp.-  
Arab. 136. 1775, (non Linn. 1753). *Alysicarpus glumaceus* Forsk., (Vahl)  
DC., Prodr. 2 : 353. 1825 ; Santapau & Jan. 17. 1967. *Hedysarum gluma-*  
*ceum* Vahl, Symb. Bot. 2 : 106. 1791.

**Butea Roxb. ex Willdenow (nom. cons.)**

Sp. Pl. 3 : 917. 1802.

(I.C.B.N. 351. 1978)

**Canavalia maritima** (Aubl.) Thouars in J. Bot. Desv. 1 : 80. 1813 ;  
Santapau, Fl. Saur. 1 : 166. 1962 ; Santapau & Jan. 17. 1967. *Dolichos*  
*maritimus* Aubl. Pl. Guian. 767. 1775.

*Note* : The basionym was not cited in the first part of the Flora of  
Saurashtra. The correct citation is as above.

**Cajanus A.P. de Candolle (nom. cons.)**

Catal. Monsp. 85. 1813.

(I.C.B.N. 351. 1978).

**Dalbergia Linn. f. (nom. cons.)**

Suppl. 52, 316. 1781.

(I.C.B.N. 348. 1978)

**Desmodium Desvaux (nom. cons.)**

Journ. Bot. Desvaux ser. 2, 1 : 122. 1813.

(I.C.B.N. 348. 1978).

**Desmodium dichotomum** (Willd.) DC., Prodr. 2 : 336. 1825 ; Backer  
& Bakh. f., Fl. Java 1 : 604. 1963 ; Santapau & Jan. 18. 1967. *Hedysarum*  
*dichotomum* Willd., Sp. Pl. 3 : 1180. 1802. *Desmodium diffusum* DC., Prodr.

2 : 336, No. 106. 1825 (non. DC. ibid. No. 88, 335 ; nec. in Ann. Sc. Nat. 4 : 100, No. 21. laxiflorum) ; Santapau, Fl. Saur. 1 : 154. 1962.

**Dolichos trilobus** Linn., Sp. Pl. 726, 1753; Verdcourt, Taxon 17 : 173. 1968. **Dolichos falcatus** Klein ex Willd., Sp. Pl. 3 : 1047. 1802 ; Santapau, Fl. Saur. 1 : 173. 1962 ; Santapau & Jan. 18. 1967.

**Erythrina indica** Lamk., Encycl. 2 : 391. 1786 ; Santapau, Fl. Khandala 64. 1967; Santapau & Jan. 18. 1967. *E. variegata* var. *orientalis* (Linn.) Merr., Inter. Herb. Amb. 276. 1977 ; Santapau, Fl. Saur. 1 : 162. 1962.

**Glycine Linnaeus (nom. cons.)**

Sp. Pl. 753. 1753.

(I.C.B.N. 350. 1978).

**Glycine wightii** (Wight & Arn.) Verdcourt, Taxon 15 : 35. 1966. **Notonia wightii** Wight & Arn., Prodr. 208. 1834. **Glycine javanica** auct. (non. Linn. 1753) Santapau, Fl. Saur. 1 : 161. 1962 ; Santapau & Jan. 18. 1967.

**Goniogyna hirta** (Willd.) Ali, in Taxon 16 : 463. 1967. **Hallia hirta** Willd., Sp. Pl. 3(2) : 1169. 1803. **Heylandia latebrosa** DC., Mem. Leg. 201. 1825 ; Santapau, Fl. Saur. 1 : 111. 1962 ; Santapau & Jan. 18. 1967.

**Indigofera astragalina** DC., Prodr. 2 : 228. 1825 ; Gillett in Kew Bull. 14(2) : 290. 1960 ; Santapau & Jan. 18. 1967. *I. hirsuta* auct. (non. Linn. 1753) Baker in Fl. Brit. Ind. 2 : 98. 1876 ; Santapau, Fl. Saur. 1 : 132. 1962.

**Melilotus** P. Miller

*Note* : In first part of the Flora of Saurashtra H. Santapau has attributed genus *Melilotus* to Jussieu but the genus *Melilotus* is created by P. Miller in Gard. Dict. Abr. ed. 4. 1754.

