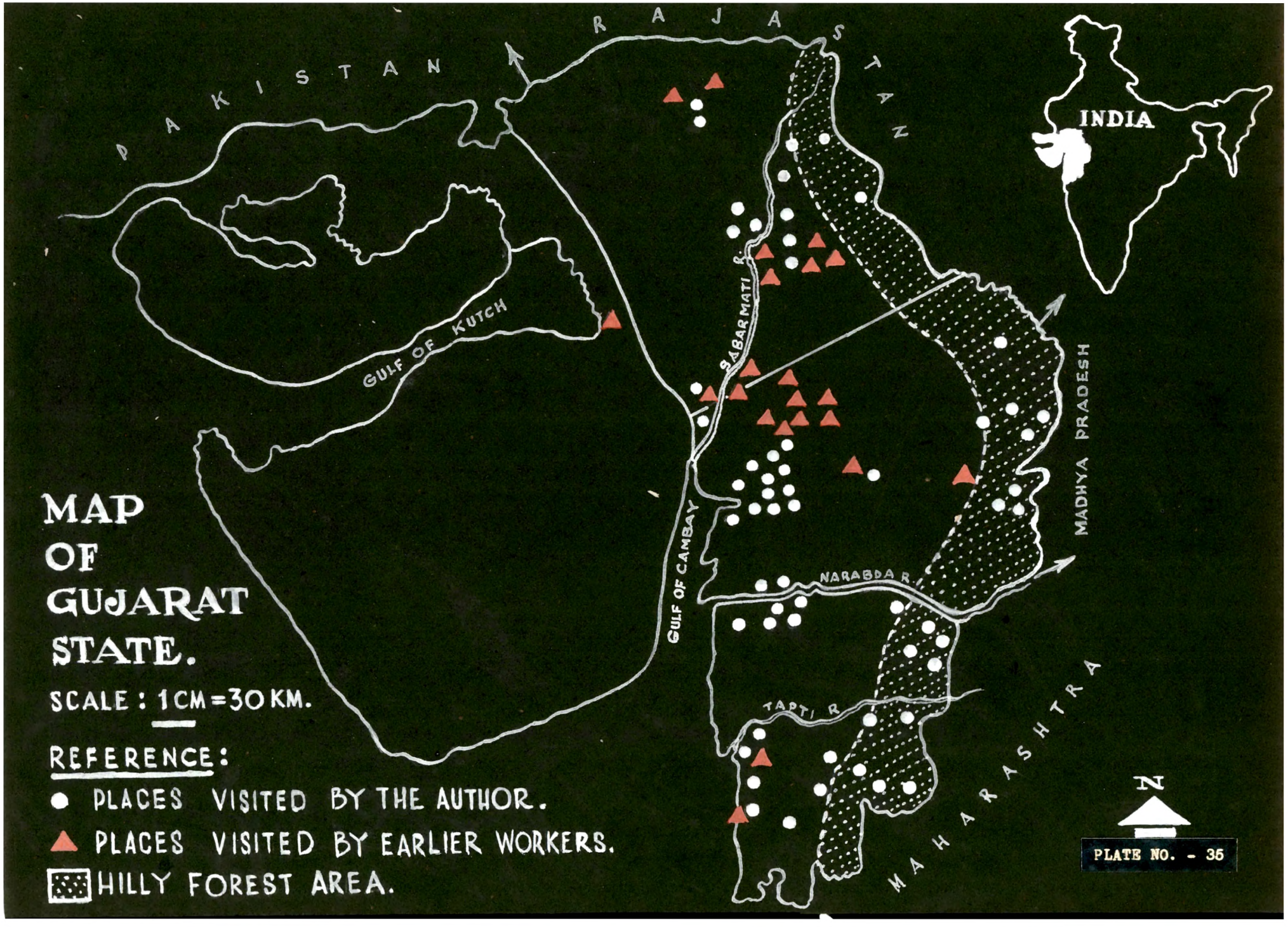
Part II

An Account of the Cyperaceae of Gujarat

INTRODUCTION

"The flora of the Presidency of Bombay by T. Cooke, the last part of which, containing the Cyperaceae and Gramineae, was published in December, 1908, is not entirely complete and probably no family is so incomplete as the Cyperaceae". So remarked Sedgwick (1918) in his revision of the Cyperaceae of the Bombay Presidency, which was based on the herbarium sheets at the herbarium of the Economic Botanist, the Talbot herbarium, Blatter and Hallberg's collection at the St. Xavier's College, Bombay and collections made by him in Ahmedabad district, Dharwar district and adjacent parts of North Kanara. The results of his excursions to Ahmedabad and other places in North Gujarat have been presented in a paper entitled "Plants of Northern Gujarat" (1918). The rest of the areas in Gujarat have not been touched by him. Blatter and McCann (1934-1935) in their unfinished revision of the flora of Bombay Presidency worked out a few families, Cyperaceae being one of them. Therein they presented an apparently complete picture of the distribution of the sedges throughout the presidency.


PAKISTAN
RAJASTHAN
INDIA
GULF OF KUTCH
SABARMATI R.
GULF OF CAMBAY
NARABDA R.
TAPTI R.
MADHYA PRADESH
MAHARASHTRA
N
MAP
OF
GUJARAT
STATE.
SCALE : 1 CM = 30 KM.
REFERENCE:
PLACES VISITED BY THE AUTHOR.
PLACES VISITED BY EARLIER WORKERS.
HILLY FOREST AREA.
PLATE NO. - 35

Only after a few preliminary attempts at studying the systematics and distribution of the sedges in Gujarat, the author was convinced of the lacuna that existed in our knowledge of the Cyperaceae. It was felt that the work of Blatter and McØann needed a revision and with that purpose in mind, the present work was undertaken. Moreover the information thus collected regarding the sedges of Gujarat can conveniently be incorporated in the proposed comprehensive flora of the state.

The present work is a compilation of the available data and the data gathered by us during the course of various excursions to places in North, Central and South Gujarat. It was rather obvious that the forest areas of Gujarat were not properly represented. A thorough exploration of such areas has been made (Plate No.35).

The vegetation of Gujarat in different areas is very diverse, the diversity being dependant upon variations in rainfall, altitude, soil etc. South Gujarat and the eastern parts of central Gujarat receive much more rain than North Gujarat and hence are rich in quality and quantity as far as the vegetation is concerned. Most of this area is a hilly tract with a forest cover. The well-known forests of Dangs, Rajpipla, Chhota Udepur, Devgadh Baria and Ratanmahal are included in

this area. The remaining parts of central Gujarat have a rich fertile, alluvial soil, while North Gujarat may be classified as an arid or semi-arid area.

Selected localities in different parts of Gujarat were visited in order to study the distribution of Cyperaceae. Particular attention was paid to the forest areas. Intensive work was done in the monsoon and post-monsoon periods and river banks were usually visited during the dry months. Most of the work was done from 1957 to 1960 with a few excursions in 1961 and beginning of 1962. Observations on the plants have been recorded in proper field books and herbarium specimens have been deposited in the herbarium of the Department of Botany, M.S. University of Baroda.

North Gujarat: (North of Ahmedabad)

In addition to places visited by Sedgwick, we have visited Khedbrahma, Idar (Hitherto untouched by any Botanist), Himmatnagar, Balaram, Palanpur, Pilvai, Mahudi, Vijapur.

Central Gujarat: (North of river Narmada upto Ahmedabad)

The forest areas of Devgadh Baria, Ratanmahal, Pavagadh and Chhota Udepur have been thoroughly explored.

The places which are on the plains include Baroda, Kelanpur, Kundhela, Padra, Dabka, Vasad, Singharot, Umeta, Sundarpura, Shahapura, Savli, Bhadarva, Manjusar, Mevali.

South Gujarat: (South of river Narmada)

Forests of Rajpipla, Dharampur and Dangs (Unai, Waghai, Bhavandagad, Ahwa.)

Bharuch, Shuklatirth, Mangaleswar, Surat, Dummas, Kosamba, Kim, Simodara, Gijram, Kara, Valia, Vankal, Bulsar, Vansada.

The present state of Gujarat includes Cutch and Saurashtra (Kathiawad) but they have been excluded in the present work.

The number of species belonging to Cyperaceae reported from Gujarat region by Blatter and other workers comes to 50. To this are added the following 16 plants for the first time from Gujarat. The number of new plants is fairly large to indicate how poorly the sedge flora has been represented so far.

1. Cyperus brevifolius (Rottb.) Hassk.
2. Cyperus metzii (Hochst.) Mattf. et Kukenth.
3. Cyperus sanguinolentus Vahl.
4. Cyperus hyalinus Vahl.
5. Cyperus leucocephalus Retz.

6. Cyperus cyperoides (Linn.) O. Kuntze.
7. Cyperus compactus Retz.
8. Cyperus pseudokyllingioides Kukenth.
9. Eleocharis acutangula (Roxb.) Schult.
10. Fimbristylis tetragona R.Br.
11. Fimbristylis polytrichoides R.Br.
12. Fimbristylis digitata Boeck.
13. Fimbristylis woodrowii C.B. Cl.
14. Scleria tessellata Willd.
15. Cyperus papyrus Linn.
16. Rhynchospora wightiana Steud.

Distribution of Species in the Different Genera of Cyperaceae of Gujarat

No.	Genus	No.of sp. reported by Blatter & McCann.	No.of sp. reported in the thesis
1.	Kyllinga	1	3
2.	Pycreus	3	5
3.	Juncellus	3	3
4.	Cyperus	16	18
5.	Mariscus	-	2
6.	Courtoisia	-	1
7.	Eleocharis	3	4
8.	Fimbristylis	12	16
9.	Bulbostylis	1	1
10.	Scirpus	8	8
11.	Eriophorum	1	1
12.	Fuirena	1	1
13.	Rhynchospora	-	1
14.	Scleria	1	2
	Total	50	66

The Cyperaceae, because of the difficulty experienced in identifying its members, have been utterly neglected. Moreover, there exists a considerable difference of opinion regarding the delimitation of certain genera. This is especially true for Cyperua Linn. Index Kewensis mentions Cyperus Linn., Pycreus Beauv., Juncellus C.B. Clarke, Mariscus Vahl and Kyllinga Rottb., as distinct genera. Clarke (1893) and Blatter and McCann (loc.cit.) conveniently followed the same practice. Cooke (1908) and Sedgwick (1918), following Pax (1887), merge Pycreus Beauv., Mariscus Vahl and Juncellus C.B. Clarke into Cyperus Linn., but consider Kyllinga Rottb. as a distinct genus. Kukenthal (1936) merges all of them into Cyperus Linn., and gives them a sub-generic status. Santapau (1960) in his 'Flora of Khandala' follows Kukenthal (loc.cit.).

The characters on which the generic differentiation is based are according to many not very reliable although the character of achene i.e. laterally compressed achene of Pycreus Beauv., and dorsally compressed achene of Juncellus C.B. Clarke appears to be fairly constant and reliable to warrant a generic status for these two taxa. But in deference to the authority of Kukenthal (loc.cit.), I should merge them in the genus Cyperus Linn., at least for the time being.

KEY TO THE GENERA OF CYPERACEAE

1. Achene-bearing glumes containing perfect stamens as well:

2. Empty glumes at base of spikelets 0-2:

3. Glumes all distichously arranged (see also Fimbristylis); hypogynous bristles 0. . . . . Cyperus

3. Glumes spirally arranged (basal ones sometimes distichous in Fimbristylis); hypogynous bristles or scales sometimes present:

4. Style-base dilated and constricted or articulated above the achene:

5. Hypogynous bristles present; style usually persistent; leaves 0.. . . . . Eleocharis

5. Hypogynous bristles o; leaves usually developed:

6. Style-base persistent, if falling, not leaving a tumour on the achene..... Fimbristylis

6. Style deciduous, leaving a tumour on the achene.... Bulbostylis

4. Style-base not dilated, continuous with achene:

7. Leaves ligulate; scales petal-like. . . . . Fuirena

7. Leaves eligulate:

8. Hypogynous scales 6, divided to the base into numerous hair-like segments. . . . . ..Eriophorum

2. Hypogynous bristles present. . . . . Scirpus (absent in some)

2. Empty glumes at base of spikelets 3 or more. . . . . .Rhynchospora

1. Achenes-bearing glumes devoid of perfect stamens; Inflorescence panicled; but bony, variously sculptured and exserted...Scleria

AN ARTIFICIAL KEY TO THE IDENTIFICATION OF CYPERACEAE

For routine keys to the species of various genera, reader is referred to 'Flora' of the Presidency of Madras (reprinted edition) Vol.III by C.E.G. Fisher or Cooke's Flora of the Presidency of Bombay (reprinted edition) Vol.III.

This artificial key is based on author's observations in the field and herbarium. The clavises have been framed as practically as possible after duly taking into consideration the flexibility of the characters involved. Much importance, no doubt, has been given to the inflorescence character but other characters such as

those of nut or achene, stigma, etc., have not been lost sight of.

The key leads directly to the identification of the plant itself, which is a definite departure from the routine keys. It is included here with the hope that identification of the members of this difficult family becomes somewhat easier. Cyperus papyrus L. and Rhynchospora wightiana Steud. have been added recently to the Gujarat flora. Both have not been included in this key.