**Moghania strobilifera** (Linn.) St. Hill ex Jacks., Ind. Kew. 2 : 252. 1894 ; Nooteboom in Reinwardtia 5 : 433. 1961, Santapau, Fl. Khandala 73. 1967 ; Santapau & Jan. 19. 1967. **Hedysarum strobiliferum** Linn., Sp. Pl. 764. 1753. **Flemingia strobilifera** R. Br. ex Ait. Hort. Kew. (ed. 2) 4 : 350. 1812 ; FBI 2 : 227 (excl. vars.) Cooke 1 : 416.

An erect much-branched shrub 1-3 m high ; branches, slender, terete, pubescent towards their tips. Leaves 1-foliate ; stipules scarious, caducous. Leaflets sub-coriaceous, minutely gland-dotted, ovate-oblong,

acute, green and glabrous or nearly so above, paler and more or less silky-pubescent beneath, base rounded or truncate ; main nerves 8–10 pairs, very conspicuous on the lower side ; stipules 0. Flowers in axillary and terminal simple or branched racemes. Calyx pubescent ; teeth linear, acute, veined, longer than the tube. Corolla white, auricled. Pods oblong, turgid, mucronate, densely pubescent. Seeds 2, dark-brown, marbled.

*Flowers* : November to January.

*Occurrence* : Recorded from Jamnagar.

**Mucuna Adanson** (nom. cons.)

Fam. 2 : 325. 1763.

(I. C. B. N. 351. 1978).

**Mucuna pruriens** (Linn.) DC., Prodr. 2 : 405. 1825 ; Saldanha, Fl. Hassan distr. 259. 1976. *Dolichos pruriens* Linn. in Stickman, Diss. Herb. Amb. 23. 1754. *Mucuna prurita* W. Hook. Bot. Misc. 2 : 348. 1830 31 ; (nom. superfl.) ; Santapau, Fl. Saur. 1 : 160. 1962 ; Santapau & Jan. 19. 1967.

**Vigna Savi**

*Note* : In the first part of this work several species were included in the genus *Phaseolus*, but recently there is a change in the generic concept. (Kew Bull. 24 : 508. 1970). The following taxa fall under the genus *Vigna*.

Hepper (Fl. W. Trop. Afr., ed. 2, 1 : 508. 1958) draws the following distinction between the two genera :

Stipules truncate at the base ; keel spirally twisted ; fruit not septate

*Phaseolus*

Stipules cordate or appendaged below the base ; keel straight or spirally twisted ; fruit septate

*Vigna*

**Vigna aconitifolia** (Jacq.) Marechal in Bull. Jard. Bot. Nat. Belge 39 : 160. 1969, Verdcourt in Kew Bull. 23 : 464. 1969. *Phaseolus aconitifolius* Jacq., Obs. Bot. 3(2) : t. 52. 1768. Santapau, Fl. Saur. 1 : 167. 1962 ; Santapau & Jan. 19. 1967.

**Vigna angularis** (Willd.) Ohwi & Ohashi in Journ. Jap. Bot. 44 : 29. 1969 : Verdcourt in Kew Bull. 24 : 557. 1970. *Dolichos angularis* Willd.,

Sp. Pl. 3 : 1051. 1802. *Phaseolus angularis* (Willd.) Wight in U. S. Dep. Agric. Bur. Pl. Ind. Bull. 137 : 17. 1909 ; Santapau, Fl. Saur. 169. 1962 ; Santapau & Jan. 19. 1967.

**Vigna dalzelliana** (O. Kuntze) Verdcourt in Kew Bull. 24 : 558. 1970.  
*Phaseolus dalzelliana* O. Kuntze, Rev. Gen. 1 : 202. 1891. *Phaseolus dalzellii* Cooke, Fl. Pres. Bombay 1 : 376. 1902 ; Santapau, Fl. Saur. 170. 1962 : Santapau & Jan. 19. 1967.

**Vigna radiata** (Linn.) Wilezck in Fl. Congo Belg. 6 : 386. 1954 ; Verdcourt in Kew Bull. 24 : 558. 1970. *Phaseolus radiatus* Linn., Sp. Pl. 725. 1753 ; Santapau, Fl. Saur. 1 : 169. 1962 ; Santapau & Jan. 19. 1967.

**Vigna trilobata** (Linn.) Verdcourt in Taxon 17 : 172. 1968. *Dolichos trilobatus* Linn., Mant 101 ; 1767. *Phaseolus trilobus* auct. (non *Dolichos trilobus* Linn. 1753) ; Santapau, Fl. Saur. 1 : 168. 1962.