1. Inflorescene terminal:
   2. A solitary spikelet (see also F. schoenoides):
      3. Hypogynous bristles absent:
         4. Lower glumes of the spikelet distichous or nearly so..... Fimbristylis ovata
         4. Glumes not distichous:
            5. Achene narrowly elongate, cylindric, curved. . . . . F. tetragona
            5. Achene obovoid, tuberculate. . . . . F. polytrichoides
      3. Hypogynous bristles present:
         6. Plants robust, stems terete, septate when dry. . . . . Eleocharis dulcis

6. Plants robust, stem triquetrous. . . . *E. acutangula*

6. Plants small, slender, bristles white. . . . . *E. atropurpurea*

6. Plants as the last one, bristle brown. . . . . *E. geniculata*

2. Spikelets in a sessile head or cluster:

7. Glumes of the spikelet spirally arranged:

8. Hypogynous bristles present. . . . *Scirpus strobilinus*

8. Hypogynous bristles o:

9. Style bifid. . . . . *F. argentea*

9. Style trifid:

10. Apical tumor on the achene present. . . . . *Bulbostylis barbata*

10. Achene without an apical tumor. . . . . *F. digitata*

7. Glumes of the spikelet distinchously arranged:

11. Heads usually greenish:

12. Glumes winged in the lower half. . . . . *Cyperus brevifolius*

12. Glumes with a toothed wing at theba back. . . . . *C. metzii*

12. Glumes not winged. . . . . *C. michelianus* ssp. *pygmaeus*

11. Heads white:

13. Spikelets in angular or lobed heads. . . . . C. triceps

13. Spikelets in globose heads:

14. Achene black with white reticulations. . . . . C. leucocephalus

14. Achene without reticulations. . . . . C. niveus

11. Heads otherwise, rhizomes creeping, rootlets thick:

15. Rootlets not woolly. . . . . C. arenarius

15. Rootlets woolly. . . . . C. conglomeratus

(Inflorescence sometimes umbellate)

2. Spikelets in umbels:

16. Umbels usually simple:

17. Glumes of the spikelet spirally arranged:

18. Style bifid:

19. Spikelets 1-3, rarely upto 5, ovate, pale, glistening...F. schoenoides

19. Spikelets more than 5:

20. Glumes mucronulate, glabrous; achene pale, trabeculate and ribbed.. . . . . F. dichotoma var. diphylla

20. Glumes pubescent in the upper half; achene pale smooth. . . ... F. ferruginea

18. Style trifid:

    21. Bristles absent; achene round, trigonus, irregularly tuberculate. . . . . F. tenera

    21. Bristles retrorsely scabrid; achene smooth, black..... S. maritimus

17. Glumes of the spikelet distichously arranged:

    22. Spikelet 1 - flowered..... C. cyperoides

    22. Spikelet more than 1 - flowered:

        23. Style bifid:

            24. Stems strong and erect:

                25. Spikelets few, short and reddish..... C. sanguinolentus

                25. Spikelets many, pale brown, roots strongly aromatic..... C. polystachyos

            24. Stems slender; spikelets many-flowered, parallel sided:

                26. Stamens usually 1, glumes bifid with the keel cuspidately produced at the apex..... C. pumilus (Spikelets sometimes in heads)

                26. Stamens 2, Glumes obtuse, keel greenish-yellow with brownish-red veins..... C. globosus

23. Style trifid:

    27. Spikelets in globose heads on the rays of an umbel; glumes obtuse. . . . . C. difformis

    27. Spikelets spicate on the umbel rays:

        28. Small or medium annuals:

            29. Spikelets golden yellow; glumes with squarrosely recurved arista.....C. squarrosus

            29. Spikelets green, compressed but with a median ridge on each side..... C. compressus

        28. Perennials:

            30. Stolons o; rhizome short and woody; glumes scarcely imbricate in fruit..... C. macer

            30. Stolons slender; glumes closely imbricate..... C. rotundus

            30. Stolons slender, elongate; glumes not closely imbricate..... C. rotundus ssp. tuberosus

            30. Stolons long, slender, glumes plicate-striate; spikelet usually shorter and broader than those of C. rotundus..... C. esculentus

16. Umbels usually compound:

31. Stigmas 2:

32. Plants tall and robust; glumes distichous. . . . . C. alopecuroides (rarely stigmas 3)

32. Plants short, not at all robust; glumes spirally arranged:

33. Achene dark, smooth or slightly rough..... F. cymosa

33. Achene ribbed and trabeculate..... F. dichotoma

31. Stigmas 3,

34. Plants not robust:

35. Glumes distichously arranged:

36. Spikelets yellowish brown in globose heads; glumes with a continuous glistening wing at the back..... C. pseudokyllingioides

36. Spikelets greenish yellow not in head; glumes without a wing..... C. tenuispica

35. Glumes spirally arranged:

37. Achene obovoid, smooth.... ..... F. falcata

37. Achene faintly ribbed and trabeculate. . . . . F. woodrowii

34. Plants robust, 1-2 meters high:

38. Stems septate or articulate when dry:

39. Spikelets reddish; achene trigonous, obovoid.....C. pangorei

39. Spikelets straw-coloured; achene trigonous, acute at either end. . . . .C. articulatus

38. Stems not septate or articulate:

40. Secondary rays of the umbel terminated by spikes or corymbs of less than 10 spikelets.....C. tegetum

40. Secondary rays of umbels terminated by spikes of more than 20 spikelets:

41. Spikelets in dense globose head. . . . .C. compactus

41. Spikelets in cylindric spikes, 8-20 flowered..... C. exaltatus

41. Spikelets in cylindric spikes, many-flowered.....C. eleusinoides

16. Umbels usually decompound:

42. Hypogynous bristles 6, divided to the base into many fine segments..... Eriophorum comosum

42. Hypogynous bristles absent:

43. Glumes distichous, obtuse, golden yellow. . . . . C. iria (in var. parviflorus, the spikes are drawn out into almost linear racemes.)

43. Glumes spirally arranged:

44. Stems triquetrous above; spikelets subglobose. . . . . F. littoralis

44. Stem 4-5 angled, spikelets longer and more acute than the last one. . . . . F. miliacea

44. Stems flattened above; spikelets longer than both the above ones. . . . . F. complanata

1. Inflorescence lateral:

45. Spikelets in sessile heads:

46. Heads near the base of the stem; bristles o. . . . . S. articulatus

46. Heads usually near the apex of the stem:

47. Bristles present. . . . . S. mucronatus

47. Bristles absent:

48. Glumes spirally arranged; achene triquetrous:

49. Spikelets golden-yellow; glumes loose. . . . . S. roylei

49. Spikelets usually green; glumes not loose. . . S. supinus

48. Glumes distichously arranged; achene dorsally compressed..... C. laevigatus

45. Spikelets on the rays of an umbel:

50. Spikelets in pedunculate clusters; bristles o.....S. corymbosus

50. Spikelets on drooping rays of an umbel; bristles plumose with moniliform hairs..... S. littoralis var. subulatus

1. Inflorescence terminal and/or axillary; plants leafy throughout their length;

51. Presence of a ligule at the junction of the lamina and the sheath. Spikelets many-flowered in dense clusters; petals (hypogynous bristles) quadrate and clawed. . . . . Fuirena ciliaris

51. Absence of such a ligule. Spikelets in panicled spikes:

52. Achenes cancellately tessellate with square depressions; puberulous with reddish hairs. . . . . Scleria tessellata

52. Achenes shallowly corrugose, shining white with sub-umbonate apex. . . . . Scleria stocksiana

Cyperus Linn.

Cyperus triceps (Rottb.) Endl.Cat.Hort.Vindob. 1:94, 1842; Kukenthal in Pfreich. 101:578.

Kyllinga triceps Rottb. Descr. et Icon.14, t.4, F.6, 1733; FBI.6:587; C.3:391; F.3:1130.

A short tufted plant. Spikelets in white, angular heads.

On open grasslands during monsoon.

Flowers: July to September.

Fruits: September to January.

Chhota Udepur (Sabnis 91, 106); Devgadh Baria (Sabnis 159); Waghai, Dangs (Sabnis 422) etc., etc.

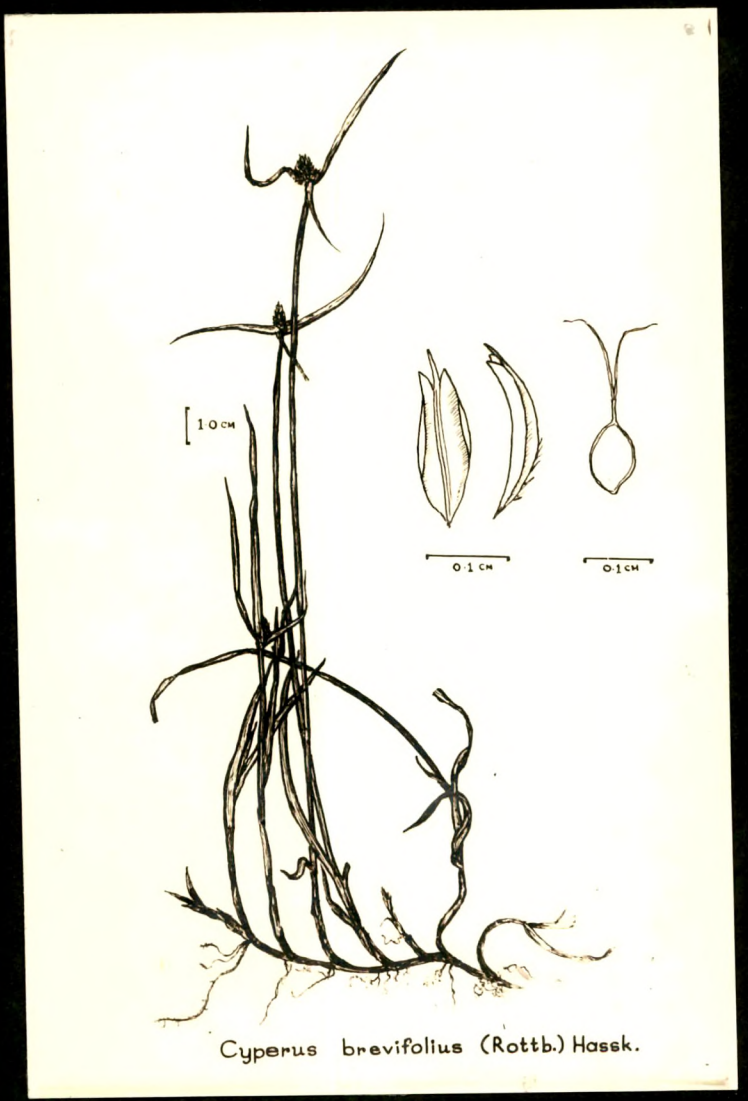
Very common and abundant throughout the state.

Sind, Gujarat, Deccan, Kokan, S.M. Country, N.W. India, Rajputana, Bengal.

Burma, Ceylon, Africa, China, Australia.

Cyperus brevifolius (Rottb.) Hassk. Cat. Hort. Bogor. 24, 1844; Kukenth.600; Sabnis in Bull.Bot.Surv. Ind. 4:194, 1962.

Kyllinga brevifolia Rottb. Descr. et Icon. 13, t.4, f.3, 1773; Clarke in FBI.6:588 and Illustr. Cyp. t.1, f.1-4, 1909; Sedgwick in JBNHS.25:700; Blatt. & McC. in JBNHS 37:25; Chavan & Sabnis in JMSU. 7(2): 60 & 8(2):17.



Cyperus brevifolius (Rottb.) Hassk.

PLATE NO. - 36

A rhizome-bearing sedge. Stems about 30 cms. high. Spikelets in green heads.

A plant inhabiting soft, muddy soils along the banks of streams and often entering stagnant waters; abundantly found on nitrogen rich soils.

Plate No. 36

Flowers and Fruits: July to November and also during the dry months, if conditions are favourable.

Baroda, Kelanpur and Padra (Sabnis 50, 68). Not very common and also not earlier reported from Gujarat region. Hence a new record for the state.

Throughout the country.

Ceylon, Malacca; All warm countries except the mediterranean.

Cyperus metzii (Hochst.) Mattf. et Kukenth. in Engl. Pflanzenreich, 101:612, 1936; Sabnis in Bull. Bot. Surv. India 4:194.

Kyllinga metzii Hochst. ex steud. Syn.Cyp. 70, 1855.

K. squamulata Thonn. ex Vahl, Enum.2, 381, 1806; FBI.6:589; Collett 552; Blatt. & McC. in JBNHS. 37:24.

An erect annual. Spikelets in greenish heads; glumes provided with a toothed wing at the back.

Along with grasses on the banks of the river and also along roadside.

Flowers: September.

Fruits: Post-Monsoon period.

Banks of the river, Balaram (Sabnis 241a); very rare.

W. Ghats, Kokan, S.Kanara, Kashmir, Garhwal, Rajasthan.

Tropical Africa, Martinique.

Cyperus globosus All. Auct. Fl.Pedem. 49, 1789; Vahl, Enum. 2:309, 1806; Kukenth.352; C.B. Clarke in JLS. 20:279 & 21; 47; Trimen 5:21; Sedgwick in JBNHS. 25:688.

Pycreus globosus Reichb. Fl.Germ. Excurs. 140, 1830; Clarke in JLS. 36:203; Blatt. & McC. in JBNHS.37:29.

P. capillaris Nees in Linnaea 9:283, 1834; FBI.6:591.

A plant of river beds. Stems slender. Spikelets in simple umbels, many flowered; glumes of the spikelet obtuse with a greenish yellow keel with brownish-red veins.

Flowers: September.

Fruits: October.

Collected so far only from North Gujarat. Nallah near the bokh, Prantij (Sedgwick 256), Banks of the river, Balaram (Sabnis 244-247).

Throughout India.

Ceylon - most temperate and tropical regions of the old world.

Cyperus hyalinus Vahl, Enum.2:329, 1806; Kukenth.498; C.B. Clarke in JLS 21:46; C.3:369; Sedgwick in JBNHS.25:689.

Pycreus pumilus Nees in Linnaea 9:283, 1835; FBI.6:591.

P. hyalinus Dom. in Bibl. Bot.85:417, 1915; F.3:1132.

A small slender annual with tufted stems. Spikelets straw-coloured, few-flowered.

Flowers: September-October, occasionally in January.

Fruits: October-January.

Wet, sandy soils of the banks of the river, Balaram (Sabnis 249, 250); open plateau in the forest of Ratanmahal (Sabnis 335); Soft sands on banks of Ambika, Waghai (394, 395).

Blatter (1936) remarks that the plant is restricted to Sion, Bombay and is mistaken for Pycreus pumilus Dom. (C. pumilus L.) by Sedgwick in his 'plant of Northern Gujarat'.

India and all other hot countries of the old world.

Cyperus polystachyos Rottb. Descr. et Icon. 39, t.11, f.1, 1773; Nees in Wight, Contrib.75, 1834; C.B. Clarke in JLS 20:280 & 21:51, t.3, f.27.

C. odoratus Linn. Sp.Pl.1:46, 1753; C.3:372.

Pycreus odoratus Urb. Symb. antill. 2:164, 1900 & 4:110, 1903; F.3:1132.