**Derris** Lour. (nom. cons.)

Fl. Cochinch. 2 : 432. 1790.

(I. C. B. N. 349. 1978).

**Derris indica** (Lamk.) Bennet in Journ. Bombay Nat. Hist. Soc. 68 : 303. 1971. *Galedupa indica* Lamk., Encycl. 2 : 594. 1788-89. *Pongamia pinnata* (Linn.) Pierre. Fl. For. Cochinch. sub. t. 385. 1899 ; Santapau, Fl. Saur. 1 : 180. 1962 ; Santapau & Jan. 19. 1967. *Cytisus pinnatus* Linn. Sp. Pl. 741. 1753 (non *Derris pinnata* Lour., 1790).

**Rhynchosia** Lour. (nom. cons.)

Fl. Cochinch. 460. 1790.

(I. C. B. N. 351. 1978).

**Sesbania** Adanson (nom. cons.)

Fam. 2 : 326. 1763 (as *Sesban*) Corr. Scop. Introd. : 308. 1777 ; Gillet in Kew Bull. 17(1) : 91. 1963. (I. C. B. N. 347. 1978).

**Smithia** Aiton (nom. cons.)

Hort. Kew. 3 : 496. 1789.

(I. C. B. N. 348. 1978).

**Smithia sensitiva** Ait. Hort. Kew. ed. 1, 3 : 496. 1789 ; FBI 2 : 148 ; Cooke 1 : 357 ; Santapau & Jan. 20. 1967.

Annual, diffuse, much-branched; stems 30–90 cm long, slender, not bristly. Leaves abruptly-pinnate; rhachis 1.4–2.5 cm long, bristly and ending in a long bristle; petioles short; stipules scarious, lanceolate. Leaflets 3–10 pairs, linear-oblong, obtuse, bristle pointed, glabrous above and with strong bristles on the midrib and somewhat straight margins beneath, base rounded. Somewhat unequal sided. Flowers 2–6, in simple racemes from the axils of the upper leaves. Calyx with a few scattered bristles, rigid. Corolla yellow. Pods flattened; joints 4–6, orbicular, margined, densely papillose on the faces.

*Flowers* : September to October.

*Occurrence* : Recorded from Junwania Nes in Gir Forest. It was found on the moist spots.

#### **Teramnus** P. Browne

*Note* : In first part of the Flora of Saurashtra H. Santapau has attributed genus *Teramnus* to Swartz, but the genus *Teramnus* is created by P. Brown in Hist. Jamaica. 290. 1756.

**Zornia gibbosa** Span. in Linnaea 15 : 192. 1841 ; Raizada in Ind. For. 92 : 326. 1966 ; Santapau & Jan. 20. 1967. *Zornia diphylla* auct. plur. (non Pers. 1807) Santapau, Fl. Saur. 1 : 142. 1962.

### CAESALPINIACEAE

**Caesalpinia bonduc** (Linn.) Roxb., Fl. Ind. 2 : 362. 1832, quoad basion. ; Dandy & Exell. in J. Bot. 76 : 179. 1938 ; Back. & Baksh. f., Fl. Java 1 : 545. 1964 ; Brenan, Fl. Trop. E. Afr. (Leg. Caes) : 37. 1967 ; Hattink, Reinwardtia, 9(1) : 17. 1974 ; J. E. Vidal et S. H. Thol in Rev. Asiatic Caes. in Bull. Du Mus. Nat. D'Hist. Nat. Ser. 3e No. 395, 91. 1976. *Guilandina bonduc* Linn., Sp. Pl. 381. 1753. *G. bonducella* (Linn.) Fleming in As. Res. 11 : 159. 1810 ; FBI 2 : 254. *Caesalpinia crista* auct. non Linn. ; Santapau, Fl. Saur. 1 : 182. 1962 ; Santapau & Jan. 20. 1967.

*Note* : The present combination [*C. bonduc* (Linn.) Roxb.] was actually misapplied by Roxburgh to a different species of *Caesalpinia*. But according to ICBN, article No. 55.2 this combination could be attributed only to the original plant and not to the new plant and its circumscription given by Roxburgh. Accordingly Dandy & Exell (loc. cit) have accepted

new combination made by Roxburgh based on type of Linneaus and have given amended description to Roxburgh's combination.

### MIMOSACEAE

#### **Acacia** P. Miller

*Note* : In first part of the Flora of Saurashtra, H. Santapau has attributed genus *Acacia* to Willdenow, but the genus *Acacia* is created by P. Miller in Gard. Dict. Abr. ed. 4. 1754 (non Guettard 1753).

**Acacia sinuata** (Lour.) Merrill, Trans. Amer. Philos. Soc. 24(2) : 186. 1935 ; Santapau, Fl. Khandala ed. 3, 84. 1967; Santapau & Jan. 21. 1967. *Mimosa sinuata* Lour., Fl. Cochinch. 653. 1790. *Acacia concinna* (Willd.) DC., Prodr. 2 : 464. 1825 ; Santapau, Fl. Saur. 1 : 204. 1962.

**Acacia nilotica** (Linn.) Del. subsp. *indica* (Benth.) Brenan in Kew Bull. 84. 1957 ; Santapau & Jan. 21. 1967. *Acacia arabica* auct. [non (Lam.) Willd. 1808] ; FBI 2 : 293. 1874 ; Cooke 1 : 443 ; Indraji 302. 1910 ; Santapau, Pl. Saur 297. 1953. *Acacia nilotica* (Linn.) Del., Fl. Eg. Ill. 79. 1813 ; Santapau, Fl. Saur. 1 : 204. 1962.

#### **Pithecellobium** Mart. (nom. cons.)

Hort. Monac. 188. 1829.

(I. C. B. N. 342. 1978).

**Prosopis cineraria** (Linn.) Druce in Rep. Bot. Epch. Cl. Brit. Isles 1913, 3 : 422. 1914 ; Hutchinson in Gen. Fl. Pl. 1 : 289. 1964 ; Santapau & Jan. 22. 1967. *Mimosa cineraria* Linn., Sp. Pl. 517. 1753. *Prosopis spicigera* Linn., Mant. 68. 1767 ; Santapau, Fl. Saur. 1 : 200. 1962.

**Prosopis chilensis** (Molina) Stuntz in U. S. Dept. Agri. Bur. Pl. Invent. Seeds and Pl. Import. 31, 85. 1914; Bhandari, Fl. Ind. Desert. 151. 1978. *Ceratonia chilensis* Molina Sagg. Chil. 172. 1782. *Prosopis juliflora* (Swartz.) DC., Prod. 2 : 447. 1825 ; Santapau, Fl. Saur. 1 : 201. 1962 ; Santapau & Jan. 22. 1967.

### VAHLIACEAE

This family was previously included in *Saxifragaceae* from which it differs in its opposite leaves, insertion of the stamens on the margin of the epigynous disc. and the parietal placentas hanging from the roof of the

ovary. In Saxifragaceae the leaves are alternate and placentation is axile. Family Vahliaeae bears only one genus, accordingly *Vahlia* Thunb. has been merged with *Bistella* Adans.

**Bistella digyna** (Retz.) Bullock. Acta. Bot. Neerl. 15 : 84, 85. 1966 ; M. A. Siddiqi in Nasir & Ali's Fl. W. Pakistan No. 101, I. 1971. *Oldenlandia digyna* Retz, Obs. 4 : 23. 1786-87. *Vahlia digyna* (Retz.) O. Kuntze, Rev. Gen. Pl. 227. 1891 ; Santapau, Fl. Saur. I : 212. 1962 ; Santapau & Jan. 22. 1967.

### CRASSULACEAE

**Kalanchoe** Adans., Fam. 2 : 248. 1763.

**Bryophyllum** Salisb. Parad. Lond. t. 3. 1805.

**Kalanchoe pinnata** (Lam.) Persoon, Syn, 446. 1805 ; Backer & Bakh. f., Fl Java I : 201. 1963 ; Santapau & Jan. 22. 1967. *Cotyledon pinnata* Lam., Encycl. 2 : 141. 1786. *Bryophyllum pinnatum* (Lam.) Oken. Allg. Naturgesch. 3(3) : 966 1841 ; Santapau, Fl. Saur. I : 213. 1962.