P. polystachyos Beauv. Fl. d'oware 2:48, 1807; FBI.6:592.

P. ferrugineus C.B. Clarke in Hook. f.FBI.6:593.

A densely tufted species growing in marshes. Roots aromatic. Inflorescence pale brown, usually simple.

Flowers and Fruits: August-December.

Surat (Woodrow ex Cooke), not so far collected by the author; included on the authority of Cooke.

Throughout India.

All warm, especially maritime regions.

Cyperus sanguinolentus Vahl, Enum.Pl.2:351, 1806; Nees in Wight, Contrib.75, 1834; C.3:369.

Pycreus sanguinolentus Nees in Linnaea 9:283, 1835; FBI.6:590; F.3:1132; Chavan & Sabnis in JMSU. 8(2):14 & JIBS 39:27.

An erect, marsh-loving plant. Spikelets reddish on a simple umbel.

Flowers and Fruits: September-November.

In a marsh near the banks of the river Balaram, (Sabnis 242, 243) very rare; not earlier reported from Gujarat. Hence a new record for the state.

Throughout India.

Ceylon - Warm parts of the old world.

Cyperus pumilus Linn. Cent.Pl.2:6, 1756 & Sp.Pl.(ed.2) 69, 1762; C.B. Clarke in JLS. 21:43; C.3:370.

Pycreus pumilus Domin. in Bibl.Bot.85:417, 1915; F.3:1132.

P. nitens Nees in Nova Acta Nat. Cur.19 (Suppl.1): 53, 1843; FBI.6:591.

A dwarf annual with tufted stems. Spikelets straw-coloured in umbels, sometimes in heads; many flowered and pareallel-sided.

A marsh-loving plant, found along the banks of ponds and rivers or also away from them.

Flowers: July-October.

Fruits: October onwards.

Khedbrahma, banks of Hernav (Sabnis 449,450); Khedbrahma, Derol Jagir (Sabnis 464); Balaram (Sabnis 254, 255); Godhra; Devgadh Baria (Sabnis 340a); Savli 282; Baroda, Harni & Amaliyara Tanks (Sabnis 61, 61a).

Throughout India.

Ceylon, Malaya, China, Tropical Africa and Australia.

Cyperus michelianus (Linn.) Link. subsp. pygmaeus (Rottb.) Aschers. et Graebner, Synops. 2:273, 1903; Kukenth. 312, f.35, f.-G.

Scirupus michelianus Linn. Sp.Pl.52, 1753; C.3:410.

Cyperus pygmaeus Rottb. Descr. et Icon. 20, 1773; C.3:372.

Juncellus pygmaeus C.B. Clarke in FBI.6:596; F.3:1133.

J. michelianus (Linn.) Blatt. & McC. in JBNHS. 37:33, 1934.

A small prostrate or sub-erect herb. Spikelets in compact, terminal heads; heads greenish becoming brown or yellow on drying; glumes of the spikelets distinchously arranged.

On wet, sandy river banks and also dry pond beds.

Flowers: July - October.

Fruits: In the dry months of January-March.

Very common throughout Gujarat.

Kabir vad (Chibber 765, Gammie); Nadiad (Chibbar 1248); Surat (Woodrow ex Cooke, Gammie 16443); Ahemdabad dry edges of the Chandola tank (Sedgwick); Sabarmati river banks (Saxton 2753); Baroda, Kundhela,

Padra (Sabnis 145); Singharot-Umeta (Sabnis 273); Dangs, Waghai (Sabnis 391, 405), Khapri banks and Bhavandagad (Sabnis 414), Ahwa Tank (Sabnis), Bansda (Sabnis 420).

More or less throughout India.

Ceylon, Tropical and North Africa, China, Malaya and Australia.

Cyperus alopecuroides Rottb. Descr. et Icon. 38, 1773; Vahl, Enum. Pl.2:368, 1806; C.3:373.

Juncellus alopecuroides C.B. Clarke in Hook. f. FBI.6:595, 1893; F.3:1133; Blatt. & McC. in JBNHS.37:33.

A stout, perennial sedge. Stem about a meter high, trigonous. Spikelets golden yellow to brown in large, compound umbels.

It resembles C. exaltatus Retz. and it is difficult to separate the two.

Flowers: August-September.

Fruits: October.

In standing and running waters; Marshes near Prantij (Sedgwick 283); Ahmedabad, Watrak river (Sedgwick 1061); Godhra (Chibber 611); Panchamahals (Woodrow ex Cooke); Kundhela (Sabnis 137, 138, 139); Savli (Sabnis 275); Kim banks (Sabnis 314).

Throughout India.

Ceylon, Tropical and North Africa, Mascarene Islands, Malaya, Queensland, Guadelampe.

Cyperus difformis Linn. Cent.Pl.2:6, 1756; C.B. Clarke in JLS. 20:290, 1883 & 21:133, 1884 & FBI.6:599; Trimen 5:25; Collett 554; C.3:376; F.3:1139; Kukenth.237, f.27, F-H.; Chavan & Sabnis in JMSU. 7(2): 60 & 8(2):15.

A very variable plant showing healthy growth on thick, muddy soils of the banks of temporary puddles during monsoon, or on wet sandy river banks. Spikelets golden yellow or green in globose heads on the rays of umbels.

Flowers: September to December or even in the dry months.

Fruits: January to March.

Kabirvad, Broach (Gammie); Sevalia, Kaira Dist. (Chibber); Vasvad (Chibber); in sandy beds of streams, Chitrasani to Sarotra (McCann 1372); Baroda, on thick muddy soils (Sabnis 51); Chhota Udepur, borders of forests (Sabnis 105a); Kundhela, in roadside ditches (Sabnis 148); Padra, not very common (Sabnis 153); Vijapur, North Gujarat (Sabnis 295), Vasad, Mahi banks (Sabnis 84) Balaram (Sabnis 236); Surat (Sabnis 267); Singharot-Umeta (Sabnis 274);

Savli (Sabnis 276); Bhadarva (Sabnis 284); Shahapura (Sabnis 363); Ratanmahal (Sabnis 376); Devgadh Baria (Sabnis 386); Waghai, Dangs forest (Sabnis 428, 429); Rajpipla (Sabnis 434); Khedbrahma, Hernav banks (Sabnis 453-454).

Throughout India and the old world.

Cyperus tenuispica steud. Syn. Cyper. 11, 1855; Kukenth. 245.

C. flavidus C.B. Clarke in FBI.6:600; C.3:375; Sedgwick in JBNHS. 25:691.

A slender, tufted, annual harb. Stems triquetrous. Achenes globose, obovoid, trigonous.

The plant prefers damp places and banks of ponds.

Flowers: August-September.

Fruits: October-November.

Talod, just out of water, by roadside pond (Saxton 562b); Sonasan, by a small tank (Sedgwick 332); Mahemnagar, near Ahemdabad, rice fields (Sedgwick 331); Baroda, marshes and banks of ponds (Sabnis 63); Balaram (Sabnis 233); Kelanpur (Sabnis); Idar, near a pond (Sabnis 470).

More or less throughout India.

Ceylon and warm regions of the old world.

Cyperus niveus Retz. Obs. 5:12, 1791; FBI.6:601; C.3:377; Collett 555-56; Sedgwick in JBNHS. 25:692; Blatt. & McC. 37:261.

A slender herb. Spikelets white in heads. Achene dark brown to black without reticulations.

Flowers: Monsoon.

Fruits: Post-Monsoon.

Ahmedabad, Sandy Hills (Sedgwick-Saxton 1718); on cultivated and waste lands, fairly common (Saxton 1718b) Bodeli (Woodrow); not so far collected by the author.

Confined to the sandy tracts of the old Bombay Presidency, Rajputana, N. Circar upto 1500 ft; more or less throughout India.

Afganistan, China.

Cyperus leucocephalus Retz. Obs. 5:11, 1789; Kukenth. 278, f.31; in JLS. 21:107 & FBI.6:602; C.3:377; Sedgwick in JBNHS.25:692; F.3:1135; Sabnis in Bull.Bot.Surv. India 4:195; Shah in Ind. For. 89(4):291, 1964.

An erect annual. Spikelets in pure white, terminal heads, becoming dirty white when fruiting. Achene black with white reticulations.

PLATE NO. - 37

Fischer in 'Flora of Madras' states the colour of the head as whitish or cinnamon-coloured. In all the specimens observed or collected by us, the colour was pure white.

A typical forest species, abundantly found under the shade of trees during and immediately after the monsoon.

Plate No. 37

Flowers: July-August (early monsoon)

Fruits: September (Mid-monsoon)

The plant is hitherto unrecorded from the Gujarat area and was collected from a number of forest areas along the eastern boundary of Gujarat.

Chhota Udepur, under the canopy of teak (Sabnis 92-98*; Devgadh Baria, Teak forest undergrowth (Sabnis 162); Baroda (Shah)

Konkan, S.M. Country, N. Canara, Deccan, Madanapalle, Cuddapah, Martaban.

Tropics generally.

Cyperus arenarius Retz. Obs. 4:9, 1786; Kukenth. 270; Clarke in JLS. 21:106 & FBI.6:602; Trimen 5:23; C.3:378; Sedgwick in JBNHS. 25:692.

A typical sand plant with very well developed rhizomes. Spikelets straw-coloured in heads.

On dry sandy banks away from the water current.

Flowers and Fruits: Usually in the dry months, from January to March.

Ahmedabad, river bed (Sedgwick 7416), dry sand Hills (Sedgwick); Sarkhej road, sand area close to river, Ahmedabad (Saxton 1781); in deep sand, Chitrasani to Sarotra (McCann 1364); Dummas, near Surat on the sea-coast (Dalzell ex Cooke, Sabnis); Tithal, Bulsar, sand dunes (Chibber); Vasad, sandy river beds (Sabnis 81, 82); Dabka, river beds (Sabnis).

Punjab, Sind and along the sea coast upto extreme south and Orissa.

Ceylon, Persia, Arabia.

Cyperus conglomeratus Rottb. Descr. et Icon. 21, t.15, f.7, 1773; Kunkenth. 272, f.30; FBI.6:602; Trimen 5:23; C.3:379; Sedgwick in JBNHS.25:692.

An erect, perennial sedge with creeping rhizomes and woolly rootlets. Spikelets in heads or sometimes umbellate.

A plant of wet and dry sandy places.

Flowers: Monsoon.

Fruits: Post-Monsoon.

Ahmedabad (Saxton), Sandy Hills (Sedgwick, Woodrow ex Cooke); not so far collected by the author.

India, specially W. Peninsula, Ceylon, Trop. Africa, Mediterranean region.

Cyperus compressus Linn. Sp.Pl.1:46, 1753; Rottb. Descr. et Icon. 27, t.9, f.3, 1773; FBI.6:605; C.3:379; F.3:1140; Kukenth.156, f.4, A-D.

A very common weed. Stems tufted. Spikelets green and compressed.

Usually found by the side of water steams and in muddy situations in cultivated fields, river banks, roadside ditches and even forests.

Flowers: July - September.

Fruits: October - January.

Nadiad (Chhiber); Roho to Chitrasani (Allan, Herb. McCann 1077); Baroda (Sabnis 52) Chhota Udepur, under the shade of forest trees (Sabnis 132) Kelanpur (Sabnis); Devgadh Baria, Devgadh Hill (Sabnis 160, 176, 177); Pavagadh (Sabnis 183); Balaram (Sabnis 235); Ratanmahal Hills (Sabnis); Padra (Sabnis 154); Surat (Sabnis 266); Pilvai (Sabnis); Vijapur (Sabnis 293); Mahudi (Sabnis 310); Waghai (Sabnis 424); Rajpipla (Sabnis); Manjusar (Sabnis 446).

Throughout India.

In nearly all tropical and sub-tropical countries.

Cyperus squarrosus Linn. (non C.B. Clarke) Cent. Pl.2:6. 1756; Kukenth 505; Mirashi & Donde in Bull.Bot. Soc.Nag. 3(2):48, 1962.

Cyperus aristatus Rottb. Descr. et Icon. 23, t.6, f.1, 1773; FBI.6:606; C.3:380; Sedgwick in JBNHS 25:693.

A small tufted annual. Spikelets golden yellow, green or brown, spicately arranged on the rays of an umbel; glumes provided with squarrosely, recurved arista. Acheme obovoid, trigonous, reddish brown.

On loose, gravelly soils.

Flowers: July - October.

Fruits: September - January.

Ahmedabad, Sandy places (Sedgwick); nala near Wadaj, (Sedgwick 306); Baroda (Sabnis 48); Kundhela (Sabnis) Chhota Udepur, a weed in cultivated crops (Sabnis 116-119); Devgadh Baria on loose gravelly soils (Sabnis 161, 173); Pavagadh, (Sabnis 180); Balaram (Sabnis 237); Bhadarva (Sabnis 287); Pilvai (Sabnis 292); Waghai, Dangs (Sabnis 423); Rajpipla (Sabnis 438, 439a); Manjusar (Sabnis 447, 448); Idar, on rocky hills (Sabnis 467).

More or less throughout India.

Ceylon, Tropical Africa, Australia, the whole of America.

Cyperus iria Linn. Sp.Pl. 1:45, 1753; Clarke in JLS. 21:137 & FBI.6:606; Trimen 5:18; Collett 556; Kukenth. 150; Woodrow in JBNHS. 13:430; Sedgwick in JBNHS. 25:693; Sant.266.

A glabrous, tufted annual. Stems triquetrous. Umbel decompound. Spikelets few-flowered, greenish-brown to yellow; glumes loosely imbricate. Achenes black, trigonous.

Abundant in rice-fields and damp places during the monsoon.

Flowers: July - September.

Fruits: October to January and even March.

Very common and abundant in North, Central and South Gujarat.

Throughout India.

Ceylon, China, Japan, Malaya, Australia, Persia, Afghanistan, Tropical Africa.

Cyperus iria L. var. parviflorus (Nees) Miq.Fl.Ind.Bot.3: 270, 1859; Kukenth. 152.

C. parviflorus Nees in Wight, Contrib.Bot.Ind.87, 1834 (excl.Syn.), non Vahl.

C. iria L. var. paniciformis C.B. Clarke in FBI. 6:607; C.3:381; Chavan & Sabnis in JMSU. 8(2):16.

The variety differs from the species in the character of inflorescence. The inflorescence is a compound umbel in which the ultimate spikes are drawn out into almost linear racemes.