### RHIZOPHORACEAE

**Bruguiera conjugata** (Linn.) Merrill in Philipp Journ. Sci. 9 : 118. 1914 ; Stewart, Fl. W. Pakistan 501. 1972. *Rhizophora gymnorhiza* Linn., Sp. Pl. 443. 1753. *Bruguiera gymnorhiza* (Linn.) Lamk. I11. t. 379. 1797 ; Santapau, Fl. Saur. I : 214. 1962 ; Santapau & Jan. 22. 1967.

**Combretum** Loefling (nom. cons.)

Iter. Hisp. 308. 1758.

(I. C. B. N. 372. 1978).

**Syzygium** P. Brown ("Brown") ex Gaertner (nom. cons.)

Fruct. 1 : 166, t. 33. 1788.

(I. C. B. N. 372. 1978)

### LECYTHIDACEAE

**Couroupita guianensis** Aubl. Pl. Gui. 2 : 708, t. 282. 1775 ; Bailey. Man. Cult. Pl. 722. 1949 ; Santapau & Jan. 27. 1967.

A tree, reaching about 15–20 m high. Leaves alternate, oblong, oblanceolate, entire, glabrous, nerves prominent, up to 30 cm long. Flowers large, rose-pink, with a strong agreeable odour, arranged in long racemes proceeding from the upper part of the trunk or from the main branches. Stamens numerous, arranged on a band that arise from the base of the ovary and bends over it like a hood so that the anthers press down on the ovary. Some abortive stamens also present at the base of the band. Fruit round, with a brown hard shell, containing pulp, up to 25 cm in diameter.

*Flowers* : January onwards.

*Occurrence* : Occasionally grown in garden for the peculiar flowers.  
Noted from various gardens.

#### AIZOACEAE

**Sesuvium sesuvioides** (Fenzl) Verdcourt in Kew Bull. 12 : 349. 1957 ; Santapau & Jan. 24. 1967. *Diplochonium sesuvioides* Fenzl, Nov. Stirp. Dec. 7 : 58. 1839. *Trianthema hydaspica* Edgew. in Journ. Proc. Linn. Soc. Bot. 6 : 203. 1862 : Santapau, Fl. Saur. 1 : 229. 1962.

*Note* : According to Verdcourt (loc. cit.) "this plant has been confused with *Sesuvium portulacastrum* Linn., but the sessile inflorescences are distinctive as also are the rough stem."

#### ONAGRACEAE

**Ludwigia perennis** Linn., Sp. Pl. 119. 1753 (excl. "folis oppositis") ; Raven in Reinwardtia 6(4) : 367. 1963; Santapau & Jan. 24. 1967. *Ludwigia parviflora* Roxb., Fl. Ind. 1 : 440. 1820. *Jussiaea perennis* (Linn.) Brenan in Kew Bull. 1953 ; 163. 1953 ; Santapau, Fl. Saur. 1 : 235. 1962.

#### CUCURBITACEAE

**Citrullus colocynthis** (Linn.) Schrad. in Linnaea, 12 : 414. 1838 ; FBI 2 : 620. 1879 : Santapau & Jan. 24. 1967. *Cucumis colocynthis* Linn., Sp. Pl. 1011. 1753. *Colocyntis vulgaris* Schr. Ind. Sem. Hort. Gotting 2. 1833; Santapau, Fl. Saur. 1 : 250. 1962.

**Citrullus lanatus** (Thunb.) Matsumara & Nakai in Cat. Sem. Hort. Bot. Univ. 1920 : 38. 1920 ; Meeuse in Bothalia 7 : 57. 1962 ; Santapau &

Jan. 24. 1967. *Momordica lanata* Thunb., Prodr. Pl. Cap. 13. 1794. *Cucurbita citrullus* Linn., Sp. Pl. 1010. 1753. *Colocynthis citrullus* (Linn.) O. Kuntze, Rev. Gen. Pl. 256. 1891; Santapau, Fl. Saur. 1 : 251. 1962.

**Coccinia grandis** (Linn.) J. C. Voigt, Hort. Suburb Calc. 59. 1845 ; Andrews, Fl. Pl. A.-E. Sudan 1 : 165, f. 98. 1950 ; Meeuse in Bothalia 7 : 96. 1962. *Bryonia grandis* Linn., Mant. 1 : 126. 1767. *Coccinia cordifolia* Cong. in DC. Monog. Pham. 3 : 529. 1881 ; Santapau, Fl. Saur. 1 : 242. 1962 (non *Bryonia cordifolia* Linn. 1753).