The character is fairly constant and hence, I am inclined to keep it as a separate variety of Cyperua iria Linn. Blatter & McCann does not consider it as a variety and have merged it with the species.

Found in a few localities along with the species.

Flowers: August - September

Fruits: October

Standing or running water, especially in North Gujarat (Sedgwick); Dabka (Sabnis 158); Pavagadh (Sabnis 182); Balaram (Sabnis); Bhadarva (Sabnis).

Kashmir, W. Peninsula, Andamans.

China, Japan, Malaya, Polynesia.

Cyperus eleusinoides Kunth, Enum. 2:39, 1837; Clarke in JLS. 21:142 & FBI. 6:608; Trimen 5:37; Woodrow in JBNHS 13:430; Sedgwick in JBNHS. 25:694; F.3:1136.

A stout perennial with a woody rootstock. Stems tall, about 1 meter. Inflorescence a compound umbel. Spikelets many flowered; glumes densely imbricating.

Flowers: September (probably throughout the monsoon)

Fruits: Post-Monsoon period.

Banks of Watrak river, Modasa petha (Sedgwick 1061); Nala near Bokh, Prantij (Sedgwick 251); Balaram, in marshes along the river (Sabnis).

Sind, Gujarat, Khandesh, Deccan, Kokan, S.M. country, Madras, Nilgiris, Pulney and Travancore Hills, Punjab, Upper gangetic plains, Naga Hills.

Ceylon, Tropical and warmer parts of Asia, Africa and Australia.

Cyperus bulbosus Vahl, Enum. 2:342, 1806; FBI.6:611; Trimen 5:22; C,3:384; Sedgwick in JBNHS. 25:695; F.3:1137.

A small, slender perennial. Underground bulbs with black, lanceolate, scales. Leaves and inflorescence bracts pale green in colour. Spikelets reddish.

Flowers: July to October; but near a perennial source of water flowering was observed in the month of March.

Fruits: November onwards.

Fairly common and abundant in northern parts of Gujarat.

Ahmedabad, fields (Sedgwick); Vastrapur, near Ahmedabad (Saxton 1771); Baroda, in sandy places and grass lands during monsoon (Sabnis 43,44); Chhota Udepur (Sabnis 90); Devgadh Baria, Devgadh Hills (Sabnis); Vasad (Sabnis); Singhaarot (Sabnis).

Sind, Baluchistan, Rajputana.

Ceylon, Tropical Africa and Australia.

Cyperus articulatus: Linn. Sp.Pl.1:44, 1753; FBI.6:611; Trimen 5:29; Sedgwick in JBNHS. 25:695; Kukenth.77

A robust perennial. Stems terete with false nodes, when dry. Leaves hardly any. Spikelets straw-coloured in usually compound umbels. Achenes trigonous, acute at either end; style shorter than the achene.

Flowers and Fruits: In dry months from January to March.

Ahmedabad, riverside (Sedgwick 1018); not so far collected by the author from any locality in Gujarat.

From Bengal to Ceylon - Tropical and warm regions of both hemispheres.

Cyperus pangorei Rottb. Descr. et. Icon. 31, 1773; Mirashi and Donde in Bull.Bot.Soc. Nagpur 3(2):49, 1962.

C. corymbosus Rottb. Descr. et.Icon.42, 1773; Clarke in JLS. 21:158 & FBI.6:612; Trimen 5:29; C.3:383.

A robust, perennial, stoloniferous sedge. Stems 1-2 meters high, more or less septate or articulate when dry. Spikelets reddish in compound umbels; glumes close to the rachilla. Achenes trigonous, obovoid.

Flowers: July - October.

Fruits: October - January.

Marshy ground, Watrak river banks, Sabarmati river beds, the Bokh (Saxton & Sedgwick) Devgadh Baria (Sabnis 168, 169); Balaram (Sabnis 239); Ratanmahals (Sabnis 339a); Savli (Sabnis 281); Shahapura (Sabnis 370-73); Kim banks (Sabnis 313, 327, 328); Vankal (Sabnis); Bansda (Sabnis 418,421); Waghai, Dangs (Sabnis 397-99); Bhavandagad, Dangs (Sabnis 409-11).

Throughout India.

Ceylon, China, Japan, Tropical Asia, Africa, America & Madagascar.

Cyperus tegetum Roxb.Hort.Beng:6, 1814 (nomen. nudum) & Fl.Ind. 1:208, 1832; FBI.6:613; Sedgwick in JBNHS. 25:695; C.3:384.

A stout perennial. Stem trigonous or triquetrous at the top. Spikelets reddish brown usually in compound or rarely decompound umbels; glumes remote; scarcely imbricating in fruit. Achenes yellowish brown, trigonous.

Flowers: September-October.

Fruits: October-November.

Devgadh Baria (Sabnis 170); Kim banks (Sabnis 323, 324); Shahapura (Sabnis 365-369).

Throughout India.

Ceylon, Tropical Africa, Mauritius.

Cyperus macer C.B. Clarke in JLS. 21:160, 1884 & FBI. 6:613, 1893.

Stems about a meter high, slender. Leaves inconspicuous. Spikelets in simple umbels; glumes remote, not imbricate in fruit. Achene ashy-black, trigonous.

Flowers: September - October.

Fruits: October - December.

Under Gorair bridge, chitrasani to sarotra, in a sandy bed of a stream, at water's edge (McCann

1375, 1375a); not so far collected by the author from any locality in Gujarat.

Gujarat, Central India, W. Ghats, Deccan, North Kanara.

India and Burma.

Cyperus rotundus Linn. Sp.Pl.1:45, 1753; Clarke in JLS. 20:292 & FBI.6:614; Trimen 5:35; C.3:385; Sedgwick in JBNHS. 25:696; F.3:1137.

A perennial with long, slender stolons and hard, ovoid, black, fragrant tubers. Stem trigonous or triquetrous. Leaves shorter or longer than the stem. Spikelets red-brown in usually simple umbels. Glumes closely imbricate. Achene trigonous, grey-black, obovoid.

A common weed of cultivated fields and waste places before and after the monsoon.

Flowers & Fruits: Almost throughout the year, generally flowering from July to January and fruiting from September to February.

Surat (Gammie 16440, Woodrow, Sabnis 265a); Empress gardens, Ahmedabad (Sedgwick 1049); Ahmedabad (Sedgwick, Blatter 2166, Cooper); Baroda (Sabnis 3,5); Chhota Udepur (Sabnis 108, 109, 110); Devgadh Baria (Sabnis); Kim (Sabnis); Unai, Dangs (Sabnis);

Bhadarva (Sabnis); Mangrol (Sabnis); Singharot-Umeta (Sabnis)341, 342, 345); Waghai, Dangs (Sabnis 426-427); etc., etc.

Throughout India.

Ceylon and all warm countries.

Cyperus rotundus Linn. subsp. tuberosus (Rottb.) Kukenth. in Engl. Pflazenreich. Cyp. 101:113, 1935-36; Sabnis in Bull.Bot.Surv.India 4:210.

C. tuberosus Rottb. Descr. et Icon. 28, t.7, f.1, 1773; FBI.6:616; Trimen 5:33; C.3:385; Sedgwick in JBNHS. 25:696.

A perennial sedge. Stems slender 1/2-1 meter high. Stolons slender, elongate. Spikelets in umbels; glumes not closely imbricate as in C. rotundus Linn.

Flowers and Fruits: June - August.

Baroda (Sabnis 31); Chhota Udepur (Sabnis 105).

India, Australia, Mauritius.

Cyperus esculentus Linn. Sp.Pl.1:45, 1753 & 2:67, 1762; Clarke in JLS.20:293, 21:178 & FBI.6:616; Sedgwick in JBNHS.25:696; F.3:1138; Chavan & Sabnis in JMSU. 7(2):61 & 8(2):16.

A tall, perennial sedge of amphibious habit. It looks very much like C. rotundus L. The stolons here are slender, long. Glumes of the spikelet plicate-striate

and that the spikelets are usually shorter and broader than those of C. rotundus L.

Flowers: June - October.

Fruits: October & January.

Edge of the tank, Talod; never seen again, one plant only, a viviparous form (Saxton and Sedgwick); Baroda (Sabnis 27, 28, 29); Chhota Udepur (Sahis 100, 101, 102); Devgadh Baria (177a, 334); Pavagadh (Sabnis 312); Kim Banks (Sabnis 325); Singharot-Umeta (Sabnis 339); Waghai, Dangs (Sabnis 408); Rajpipla (Sabnis 433); Mevali (Sabnis 440, 441); Khedbrahma, Derol Jagir (Sabnis 461).

Upper gangetic plain, from the ganges plain to Nilgiris and Anamalais - In nearly all warm countries especially America, S. Europe, Africa.

Cyperus exaltatus Retz. Obs. 5:11, 1789; Clarke in JLS 21: 186 & FBI. 6:617; C.3:386; F.3:1138; Kukenth. 64, f.9 A-F; Chavan & Sabnis in JMSU. 7(2):61 & 8(2):16.

A large, glabrous perennial. Stem 1-2 meters long, obtusely trigonous. Leaves few with more or less scaberulous margins. Umbels compound; secondary rays of the umbels terminated by spikes of more than 20 spikelets. Spikelets 8-20 flowered, chestnut-brown; glumes closely imbricate. Achenes ellipsoid, trigonous, brown or yellow.

In marshes and on banks of rivers and ponds.

Flowers & Fruits: September to December, sometimes upto March.

Marshy banks of the Watrak river, Modasa petha (Sedgwick 1058); Sevalia, Kaira Dist. (Chibber); Baroda, banks of Vishwamitri river (Sabnis 7); Kelanpur (Sabnis 140,141); Devgadh Baria (Sabnis 171, 172); Kim (Sabnis 329); Rajpipla (Sabnis 432); Hernav river banks, Khedbrahma (Sabnis 455); Derol Jagir, Khedbrahma (Sabnis 460, 462); Idar, near pond (Sabnis 469); Balaram (Sabnis 240, 241); Vijapur (Sabnis 294);

All over India; Tropical and sub-tropical regions.

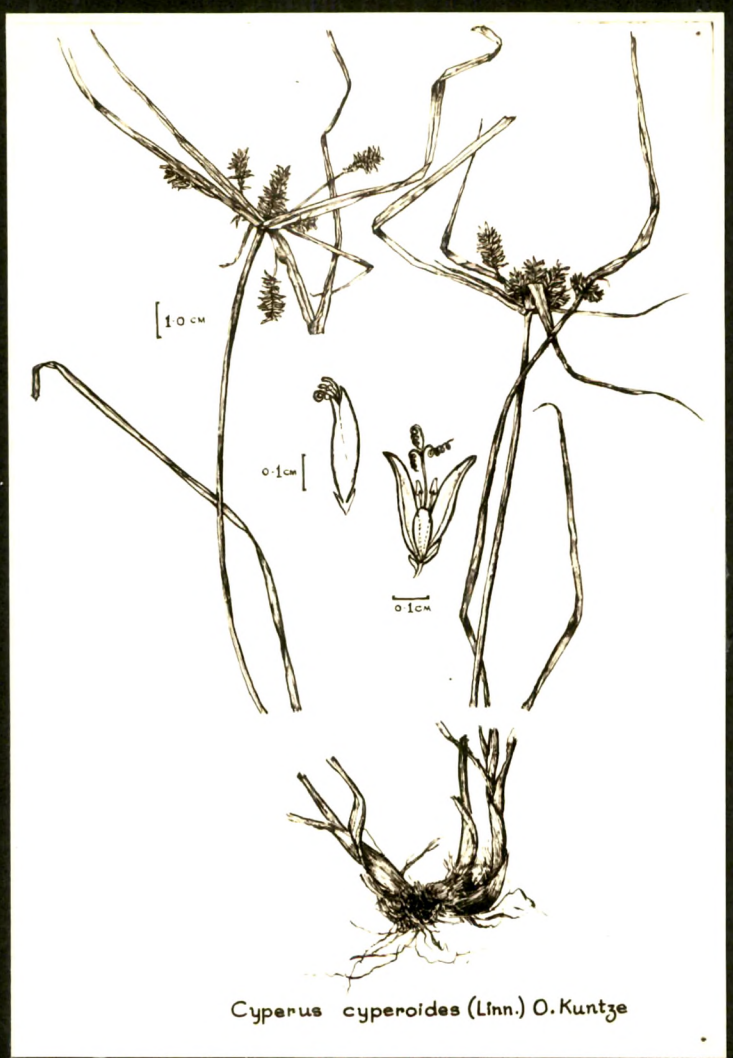
Cyperus cyperoides (Linn.) O. Kuntze, Rev.Gen.3(2):333, 1898; Kukenth. 514; Sant.265.

Scirpus cyperoides Linn. Mant. 2:181, 1771.

Mariscus sieberianus Nees in Linnaea 9:286, 1834; FBI.6:622; Clarke, Illustr.Cyp. t.23, f.5-6, 1909.

M. paniceus Vahl, Enum. 2:373, 1806; FBI.6:620; Clarke, Illustr.Cyp. t.22, f.1-2, 1909; Blatt. & McC. in JBNHS. 37:533; Chavan & Sabnis in JBNHS. 56:369-70.

A slender, stolon-bearing, perennial sedge. Stems 25-30 cm. or even more. Spikelets usually 1-flowered, divaricately arranged in simple umbels.



Cyperus cyperoides (Linn.) O. Kuntze

PLATE NO. - 38

A typical forest species found under the shade of forest trees or rocks.

Plate No. 38

Flowers: July, August and even in October.

Fruits: October - January.

The plant is not previously recorded from any locality in Gujarat and is reported from heavy rainfall areas of Western Ghats.

Pavagadh (Sabnis 178, 179, 186, 187) - growing under the shade of forest trees at Machi (400 meters above M.S.L.). The plant is confined to a very small area near the point of emergence of the river Vishwamitri and is not to be found either at the foot of the hill or anywhere above Machi.

Chhota-Udepur (Sabnis 89, 113, 133); Devgadh Baria (Sabnis 163, 164); Dharampur forests (Sabnis 310, 311); Dangs, Bhavandagad (Sabnis 415).

Throughout India - Warm regions of the old world.

Cyperus compactus Retz. Obs.5:10, 1879; Vahl, Enum.Pl. 2:304, 1806; non. Lam.

C. dilutus Vahl, Enum.Pl.2:357, 1806; C.3:389; C.B. Clarke in JLS. 21:193, 1884.

Mariscus compactus Druce in Rep.Bot.Exch.Cl.Brit. Isl. 634, 1917; Blatt. & McC. in JBNHS.37:535.

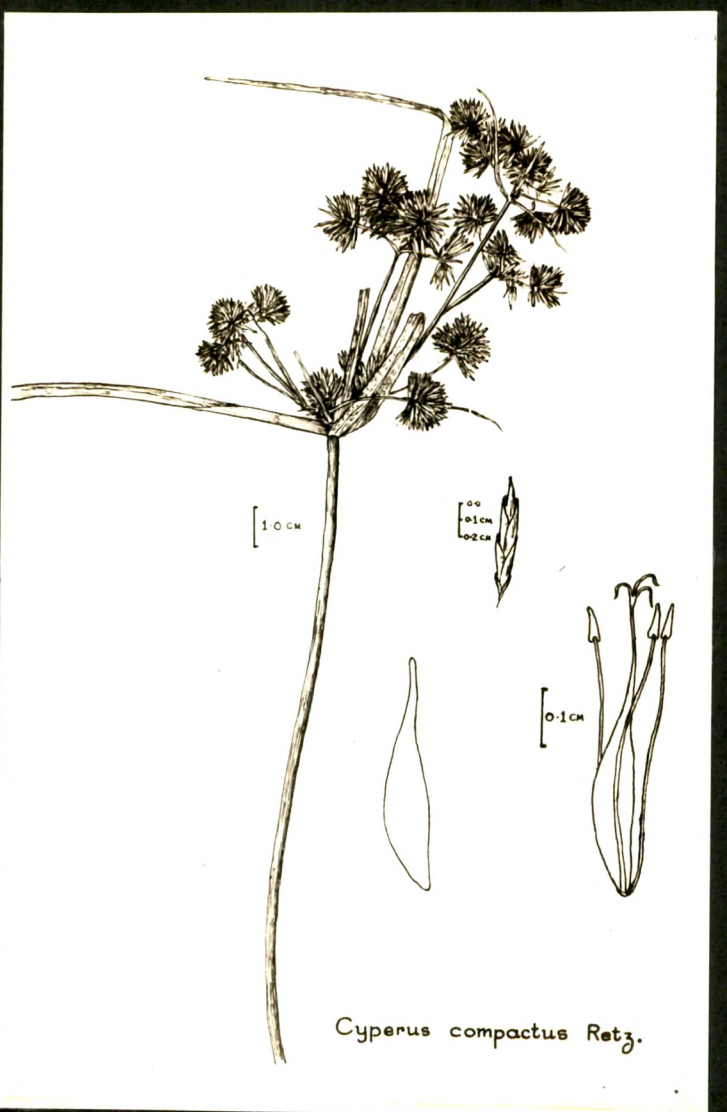


PLATE NO. - 39

M. microcephalus Presl. Reliq.Haenk. 1:182, 1830; FBI.6:624.

A stout, erect sedge. Spikelets red in globose heads on the rays of a compound umbel.

Plate No. 39

Flowers and Fruits: December - January

A typical forest species collected from the banks of river Ambika at Bhavandagad in Dangs forests of South Gujarat; very rare.

A new record for the Gujarat State.

More or less throughout India.

Ceylon, Mauritius, China, Malaya.

Cyperus pseudokyllingioides Kukenthal in Engl. Pflazenreich 101; 501, 1936.

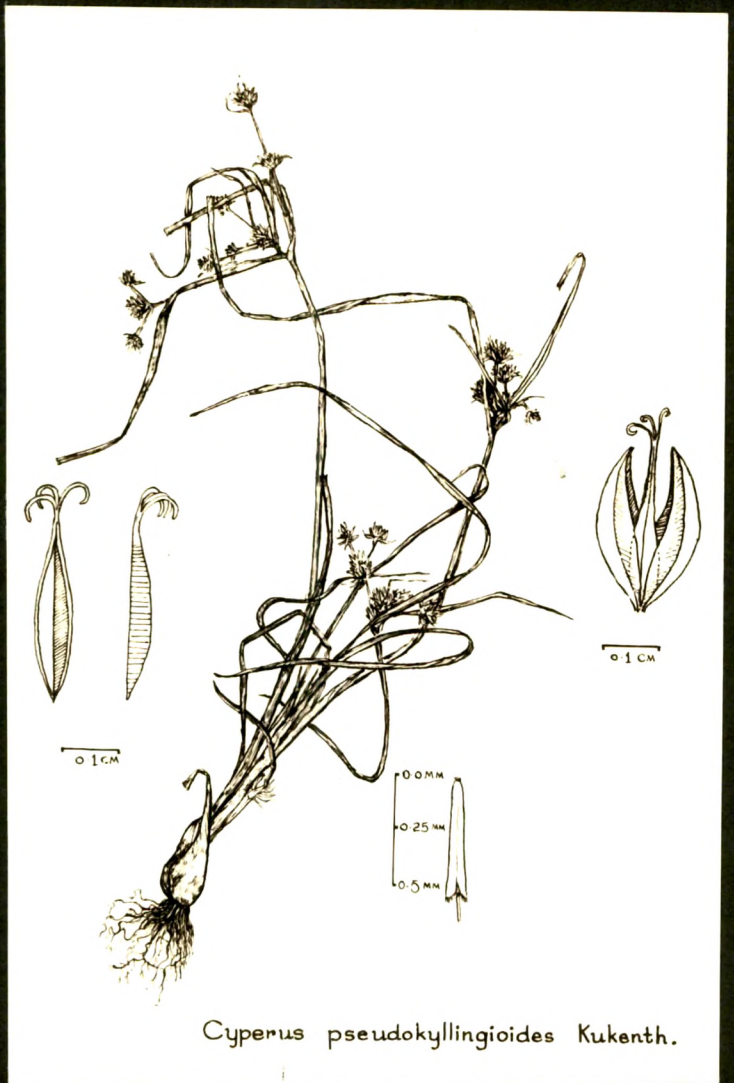
Courtoisia cyperoides Nees in Wight, Contrib.Bot. Ind.92, 1834 et Linnaea 9:286, 1834; FBI.6:625; C.3:391; F.3:1143.

An erect, herbaceous annual. Spikelets yellowish-brown to almost golden yellow in globose heads on the rays of an umbel; glumes with a continuous, glistening wing at the back.

Plate No. 40

Flowers: December - January.

Fruits: January - February.



Cyperus pseudokyllingioides Kukenth.

PLATE NO. - 40

It was collected from the gravelly banks of river Ambika at Waghai in Dangs and also from dried ditches at an altitude of 615 meters at Ratanmahal (Sabnis 400, 401).

Not reported by previous workers from Gujarat region. Hence a new record for the State.

N.E. & S.E. India.

Tropical Africa, Malaya, Madagascar.

Cyperus flabelliformis Rottb. Descr. et Icon. 42, t.12, f.2, 1773.

C. alternifolius Linn. ssp. flabelliformis (Rottb.) Kukenth. in pflanzenreich. 101: 193, 1936.

An erect, stout sedge, more than a meter high. Involucral bracts prominently nerved, much exceeding the umbel. Spikelets compressed, lustrous; glumes closely imbricate.

Native of Africa. Cultivated as an ornamental, amphibious sedge in the Botanical garden, M.S. University of Baroda and also found an escape along the banks of nallah, Navlakhi, L.V. Palace compound, Baroda (Sabnis 74).

Cyperus papyrus Linn. Sp.Pl.47, 1753; Shah in Curr. Sci. 32(9):424, 1963.

A tall sedge reaching a height of about 1 meter. Clums trigonous, smooth terminating in an umbel which bears as many as 100 filiform rays. Spikelets chestnut brown; rachilla winged; glumes distichous subtending a trigonous

achene and three stamens.

The plant is one of the earliest sources for writing materials and has not been hitherto reported from India, at least in a wild state.

It was collected growing in a natural association with C. rotundus L., species of Arundinella and Equisetum at the junction of the two rivers Sabar and Harnav, near Taranga hills, North Gujarat.

Not collected by the author, but mentioned here on the authority of Shah (l.c.)

Syria, Tropical Africa, Malayasia, India.

Eleocharis R. Br.

Eleocharis geniculata (Linn.) Roem. et Schult.Syst. veg.2:150, 1817.

Scirpus geniculatus Linn. Sp.Pl.48, 1753.

Eleocharis capitata R.Br.Prod.225, 1910; C.3:404; Blatt. & McC. in JBNHS. 37:538; Sedgwick in JBNHS.26:199.

An annual. Stems densely tufted, slender, trigonous. Spikelet solitary, terminal, globose-ovoid; bristles brown, as long as or longer than the achene.

An inhabitant of sandy sea-shores and river banks; difficult to distinguish from E. atropurpurea (Retz.) Kunth.

Flowers and Fruits: October to December.

Godhra (Woodrow). This is the only locality from Gujarat. I have not been able to collect it.

Bihar, Bengal, Maharashtra, Gujarat and Madras.

Singapore, Ceylon, most warm countries.

Eleocharis atropurpurea (Retz.) Kunth, Enum.2:151, 1837; C.3:403; Blatt. & McC. in JBNHS. 37:537; Sedgwick in JBNHS. 26:199; FBI.6:627.

Scirpus atropurpureus Retz. Obs. 5:14, 1789.

A small, slender annual. Spikelet dark brown or chocolate coloured, solitary, terminal; bristles white, not brown as in E. geniculata (Linn.) R. et S.

An inhabitant of wet, sandy river banks and rice fields.

Flowers: July - October and also during the dry months of March on the river banks.

Fruits: October - December.

Ahmedabad, nala near Watraj (Sedgwick 293); Godhra (Woodrow ex Cooke); Baroda (Sabnis 78); Vasad (Sabnis 88); Kelanpur (Sabnis); Padra (Sabnis); Gijram, rice field (Sabnis); Devgadh Baria (Sabnis 383); Ratanmahal (Sabnis 380); Mevali, Savli Taluka (Sabnis 444).

W. Himalaya, Assam, Sind, Rajputana, Gujarat, Konkan, W. Ghats, S. and N. Kanara.

Ceylon, Tropics generally.

Eleocharis acutangula (Roxb.) Schult. in R. & S. Syst. Veg.Mant.2:91, 1824; Andrews, Fl.Pl.Sudan 3:359, 1960.

Scirpus acutangulus Roxb. Fl.Ind.1:213, 1820.

Eleocharis fistulosa Link ex Spreng. Jahrb. Gewach 3:78, 1820; C.3:402; Blatt. & McC. in JBNHS. 37:537; Sedgwick in JBNHS.26:199; Clarke in FBI.6:626.

A stout, stoloniferous sedge with a solitary terminal spikelet as in other species of the genus. Stem triquetrous, of pale green colour.

It was found growing as an amphibious hydrophyte along with E. dulcis and Cyperus esculentus.

Flowers and Fruits: August to October.

Harni pond, near Baroda (Sabnis 79). Not so far recorded from any other locality in Gujarat. Hence it is a new record for the Gujarat state.

N.E. and S.W. India.

Burma, Tropics generally.

Eleocharis dulcis (Burm. f.) Trin. ex Henschel, Vita Rumph. 186, 1833; Blake in JAA 28:227, 1947.

Andropogon dulce Burm. f.Fl.Ind.219, 1768.

Scirpus plantagineus Retz. Obs. 5:14, 1789.

Eleocharis plantaginea (Retz.) R. et S.Syst.2:150, 1817; C.3:402; FBI.6:625.

A dark green, stoloniferous sedge. Stems terete, densely tufted, appearing transversely septate when dry. Spikelet solitary, terminal, straw-coloured, narrower than the stem; glumes closely imbricate; bristles retrorsely scabrid, longer than the achene.

Amphibious hydrophyte fringing and almost monopolizing the shallow banks of the ponds. The plants stand erect in water but as soon as the water level goes down, they start drooping, forming a complete cover on the ground during the dry months.

Flowers and Fruits: August to October.

Dansura rank, North Modasa (Sedgwick 1071); Prantij (Saxton 2927); Baroda (Woodrow ex Cooke; Sabnis 65); Kelanpur-Kundhela road (Sabnis); Gijram (Sabnis); Kim (Sabnis); Near Kosamba (Sabnis).

N.W. India, Assam, Sind, Gujarat, Konkan, S.M. Country, N. Kanara, Mysore, Coimbatore, Travancore.

Ceylon, Malay Peninsula, Tropics of the old world.

Fimbristylis Vahl nom.cons.

Fimbristylis ovata (Burm.f.) Kern, Blumea 15:126, 1967.

Carex ovata Burm.f. Fl.Ind. 194, 1768.

Fimbristylis monostachyos (L.) Hassk. Pl.Jav.Rar.61, 1848; FBI.6:649; C.3:399.

Cyperus monostachyus Linn. Mant.2:180, 1771.

Densely tufted plants. Stems 15-30 cms high, very slender. Spikelet pale, straw-coloured solitary or rarely 2; rachilla with persistent wings. Achene trigonous, tuberculate with a short pyramidal apex.

A denizen of open grassy slopes of banks of ponds and puddles during the monsoon.

Flowers: July to October.

Fruits: October to December.

Dhansura, Modasa Petha, damp ground (Sedgwick 249); Baroda, grassy places (Sabnis 46); Chhota Udepur (Sabnis 114, 115); Devgadh Baria (Sabnis 165); Kelanpur (Sabnis); Padra (Sabnis); Unai, Dangs Sabnis 256); Balaram (Sabnis 218).

Throughout warmer parts of India.

In all hot countries.

Fimbristylis tetragona R.Br.Prod.Fl.Nov.Holl.226, 1810; FBI.6:631; Trimen 5:48; C.3:393; Sedgwick in JBNHS.26:193; Blatt. & McC. in JBNHS.37, 539; Sant.269.