**Corallocarpus epigaeus** (Rottl. et Willd.) Clarke in Hook. Fl. Brit., Ind. 2 : 628. 1879 ; Santapau, Fl. Saur. 1 : 245. 1962 ; Santapau & Jan. 25. 1967. *Bryonia epigaea* Rottl. et Willd. Neue. Schrift. Ges. Naturf. Freunde. Berlin 4 : 223. 1803.

*Note* : The basionym was not cited in the first part of the Flora of Saurashtra. The correct citation is as above.

**Ctenolepis cerasiformis** (Stocks) Hook. f. in Fl. Trop. Afr. 2 : 558. 1871 ; C. Jeffrey, Fl. Trop. E. Afr. 92. 1967 ; Santapau & Jan. 25. 1967. *Zehneria cerasiformis* Stocks in Hook. Journ. Bot. Kew Gard. Misc. 4 : 149. 1852. *Blastania fimbriatipula* Fenzl. ex Kotschy & Peyr. Pl. Tinn. 15, t. 7. 1865-66 (nom. illegit.) ; Santapau, Fl. Saur. 1 : 240. 1962.

**Stenolepis garcinii** Naud. in Ann. Sci. Nat. Ser. 5, 6 : 13. 1866 ; Santapau & Jan. 25. 1967 ; Stewart, Fl. W. Pakistan 703. 1972. *Blastania garcinii* (Linn.) Cong. in DC. Mon. Phan. 3 : 629. 1881 ; Santapau, Fl. Saur. 1 : 240. 1962.

**Diplocycles palmatus** (Linn.) Jeffrey, Kew Bull. 15 : 352. 1962 & in Fl. Trop. E. Afr. 73. 1967 ; Santapau & Jan. 25. 1967. *Bryonia palmata* Linn., Sp. Pl. 1012. 1753. *Bryonopsis laciniosa* auct. [non (Linn.) Naudin 1859] ; Santapau, Fl. Saur. 1 : 247. 1962.

**Kedrostis foetidissima** (Jacq.) Cong. in DC., Monog. Phan. 3 : 634. 1881 ; C. Jeffrey in Fl. Trop. E. Afr. 137. 1967. *Trichosanthes foetidissima* Jacq., IC. Rar. t. 624. 1788. *Kedrostis rostrata* (Rottl.) Cong. in DC., monog. Phan. 3 : 636. 1881 ; Santapau & Jan. 25. 1967 ; Cooke 1 ; 577. *Bryonia rostrata* Rottl. in Ges. Naturf. Freunde Neue Schr. 4 : 212. 1803. *Rhynchosarpa foetida* C. B. Clarke in Hook. f. Fl. Brit. Ind. 2 : 627. 1879 (pro parte).

Scandent, monoecious ; stems slender, branched, angled, sparsely hairy. Tendrils simple, filiform, glabrous. Leaves as broad as long, membranous, orbicular in out-line bright-green, hairy and more or less scabrid

on both sides, margins entire or distantly toothed, cordate at the base, sometimes 5-angled or sublobate, the lobes subacute, apiculate. Male flowers : peduncles filiform, 2-4-flowered at the apex ; pedicels capillary, usually bracteolate at the base. Calyx hairy ; tube campanulate, rounded at the base ; teeth minute. Corolla pale-yellow. Female flowers : Peduncles 0.1-0.8 cm long. Ovary oblong, beaked, pubescent. Fruit subsessile, deep-red, about 2.5 cm long, ovoid, tapering into a long narrow beak, pubescent. Seeds 0.4 cm long, ovoid, with a narrow sharp wing, brown.

*Flowers* : September to November.

*Occurrence* : This is given here on the authority of H. Santapau & Janardhanan. No specimen could be located.

**Lagenaria siceraria** (Mol.) Standl. in Field Mus. Nat. Hist Ser. 3, 435. 1930 ; C. Jeffrey in Fl. Trop. E. Afr. 51. 1967 ; Santapau & Jan. 25. 1967. *Cucurbita siceraria* Molina, Sagg. Chil. 133. 1782. *Lagenaria vulgaris* Ser. in Mem. Soc. Phys. Hist. Nat. Geneve 3 : 25, t. 2. 1825 ; Santapau, Fl. Saur. 1 : 252. 1962.