A small, slender tufted plant with a solitary terminal spikelet. Spikelet ovoid-conical; rachilla studded with tetragonal pits with raised edges, exposed by the deciduous glumes. Achene narrowly elongate, cylindric and curved.

Flowers and Fruits: January.

Very rare; on the wet sandy banks at Dummas, near Surat (Sabnis 271). Hitherto not reported from Gujarat region, hence a new record for the state.

Throughout India, except the North-West.

Ceylon, East Asia, Australia.

Fimbristylis polytrichoides R.Br.Prodr.226, 1810; FBI.6:623; Trimen 5:49; C.3:393; Sedgwick in JBNHS. 26:193; Blatt. & McC. in JBNHS.37:540.

A small, slender annual with a solitary, terminal spikelet. Spikelet oblong-ellipsoid, many-flowered; rachilla stout, deeply pitted. Achene minutely tuberculate, obovate with obcordate apex.

Flowers: August - September.

Fruits: October to January.

A new record for the Gujarat State.

On wet sandy banks at Dabka, Dummas and Bulsar (Sabnis 157, 270,305.)

Bengal, Sunderbans, Western Peninsula.

Ceylon, Malacca and tropics of the old world.

Fimbristylis schoenoides Vahl, Enum.2:286, 1806; FBI.6:634; Trimen 5:49-50; C.3:394; Sedgwick in JBNHS.26:194; F.31:1150; Blatt. & McC. in JBNHS. 37:541; Chavan & Sabnis in JMSU. 7(2):63 & 8(2):17.

A densely tufted plant. Stems upto 50 cms. high, filiform. Inflorescence consists of a solitary or 2-5, distantly arranged, pale, glistening spikelets. Glumes loose, almost semicircular. Achene smooth with a prominent white margin all around.

The plant was found growing abundantly in marshes and by the side of tanks or pools and puddles.

Flowers: July - October.

Fruits: October.

Talod, red earth upland (Sedgewick 274, Saxton 365); Dhansura, Modasa petha, Ahmedabad Dist., damp ground (Sedgwick); Baroda (Sabnis 64,71); Balaram, banks of river (Sabnis 217); Chhota Udepur (Sabnis 125, 126, 127).

Throughout India.

Ceylon, China, Malaya and Australia.

Fimbristylis argentea Vahl, Enum. 2:294, 1806; FBI.6:640; Trimen 5:52; C.3:395; Sedgwick in JBNHS.26:194; F.3:1151; Bhatt. & McC. in JBNHS. 37:541; Chavan & Sabnis in JMSU. 7(2):63 & 8(2):17.

A very small tufted annual. Spikelets cylindric in apparent head, clusters or slightly stalked umbels. Glumes closely and spirally arranged, obtuse and not cuspidate. Achene obovoid, biconvex, smooth.

A gregarious herb of the sloping margins of tanks.

Flowers & Fruits: September.

Sonasan, by a small tank (Sedgwick 327); Baroda, Danteshwar tank - on slopes (Sabnis 53, 55, 56, 57); Kelanpur (Sabnis). Not common.

Ceylon, Malaya, Mauritius.

Fimbristylis dichotoma (Linn.) Vahl, Enum. 2:287, 1806; FBI.6:635; Trimen 5:50; C.3:394; Sedgwick in JBNHS. 37:542; Chavan & Sabnis in JMSU. 7(2):63 & 8(2):17 & in JIBS. 39:29.

Scirpus dichotomus Linn. Sp.Pl.50, 1753.

An annual sedge with densely tufted, striate stems. Spikelets in usually compound umbels. Achene ribbed and trabeculate.

A plant of river beds and banks of ponds. It displays a great range of soil and climatic factors.

Flowers: End of June to December.

Fruits: October to January.

Flowering and fruiting apparently depend upon the availability of water. On the river banks, flowering and fruiting specimens were collected even in the months of January and March.

Bodeli (Woodrow, Blatter 3122); Dangs, S. Gujarat (Bell 5440); Kabir vad, Broach (Chibber 772, Gammie); Nadia (Chibber 251); Surat (Gammie 16444); Sevalia (Chibber 515); Vasvad (Chibber); In bed of a stream under Gorair Bridge, Chitrasani to Sarotra (McCann 1400); Baroda, Vishwamitri banks and other ponds (Sabnis 18, 19, 20); Chhota Udepur (Sabnis 111) Kelanpur (Sabnis 146); Kundhela (Sabnis 147); Devgadh Baria plains (Sabnis); Balaram (Sabnis 219, 220); Vasad (Sabnis 83, 86); Singharot (Sabnis); Dangs, Bhavandagad (Sabnis 414a); Waghai, Dangs (Sabnis 403, 404); Vansda (Sabnis 419); etc., etc.

The plant is common and abundant throughout Gujarat.

Throughout India.

Ceylon and warm regions of the old world.

Fimbristylis dichotoma (Linn,) Vahl var. diphylla (Retz.) T. Koyama in Quart. Journ. Taiwan Museum 13:229, 1960.

Scirpus diphyllus Retz. Obs.5:15, 1789.

Fimbristylis annua Roem. et Schult. var diphylla (Retz.) Kukenth. in Act. Hort. Gotob. 5:109, 1929.

F. dichotoma Vahl forma diphylla (Retz.) Ohwi in Journ. Jap.Bot.14:577, 1933.

A densely tufted perennial. Stems upto 60 cm. long, slender, angled, striate, smooth. Leaves with scaberulous margins. Inflorescence a simple umbel, often varying. Glumes loosely arranged, mucronulate, glabrous. Achene pale, trabeculate and ribbed.

In marshes and water-logged soils in association with F. schoenoides.

Flowers: July to September.

Fruits: January.

Talod, red earth upland (Sedgwick 270, Saxton 357); Dhansura, Modasa Petha (Sedgwick); Balaram (Sabnis); Chhota Udepur (Sabnis 128, 129, 130); Waghai, Dangs (Sabnis 402).

Throughout India, upto about 2000 meters.

Ceylon and all warm regions.

Fimbristylis cymosa R.Br.Prod.228, 1810; Mirashi & Donde in Bull.Bot.Spc.Nag.3(2):52, 1962.

F. spathacea Roth, Nov.Pl.Sp.24, 1821; FBI.6:640; Trimen 5:54; C.3:396; F.3:1151; Blatt. & McC. in JBNHS. 37:543.

A densely tufted, marsh-loving herb. Stems obtusely trigonous, striate. Leaves shorter than the stem, narrow, linear with scaberulous margins. Spikelets pale brown, ovoid, in usually compound umbels. Glumes loosely imbricate. Achene compressed, biconvex, at first yellow, afterwards black, smooth or slightly rough.

In marshes with other species of the same genus.

Flowers and Fruits: August to November.

Loamy and salt encrusted valleys, not uncommn (Saxton and Sedgwick); marshes on the Dhansura-Talod road (Sedgwick); nala near Wadaj, marshy gound (Saxton 1822); in sandy bed of stream under Gorair Bridge, Chitrasani to Sarotra (McCann 1402, 1402a); in marshes, Chhota Udepur (Sabnis 134); in a marsh, Balaram (Sabnis 221-225).

Orissa, Bombay Presidency, Coastal regions of Madras Presidency and N. Coimbatore.

Ethiopia, Arabia, China, Ceylon, Malaya, Singapore.

Fimbristylis ferruginea (Linn.) Vahl. Enum.2:291, 1806; FBI.6:638; C.3:396; Sedgwick in JBNHS.26:195; Blatt. & McC. in JBNHS. 37:544; Chavan & Sabnis in JMSU 7(2): 63 & 8(2):17; Maheshwari, 359.

Scirpus ferrugineus Linn. Sp.Pl.50, 1753.

A densely tufted perennial. Spikelets pale-brown in usually simple umbels. Glumes broadly ovate and hoary, pubescent in the upper half. Achenes pale-brown biconvex and smooth.

A plant of marshes and river beds.

Flowers: September - October.

Fruits: October.

Gogha, in tank (Chibber 312); Road to Lasundra (Chibber 460); Red earth upland, near Talod (Sedgwick 255, Saxton 309); In sandy bed of stream under Gorair Bridge, Chitrasani to Sarotra (McCann 1398); Baroda (Sabnis 62, 66); Balaram, Banks of the river (Sabnis 211-216); Kim banks (Sabnis 320); Doongri (Sabnis 332, 333); Khedbrahma, Hernav banks (Sabnis 451, 452); Idar, near the pond (Sabnis 468).

Throughout India.

Ceylon, China, Japan, Malaya, Australia, Polynesia.

Fimbristylis digitata Boeck. in Flora 61:35, 1878; FBI.6:648; C.3:398; Sedgwick in JBNHS. 26:195; Blatt. & McC. in JBNHS. 37:545.

A slender, short-lived sedge. Spikelets whitish in capitate heads. Achene globose-obovoid, trigonous without an apical tumor.

The plant resembles very much Bulbostylis barbata.

Flowers & Fruits: November.

It was collected from wet, sandy banks of river at Umeta, West of Baroda and is reported to be endemic to Bombay. (Sabnis 347, 348).

A new record for Gujarat.

Parts of Western Peninsula (India). - Endemic.

Fimbristylis woodrowii C.B. Clarke in JLS 34:68, 1898; C.3:398; Blatt. & McC. in JBNHS.37:545; Sant.269; Sabnis in Bull. Bot.Surv.Ind.4:195, 1962.

A very slender annual. Spikelets usually in compound umbels. Achene faintly ribbed and trabeculate.

It was found growing along with F. dichotoma (Linn.) Vahl, from which it was difficult to distinguish.

Flowers & Fruits: November.

On the banks of river Dhadhar at Shahapura, South of Baroda (Sabnis 375).

Not earlier reported from anyl locality in Gujarat. hence it is a new record.

Parts of Western Peninsula (India). - Endemic.

Fimbristylis tenera Roem. & Schult.Syst.Mant.2:57, 1824; FBI;6:642; Blatt. & McC. in JBNHS.37:546; Sant.269.

F. monticola Hochst. ex Steud. Sy.Pl.Cyp.111, 1855; Trimen 5:60-61; C.3:399.

Slender plants. Stems 20-30 cm. long. Inflorescence usually a simple umbel. Spikelets brown; glumes softly puberulous. Achene round, trigonous, irregularly tuberculate.

Abundant on loose, gravelly soils of river beds.

Flowers: July to December.

Fruits: December - January.

Ahmedabad, nala near Wadaj (Sedgwick 292); Red earth upland, near Talod (Sedgwick 241); Balaram (Sabnis 227-230); Ratanmahal (Sabnis 336, 337, 338); Chhota Udepur, on soft muddy soils (Sabnis 120-124) Singharot-Umeta (Sabnis 349-353); Kim banks (Sabnis 315); Unai, Dangs (Sabnis 259, 260); Waghai, Dangs (Sabnis 388, 392) Khapari banks and Bhavadagad, Dangs (Sabnis 517).

Throughout Bombay Presidency (Gujarat & Maharashtra) S. Kanara, Mysore, Nilgiris, Anamalais, Travancore.

Ceylon, TropicalA Africa.

Fimbristylis falcata (Vahl) Kunth, Enum.Pl.2:239, 1837; Kern in Blumea 8(1):113, 1955.

Scirpus falcatus Vahl, Enum Pl.2:275, 1806.

Trichelostylis junciformis Nees in Wight, Contrib. Bot.Ind.106, 1834.

Fimbristylis junciformis (Nees) Kunth, Enum.Pl.2:239, 1837; FBI.6:647; C.3:400; Blatt. & McC. in JBNHS.37:546.

A perennial sedge with a short, woody rhizome. Stems not more than 50 cm. high, tufted, rigid, angled below and compressed above. Spikelets brownish in compound umbels. Achene pale or white, slightly stalked, trigonous, smooth.

A sedge of dry grasslands, also on sandy soils in the vicinity of water.

Flowers and Fruits: July to September.

Talod, dry places on red earth upland (Sedgwick 282, Saxton 376); Baroda (Sabnis 22, 23, 24); Kelanpur (Sabnis); Padra (Sabnis 152); Shahapura (Sabnis); Devgadh Baria (Sabnis 166, 167).

Throughout India.

Ceylon, Madagascar, Philippines.

Fimbristylis littoralis Gaudich, in Freyc.Voy.Bot.413, 1826.

F. miliacea sensu Clarke in FBI.6:644, 1893, non Scirpus miliaceus L.

This plant resembles F. miliacea in habit and character of inflorescence. Spikelets globose. Achene white or yellow, tuberculate.

Very common in marshes and banks of puddles during the monsoon.

Flowers: July to December.

Fruits: December - January.

Baroda (Blatter 3120, Woodrow, Sabnis 54); Grassy path between rice-fields, 4 miles N.W. of Ahmedabad (Sedgwick 312); Unai, Dangs (Sabnis 257, 258); Chhota Udepur (Sabnis 113); Surat (Sabnis 268); Waghai, Dangs (Sabnis 390); Bhavandagad, Dangs (Sabnis 416).

Throughout India, upto about 2000 meters.

All warm regions.

Fimbristylis miliacea (L.) Vahl, Enum. 2:287, 1806.

F. quinquangularis Kunth, Enum. 2:229, 1837; FBI.6:644; C.3:397.

The plant is closely allied to F. littoralis. Stems upto 100 cm. high, 4-5 angled. Spikelets acute and not globose, in decompound umbels. Achene pale yellow, tuberculate.

An inhabitant of marshes and borders of puddles during the monsoon.

Flowers: July to November.

Fruits: October to January.

Modasa petha, marshy banks of Watrak river (Sedgwick 1059); Ahmedabad, rice-fields (Sedgwick 311); Kharaghoda (Saxton); Baroda (Woodrow, Sabnis 49); Chhota Udepur, in marshes (Sabnis 135); Balaram, banks of river (Sabnis 230a); Gijram (Sabnis 316); Doongri (Sabnis); Kim, Vankal (Sabnis); Mahudi (Sabnis 297, 298); Singharot-Umeta (Sabnis 354, 355); Waghai, Dangs (Sabnis 387); Khedbrahma, Derol Jagir (Sabnis 459, 463); Khedbrahma, Hernav banks (Sabnis 465).

More or less throughout India.

Ceylon, Malay Peninsula, China, Australia.

Fimbristylis complanata (Retz.) Link, Hort.Berol. 1:292, 1827; FBI.6:646; C.3:400; Blatt. & McC. in JBNHS. 37:547.

Scirpus complanatus Retz.Obs.5:14, 1789.

The plant is described as resembling F. littoralis and F. miliacea although the stems are quite flattened below the inflorescence. Spikelets in decompound umbels, longer than the above mentioned two species. Achene pale and minutely tubercled.

Watrak river banks, Modasa petha (Sedgwick 1060); Talod, damp ground on red earth upland (Sedgwick 253).

Not so far collected by me from any locality in Gujarat.

Throughout India in the warm regions.

Ceylon, Indochina, Africa, Oceania.

Bulbostylis Kunth

Bulbostylis barbata (Rottb.) Clarke in FBI.6:651, 1893; Trimen 5:66; F.3:1153; Blatt. & McC. in JBNHS. 37:764; Kern in Reinwardtia 6:51.

Scirpus barbatus Rottb. Descr. et Icon. 52, t.17, f.4, 1773.

Stenophyllus barbatus (Rottb.) Th. Cooke in Fl.Pres. Bom.3:401; Sedgwick in JBNHS.26:197.

A small, tufted annual with filiform stems and wiry leaves. Spikelets small, brown crowded in terminal heads or clusters. Achenes trigonous, dull white; style leaving a tumor on the achene.

Abundantly found on loose, sandy soils.

Flowers: July - October.

Fruits: October - January.

Nadiad farm (Bhide); Ahmedabd, very common (Saxton 1728, Cooper); Baroda (Sabnis 58, 72); Chhota Udepur, along the railway tract (Sabnis 131); Devgadh Baria

(Sabnis); Padra (Sabnis 150); Balaram (Sabnis 231, 232); Pilvai (Sabnis 288, 289); Mahudi (Sabnis 300); Waghai, Dangs (Sabnis 431a); Rajpipla (Sabnis 435, 436).

Throughout India.

Ceylon and other warm regions.

Scirpus Linn.

Scirpus articulatus Linn. Sp.Pl.47, 1753; FBI.6:656; Trimen 5:75; C.3:406; F.3:1156; Blatt. & McC. in JBNHS. 37:767; Chavan & Sabnis in JMSU. 7(2):63.

An amphibious species. Culms cylindrical, septate, bearing spikelets in lateral heads below the middle, often immediately above the orifice of the uppermost basal sheaths. Bristles o. Achene obovoid, triquetrous, black, apiculate.

On extremely muddly soils in marshes and by the side of ponds.

Flowers and Fruits: Blatter and McCann (loc.cit.) state that flowering takes place about the first week of September. My observations permit me to say that flowers and fruits start late in the post-monsoon period and continue till the months of March and April although occasional flowering does occur in July and August.

Godhra (Chibber 593); Talod, marshy land near tank (Saxton 568); Sonasan, by a small tank (Sedgwick 329); Dakor (Kanitkar ex Cooke); Baroda, dried ponds (Sabnis 12-15); Kelanpur (Sabnis); Padra (Sabnis); Devgadh Baria plains (Sabnis 382, 384, 385).

Throughout India.

China, Africa, Indochina, Malaysia and northern Australia.

Scirpus supinus Linn. Sp.Pl.49, 1753; FBI.6:655; Trimen 5:74; C.3:406; Sedgwick in JBNHS. 26:201; F.3:1156; Blatt. & McC. in JBNHS. 37:766; Chavan & Sabnis in JMSU. 7(2):63 & 8(2):18.

S. supinus var. uninodis Clarke in FBI.6:656; Sedgwick in JBNHS.26:201.

A densely tufted, glabrous annual. Stems slender, obtusely trigonous, striate. Spikelets pale green or straw-coloured, in lateral inflorescence. Inflorescence is either a compact head or is broken up into clustered spikelets on the rays of an umbel. Achenes obovoid or orbicular, trigonous, black.

In marshes almost throughout the year.

Flowers: July - October.

Fruits: October - November.

Dakor (Kanitkar ex Cooke); Baroda, banks of ponds (Sabnis 69, 70, 73); Kelanpur (Sabnis); Padra, in a

marsh (Sabnis 149); Doongri, near Gijaram, harvested paddy fields (Sabnis); Bhadarva, near a pond (Sabnis 285).

More or less throughout India.

Old world in general and also in America.

Critical notes: Clarke (loc.cit.) on the basis of the basis of the inflorescence character, erects variety uninodis. Sedgwick (loc.cit.) remarks "commoner than S. supinus Linn. - This variety is of very doubtful validity. All intermediate stages occur". I am inclined to give weightage to these remarks and merge the variety with the species, thereby reducing the former to synonymy.

Scirpus roylei (Nees) Parker in Fl.Upp. Gang.Plains. 3:361, 1929.

Isolepis roylei Nees in Wight, Contrib. 107, 1834.

Scirpus quinquefarius Buch.-Ham. ex Boeck in Linnaea 36:701, 1870; FBI.6:657; Blatt. & McC. in JBNHS. 37:768.

Plants with slender, terete stems, upto 60 cm. high. Spikelets golden yellow, flaccid with conspicuously loose glumes. Inflorescence borne above the Middle of the stem. Achene black, nearly triquetrous with transverse wavy lines.

Generally found in rice fields and other moist situations.

Flowers: September - October rarely in March.

Fruits: October.

Gujarat (Hove ex Clarke); Ahmedabad (Gammie 16351); Munnagar, rice-fields, Ahemdabad Dist. (Sedgwick 332); Talod (Saxton 708); Umrat (Woodrow ex Cooke); Baroda, in marshes (Sabnis 11, 67); Kundhela (Sabnis); Doongri, from a marsh near the village (Sabnis).

N.W. India, Central India, West Bengal, Sind, Cutch, Gujarat, Deccan.

Afghanistan, Baluchistan, Africa.

Scirpus corymbosus Heyne ex Roth, Nov.Pl.Sp.28, 1821; FBI.6:657; C.3:407; Blatt. & McC. in JBNHS.37:768.

A stout perennial. Stems about 1 meter high, stout, finely striate. Spikelets reddish brown in pedunculate clusters borne laterally near the top of the stem. Achenes yellow, trigonous with a somewhat pyramidal apex.

Flowers and Fruits: September to December.

Kabir vad, Broach Dist. (Chibber); not collected by the author so far from any locality in Gujarat.

Bundelkhand, Sind, Gujarat, Khandesh, Deccan, N. Kanara, Mysore.

Africa, Madagascar.

Scirpus maritimus Linn. Sp.Pl.51, 1753; FBI.6:658; C.3:407; Sedgwick in JBNHS. 26:202; Blatt. & McC. in JBNHS.37:768; Chavan & Sabnis in JMSU. 7(2):64 & 8(2):18.

An amphibious species perennating by means of creeping rhizomes bearing tubers. Stems nearly a meter tall or less, triquetrous. Leaves keeled, often as long as the stem. Inflorescence umbellate with unequal rays. Spikelets pale brown or reddish brown; glumes strongly keeled. The keel produced into a recurved mucro in between the apical lobes of the bifid apex. Hypogynous bristles usually shorter than the achene, retrorsely scabrid. Achene pale yellow or white, trigonous, smooth.

Flowers: July to October sometimes upto January.

Fruits: October - January.

Chharod farm (Javlekar); Umreth (Clarke, Woodrow ex Cooke); Godhra (Chibber); Kabir vad, Broach Dist. (Chibber); Kharaghoda (Saxton 482b); Mishwa river Harsol (Sedgwick); Baroda, fairly common (Sabnis 4, 80); Kundhela (Sabnis 142); Padra (Sabnis); Chhota Udepur, banks of Orsang river (Sabnis 136); Devgadh Baria, on theb banks of streams in forests (Sabnis); Doongri, Surat Dist.(Sabnis); Bhadarva (Sabnis 286); Singharot-Umeta (Sabnis 272); Vasad (Sabnis); Waghai, Dangs (Sabnis 430).

Kashmir, Kashgar, Moradabad, Rajputana desert, Bombay Presidency, Mysore, Nellore.

Old world species with varieties in Australia and America.

Scirpus strobilinus Roxb, Hort.Beng. 6, 1814, nomen nudum & Fl.Ind. 1:222, 1820; Koyama in Acta phytotax. Geobot. 17(2):50, 1957.

S. affinis Roth. Nov.Pl.Sp.30, 1821.

S. maritimus Linn. var. affinis Clarke in FBI.6:659, 1893; C.3:408; F.3:1156; Blatt. & McC. in JBNHS. 37:769.

The plant is not as tall as S. maritimus. Spikelets 3-1, straw-coloured, crowded in terminal heads are bigger than those of S. maritimus.

(The number of spikelets in a head seems to be variable. Cooke (loc.cit.) mentions 3-1 as the number, while Blatter and McCann (loc.cit) remarks that their Sangli specimens have from 4 to 5 spikelets. Fisher (loc.cit.) gives the spikelet number as 1 or 2-5 in clustered heads. I have noted that the number is usually 3-1 but 5 or even 6 spikelets are rarely met with. Variability also exists regarding the size of the spikelets).

Flowers: July - August.

Fruits: Upto November.

Ahmedabad (Chibber, Saxton 1819); Surat (Gammie 16448); Sabarmati (Sedgwick); Baroda, Vishwamitri banks (Sabnis); Kelanpur-Kundhela (Sabnis 148a); Singharot-Umeta, Mahi banks (Sabnis 346); Devgadh Baria, banks of Panam (Sabnis); Shahapura (Sabnis 357-361).

Throughout N. India, in the plains from Punjab and Bombay to Assam.

N. Asia, Turkestan, N. China.

Scirpus littoralis Schrad var. subulatus (Vahl) Chiov., Pl. Nov. etc. ex Aethiopia 16, 1928; Koyama in Canad. J. Bot. 41(7):1126, 1963.

S. subulatus Vahl, Enum. 2:268, 1806.

S. pectinatus Roxb. Hort. Beng. 81, 1814, nom.nud. & Fl.Ind. 1:220, 1820.

S. littoralis sensu Clarke in FBI.6:659, 1893, non. Schrad.

A sturdy, amphibious plant. Stems 1-2 meters high, terete below and slightly trigonous above. Inflorescence a lateral umbel with drooping rays near the top of the stem. Glumes membranous, notched at the apex with a mucro. Hypogynous bristles plumose with moniliform hairs. Achenes obovate, apiculate, dark brown, smooth.

Flowers and Fruits: Usually in the monsoon and post-monsoon periods as earlier reported. It is observed that the plants are flowering and fruiting almost throughout the year depending upon the availability of water.

Dharsana (Chibber); Kharagoda, in a tank in 3 ft. of water (Saxton 493b); Watrak river, Modasa petha (Sedgwick 1172); in sandy bed of stream, Gorair Bridge, Chitrasani to Sarotra (McCann 1394, 1394a); Ahmedabad (Burkhill ex Drummond ex Cooke); Baroda, Harni tanks (Sabnis 1,2); Kelanpur (Sabnis); Padra (Sabnis); Devgadh Baria, river Panam (Sabnis); Kim, river banks (Sabnis); Shahapura, banks of river Dhadhar (Sabnis 362, 364); Singharot (Sabnis); Vasad, Mahi banks (Sabnis 85); Bhadarva (Sabnis); Waghai, Dangs (Sabnis 431).

Punjab, Central India, Rajputana desert, Sind, Kathiawar, Gujarat, N. Kanara, Cuddapah, Kurnool, Chigleput, Travancore upto 600 meters.

Ceylon, Persia, Central Asia, Africa, Mediterranean region, Australia, Malaysia.

Scirpus mucronatus Linn. Sp.Pl.73, 1753; FBI.6:657; Trimen 5:76; Blatt. & McC. in JBNHS. 37:770.

A stout, tufted perennial. Stems 15-75 cm. high, triquetrous. Spikelets yellowish-brown in apparently lateral heads near the top of the stem.

Flowers and Fruits: March to May.

The Bokh, Prantij, Ahmedabad Dist. (Sedgwick 1278); not so far collected by the author from Gujarat region.

Throughout India, upto 2000 meters.

Europe, Tropical Africa, Madagascar, W. Asia to Japan, Australia, Polynesia.

Scirpus squarrosus Linn. Mant. 181, 1771; FBI.6:663; Trimen 5:74; C.3:410; Sedgwick in JBNHS. 26:202; F.3:1156; Blatt. & McC. in JBNHS. 37:771; Chavan & Sabnis in JMSU. 8(2):19.

A slender, tufted annual. Stems approximately 15 cms. high or even less sometimes, filiform, terete, striate. Spikelets solitary or 2-4 in a cluster. Glumes provided with recurved mucro as long as the blade. Hypogynous bristles o. Achene trigonous.

A plant commonly found in the rice-fields and also on loose soils of the fallow fields.

Flowers: August - September.

Fruits: Post-monsoon.

Sevalia, Kaira Dist. (Chibber); Devgadh Baria, rice-fields (Sabnis 174, 175); Amaliyara, near Baroda,

fallow fields after monsoon (Sabnis), Manjusar (Sabnis 445).

More or less throughout India.

Ceylon, Java, China, Trop. Africa.

Eriophorum Linn.

Eriophorum comosum Wall. (Cat. No.3446) ex Nees in Wight, Contrib. Bot.Ind.110, 1834; FBI.6:664; C.3:411; Blatt. & McC. in JBNHS. 37:771; Chavan & Sabnis in JIBS. 39:29; Maheshwari, 363.

A densely tufted sedge, growing in the crevices of the rocks. Stems upto 50 cms. high, cylindrical below and trigonous above, leafy at the very base. Leaves as long as or even longer than the stem, linear, rigid with serrulate margins. Inflorescence a decompound umbel. Spikelets reddish brown. Glumes mucronate. Achenes trigonous, greyish-black with white bristles divided nearly to the base into innumerable comose segments.

Flowers & Fruits: December to May.

Champanir (Woodrow ex Cooke); possibly Fort Pavagadh (Sedgwick). Only after intensive search, the plant could be collected from Pavagadh hills and also recently from Rajpipla forests by Bhatt (No.420) and subsequently by me. (Sabnis 471, 472); very rare.