**Mukia maderaspatana** (Linn.) Roem. Syn. Pepon. 47. 1846 ; C. Jeffrey in Fl. Trop. E. Afr. 115. 1767 ; Santapau & Jan. 25. 1967. *Cucumis maderaspatanus* Linn., Sp. Pl. 1012. 1753. *Melothria maderaspatana* (Linn.) Cong. in DC., Monog. Phan. 3 : 623. 1881 ; Santapau, Fl. Saur. 1 : 244. 1962.

#### APIACEAE (*Umbelliferae*)

**Trachyspermum ammi** (Linn.) Sprague in Kew Bull. 228. 1929 ; Nasir & Ali in Fl. W. Pakistan No. 20, 72. 1972. *Sison ammi* Linn., Sp. Pl. 252. 1753. *Trachyspermum copticum* (Linn.) Link., Enum. Pl. Hort. Berol 1 : 267. 1821 ; Santapau, Fl. Saur. 1 : 255. 1962 ; Santapau & Jan. 26. 1967. *Ammi copticum* Linn., Mant. 57. 1767.

#### RUBIACEAE

**Borreria** G. F. W. Mey (nom. cons.)

Prim. Fl. Essegs. 79, t. 1. 1818.

(I. C. B. N. 400. 1978).

**Gardenia J. Ellis (nom. cons.)**

*Philos. Trans. Roy. Soc.* 51 : 935, t. 23. 1761.

(I. C. B. N. 399. 1978).

**Gardenia turgida Roxb.**, Fl. Ind. 2 : 557. 1824 ; Santapau & Jan. 26. 1967. *Gardenia lucida Roxb.*, Fl. Ind. 2 : 553. 1824 ; Indraji 385. 1910.

A small tree or a large shrub. Leaves elliptic-oblong, glabrous, shiny, 7.5-15 cm long. Flowers fragrant, standing singly in the axils of leaves. Corolla large, at first white, soon turning yellow ; tubular part about 4 cm long ; lobes over 2.5 cm long. Fruit an ellipsoid berry about 1.8 cm diameter.

*Local name* : Malan, Malani.

*Flowers* : June onwards.

*Occurrence* : Junagadh ; on Barda Hill, at the bank of Satvirda, Chamudra and Badhari streams.

*Uses* : The gum of the tree is locally known as Dikamari or Dekamari and is used medicinally in Ayurveda.

**Hymenodictyon Wallich (nom. cons.)**

Roxb., Fl. Ind. ed. Carey, 2, 148. 1832.

(I. C. B. N. 398. 1978).

**Kohautia aspera (Heyne ex Roth) Bremekamp** in Verh. Kon. Ned Akad. Wetensch., Afd. Natuurk., Tweede Sect. 11. 48(2) : 113. 1952 ; Santapau & Y. Merchant, Bull. Bot. Surv. Ind. 3(2) : 108. 1961 ; Santapau & Jan. 26. 1967. *Hedyotis aspera* Heyne ex Roth, Nov. Pl. Sp. 94. 1821. *Oldenlandia aspera* Heyne ex Roth, Nov. Pl. Sp. 94. 1821. *Oldenlandia aspera* DC., Prodr. 4 : 428. 1830 ; Santapau, Fl. Saur. 1 : 265. 1962.

**Mitragyna Korth (nom. cons.)**

Obs. Nauci. Ind. 19. 1839.

(I. C. B. N. 398. 1978).

**Xeromphis spinosa** (Thunb.) Keay, Bull. Jard. Bot. Etat 28 : 37. 1958 ; Maheshwari, Bull. Bot. Surv. Ind. 3 : 91. 1962 ; Santapau & Jan. 27. 1967. *Gardenia spinosa* Thunb., Diss. Gard. No. 7. 1780. *Randia spinosa* (Thunb.) Poir. in Lam., Encycl. Suppl. 2 : 14. 1781 ; Santapau, Fl. Saur. 1 : 266. 1962.

**Xeromphis uliginosa** (Retz.) Maheshwari, Bull. Bot. Surv. Ind. 3 : 92. 1962 ; Santapau & Jan. 27. 1967. *Gardenia uliginosa* Retz., Obs. Bot. 2 : 14. 1781. *Randia uliginosa* (Retz.) DC., Prodr. 4 : 386. 1830 ; Santapau, Fl. Saur. 1 : 266. 1962.

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