Throughout India.

Tonkin, China, Afghanistan.

Fuirena Rottb.

Fuirena ciliaris (Linn.) Roxb.Hort.Beng. 81, 1814; Blatt. & McC. in JBNHS. 37:772.

Scirpus ciliaris Linn. Mant. 2:182, 1771.

Fuirena glomerata Lam. Ill. 1:150, 1791; FBI.6:666; Trimen 5:79; C.3:412; Sedgwick in JBNHS. 26:203; F.3:1158.

An annual. Stems 10-40 cm. high, leafy throughout. Leaves linear-lanceolate, provided with ligules at the mouth of the sheath. Sheaths closed, striate. Spikelets ovoid, green or brown appearing in axillary clusters. Glumes with a keel having a long awn. Hypogynous scales petaloid, quadrate and clawed.

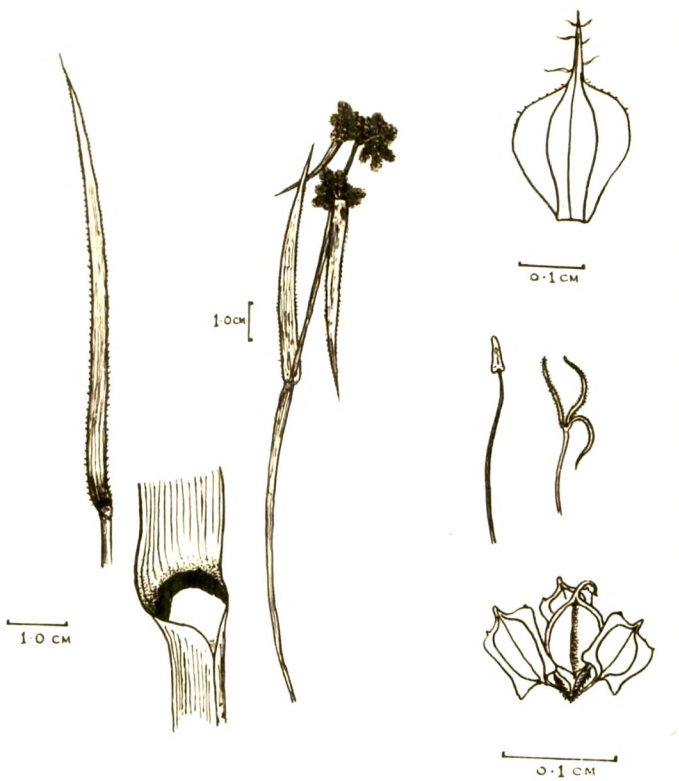
Achenes broadly obovoid to elliptic, trigonous, yellowish white to brown.

On open plateau of the forests, usually near dry ditches.

Plate No. 41.

Flowers & Fruits: December.

Sonasan, in rice-fields (Sedgwick 330); Godhra (Woodrow ex Cooke); Ratanmahal hills (Bedi, Sabnis 377, 378, 379).



Fuirena ciliaris (Linn.) Roxb.

PLATE NO. - 41

Throughout the warmer parts of India.

Ceylon, Tropical Africa, S.E. Asia, Australia.

Rhynchospora Vahl Corr.Willd.

Rhynchospora wightiana Steud. Cyp. 148, 1855; FBI.6:669; C.3:415; Blatt. & McC. in JBNHS. 37:774; Shah and Suryanarayan in 54th Ind.Sc. Congr. Abstr. 321.

A small tufted annual. Stems leafy towards the base only. Spikelets many, in a single, terminal rusty-brownish heads.

The occurrence of the plant in Dangs forests, Gujarat state was recorded by Shah and Suryanarayan (l.c.) and was almost simultaneously collected by Shri S.A. Chavan, a forest officer of the state from forests near Waghai and Saputara. According to him "the plants were observed growing on grassy slopes in open sunlight on the borders of forests". This is a new record for the Gujarat state.

Flowers & Fruits: July-August to October.

Bombay Presidency, Mysore and W. Coast of Madras Presidency; Cochinchina.

Scleria Berg.

Scleria stocksiana Boeck in Linnaea 38:474, 1874; FBI.6:687; C.3:419; Sedgwick in JBNHS. 26:208; Blatt. & McC. in JBNHS. 37:779.

A plant of the marshy soils. Stems leafy, upto 40 cms. high, slender, striate, triquetrous above with minute spinules. Leaves long, linear with scabrousm margins. Spikelets in axillary panicles. Flowers unisexual. Achenes shallowly corrugose, shining white with sub-umbonate apex.

Flowers & Fruits: August to November.

Talod, red earth upland (Sedgwick 252); not collected by the author but included on Sedgwick's authority.

Endemic to the Bombay Presidency.

Scleria tessellata Willd. Sp.Pl. 4:315, 1805; FBI.6:686; C.3:418; F.3:1163; Blatt. & McC. in JBNHS. 37:776.

A tufted, slender, loafy plant. Stem reaching a meter in height, triquetrous. Leaves long, linear with scaberulous margins. Spikelets in panicled inflorescence. Achene bony, white, exserted, cancellately tessellate with square depressions, sometimes puberulous with reddish hairs.

Plate No. 42

Flowers & Fruits: September.

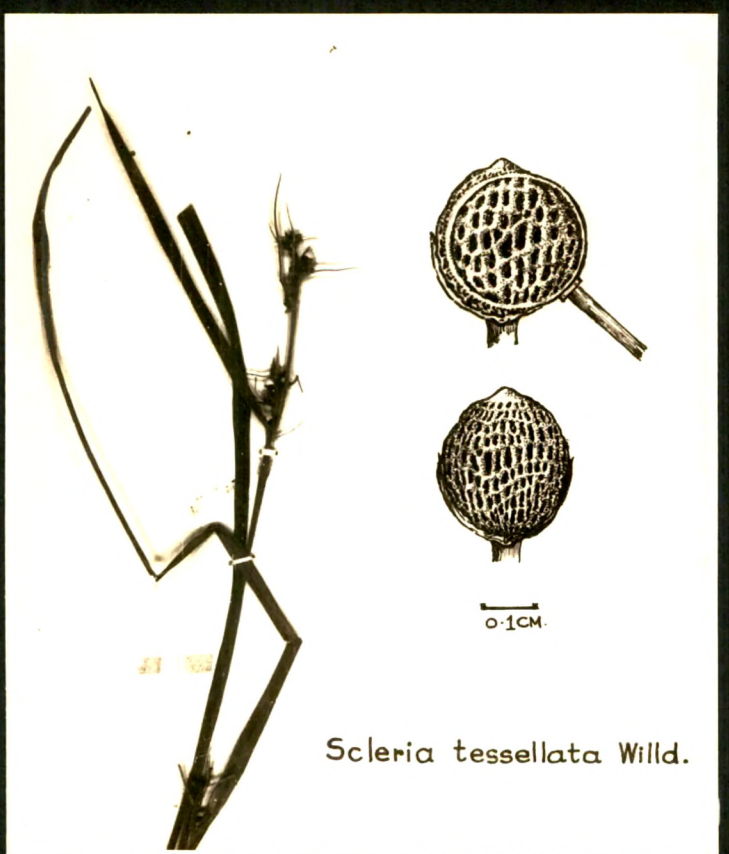


PLATE NO. - 42

Nimetta, near Baroda (Sabnis 59, 60, 60a); very rare. The plant is reported here for the first time from Gujarat region.

Throughout India, except the arid areas.

Ceylon, Malaya, China Japan, Australia.

The Distribution of Cyperaceae in Gujarat

Sr. No.	Name of the plant	North Gujarat	Central Gujarat	South Gujarat
1.	Cyperus triceps	X P	* P & H	X P & H
2.	C. brevifolius	-	X P	-
3.	C. metzii	X P	-	-
4.	C. globosus	X P	-	-
5.	C. hyalinus	X P	X H	X H
6.	C. polystachyos	-	-	X P
7.	C. sanguinolentus	X P	-	-
8.	C. pumilus	X P	X P & H	-
9.	C. michelianus subsp. pygmaeus	X P	* P	* P
10.	C. laevigatus	* P	* P	-
11.	C. alopecuroides	X P	* P	X P
12.	C. difformis	* P	* P & H	* P & H
13.	C. tenuispica	X P	X P	-
14.	C. niveus	X P	X P	-

Sr. No.	North Gujarat	Central Gujarat	South Gujarat
15. C. leucocephalus	-	* H	-
16. C. arenarius	* P	X P	X P
17. C. conglomeratus	X P	-	-
18. C. compressus	* P	* P & H	X P
19. C. squarrosus	X P	X P & H	X P
20. C. iria	* P	* P & H	* P
21. C. iria var. parviflorus	X P	X P	-
22. C. eleusinoides	X P	X P	-
23. C. bulbosus	* P	X P	-
24. C. articulatus	X P	-	-
25. C. pangorei	X P	X P & H	X P
26. C. tegetum	-	X - P	X P
27. C. macer	X P	-	-
28. C. rotundus	* P	* P	* P
29. C. rotundus ssp. tuberosus	-	X P & H	-
30. C. esculentus	X P	X P & H	X P & H
31. C. exaltatus	X P	X P	X P
32. C. cyperoides	-	* H	X H
33. C. compactus	-	-	X H
34. C. pseudokyllingioides	-	X H	X H
35. Eleocharis geniculata	-	X P	-
36. E. atropurpurea	X P	X P & H	X P

Sr. No.	Name of the plant	North Gujarat	Central Gujarat	South Gujarat
37.	E. acutangula	-	X P	-
38.	E. dulcis	X P	X P	X P
39.	Fimbristylis ovata	X P	X P & H	X P
40.	F. tetragona	-	-	-
41.	F. polytrichoides	-	-	-
42.	F. schoenoides	X P	X P	-
43.	F. argentea	X P	X P	-
44.	F. dichotoma	* P	* P & H	* P & H
45.	F. dichotoma var. diphylla	X P	X P	X P
46.	F. cymosa	* P	X P	-
47.	F. ferruginea	* P	X P	X P
48.	F. digitata	-	X P	-
49.	F. woodrowii	-	X P	-
50.	F. tenera	X P	X P	* P
51.	F. falcata	X P	X P	-
52.	F. littoralis	X P	* P	X P
53.	F. miliacea	* P	* P	X P
54.	F. complanata	X P	-	-
55.	Bulbostylis barbata	* P	* P & H	X P & H
56.	Scirpus articulatus	X P	X P & H	-
57.	S. supinus	-	X P	X P
58.	S. roylei	X P	X P	X P

Sr. No.	Name of the plant	North Gujarat	Central Gujarat	South Gujarat
59.	S. corymbosus	-	-	X P
60.	Scirpus maritimus	X P	* P & H	X P
61.	S. strobilinus	X P	X P	X P
62.	S; littoralis var. subulatus	* P	* P	X P
63.	S. mucronatus	X P	-	-
64.	S. squarrosus	-	X P	-
65.	Eriophorum comosum	-	X H	-
66.	Fuirena ciliaris	X P	X P	-
67.	Scleria stocksiana	X P	-	-
68.	S. tessellata	-	X P	-
69.	Cyperus papyrus	X P	-	-
70.	Rhynchospora wightiana	-	-	X H

- absent; X = present; * = abundant;

P=Plains; H = Hilly forest area.

DISTRIBUTION

The family Cyperaceae are represented in Gujarat by 9 genera and 69 species including the varieties and sub-species. The genus Cyperus is the most dominant with 34 species. Next comes the genus Fimbristylis with 16 Sps. other genera are Scirpus, Eleocharis, Scleria with 9, 4 and 2 species respectively and Eriophorum, Bulbostylis, Fuirena and Rhynchospora with only one species each.

The genus Cyperus is widely distributed both on the plains as well as the hilly forest areas. Some of the species such as Cyperus leucocephalus, C. cyperoides, C. compactus and C. pseudokyllingioides are the denizens of hilly forests only and are not to be met with on the plains. The genus Fimbristylis is apparently confined to the plains with the solitary exception of F. dichotoma (Lin.) Vahl, which grows with equal vigour both on the plains and hills. Scirpus is essentially plain-loving although a few species are occasionally met with in the forest areas. All the species of Eleocharis are also largely confined to the plains, although E. atropurpurea was recently collected from the Ratanmahal hills in Central Gujarat. Eriophorum comosum has been collected by me after intensive search, in the Rajpipla forests

and also from Pavagadh. Woodrow cites Champanir or possibly Fort Pavagadh as the sole locality for the plant. Bulbostylis barbata is abundantly found on loose, gravelly soils of the plains and also of the high hills. Fuirena ciliaris is the only species of the genus reported both from the plains and hills of Central Gujarat. The plant is not very common in any of the areas. Out of the two species of the genus Scleria, S. stocksiana is restricted to the red upland plateau at Talod in North Gujarat while S. tessellata is apparently confined to the grasslands at Nimetta 7 miles, east of Baroda. Rhynchospora wightiana is so far collected only from the Dangs forests.

Ecological Synopsis

The plants of this family are annual or perennial herbs. They are mostly the denizens of marshes, though some species inhabit dry localities, even deserts and some forests.

A majority of the sedges grow as amphibious hydrophytes. The most outstanding examples are Eleocharis dulcis, Scirpus littoralis var. subulatus, Cyperus esculentus etc., etc.

There are quite a few species, which are found growing at extremely muddy places or in the vicinity of water. The prominent among them are Scirpus articulatus, S. maritimus (sometimes it is found growing in comparatively dry habitats), S. supinus, Cyperus difformis, etc.

Cyperus rotundus, C. compressus, C. bulbosus, C. triceps, Fimbristylis ovata, F. schoenoides, F. argentea F. falcata are usually found in open lands or pastures.

A few species of Cyperaceae prefer sandy soils or dry localities to any other type of habitat. They are Cyperus pumilus, C. michelianus subsp. pygmaeus, C. niveus, C. conglomeratus and Bulbostylis barbata.

There are a few species, which show much variability depending on the availability of water. For example, Cyperus laevigatus which grows stout and erect in water-logged soils, shows poor growth in dry, sandy soils. Cyperus rotundus, C. difformis, C. iria, and Scirpus maritimus also show considerable variation. It is quite probable that the subspecies or varieties of some of these are nothing but mere ecotypes.