

CYPERACEAE OF GUJARAT

S. D. SABNIS

Department of Botany, M. S. University of Baroda, Baroda

A B S T R A C T

The family Cyperaceae, because of the difficulty experienced in identifying the members, have been utterly neglected. The aim of the present work is to provide a more up-to-date flora of the family by compiling the available data and the data gathered by the author during the course of various excursions to places in north, central and south Gujarat. The number of species reported from Gujarat region by previous workers comes to 50. To this have been added 14 sedges which are new to Gujarat. Notes on the habit, habitat of these plants along with a distribution chart of all the sedges have been included in the present paper.

"The flora of the Bombay Presidency 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 in his revision of the Cyperaceae of the Bombay Presidency (1918), 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 the 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 the paper entitled "Plants of Northern Gujarat (1918)". The rest of the areas in Gujarat have not been touched by him. Blatter (1935) in his unfinished revision of the flora of Bombay Presidency worked out a few families, Cyperaceae being one of them. Therein he presented an apparently complete picture of the distribution of the sedges throughout the presidency.

Only after a few preliminary attempts at studying the taxonomy 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 needed a revision and with that purpose in mind, the present work was undertaken.

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The vegetation of Gujarat in different areas is very diverse, the diversity being dependant upon variations in rainfall, altitude, soil etc. The south 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, Rapipla, Chhota Udepur, Devgadhi Baria and Ratanmahal are in-

*Distribution of species in the different genera of Cyperaceae**

Serial No.	Genus	No. of sp. reported by Blatter	No. of sp. reported in the present paper
1	Kyllinga	1	3
2	Pycnus	3	5
3	Juncellus	3	3
4	Cyperus	16	17**
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	Scleria	1	2
Total		50	64

cluded in this area. The remaining parts of Central Gujarat have a rich fertile alluvial soils, while North Gujarat can 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 the river banks were usually visited during the dry months. Most of

* Genera *Kyllinga*, *Pycnus*, *Juncellus*, *Mariscus* and *Cyperus* have been brought under one genus *Cyperus*, following Kuenthal.

** Blatter combines *C. isegretii* with *C. corymbosus*. They have been separated in the present paper.

work done from 1957-60 with a few excursions in 1961 and beginning of 1962. Observations on the plants have been recorded in field note books and herbarium specimens have been deposited in the herbarium of the Botany Department, M. S. University of Baroda.

FOLLOWING PLACES WERE VISITED

NORTH GUJARAT—(North of Ahmedabad upto Khedbrahma)

In addition to the places visited by Sedgwick, places like Khedbrahma, Idar (hitherto untouched by any botanist), Himmatnagar, Balaram, Palanpur, Pilvai, Mahudi Vijapur were visited.

CENTRAL GUJARAT—(North of river Narmada upto Ahmedabad)

The forests of Devgad Baria, Ratanmahal, Pava-gadh and Chhota Udepur have been thoroughly explored.

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

SOUTH GUJARAT—(South of river Narmada)

Bharuch, Shuklatirth, Mangaleshwar, Rajpipla forests, Surat, Dumas, Kosamba, Kim, Simodara,

Gijram, Kara, Valia, Vankal, Bulsar, Vansda, Dharampur-Unai, Waghai, Bhavandagad, Ahwa (Dangs).

The present state of Gujarat includes Cutch and Saurashtra (Kathiawar) 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 follow-ing 14 plants for the first time from Gujarat. The number of new plants is fairly large to indicate how poorly the sedge flora of Gujarat has been represented so far.

1. *Cyperus brevifolius* (Rottb.) Hassk.
2. *C. metzii* (Hochst.) Nattf. et Kuenth.
3. *C. sanguinolentus* Vahl
4. *C. hyalinus* Vahl
5. *C. leucocephalus* Retz.
6. *C. paniceus* (Rottb.) Boeck.
7. *C. dilutus* Vahl
8. *Courtoisia cyperoides* Nees
9. *Eleocharis fistulosa* Link.
10. *Fimbristylis tetragona* R. Br.
11. *F. polytrichoides* Vahl
12. *F. digitata* Boeck.
13. *F. woodrowii* C. B. Clarke
14. *Scleria tessellata* Willd.

Key to genera of Cyperaceae (adapted from Cooke and Sedgwick)

1. Flowers 2-sexual, solitary in the glumes of a simple spikelet
 2. Flowering glumes all distichously arranged
 3. Keels of the fertile glumes not winged *Cyperus**
 - (exceptions in some species of the sub-genus *Kyllinga*)
 3. Keels of the fertile glumes with a continuous glistening wing *Courtoisia*
 2. Flowering glumes all spirally imbricate or the lower only distichous
 4. Hypogynous bristles or scales 0.
(see also *scirpus*)
 5. Style base swollen, disarticulating from the nut *Fimbristylis*
 5. Style base persistent, leaving a tumor on the nut *Bulbostylis*
 4. Hypogynous bristles or scales present
 6. Nut with hypogynous bristles
 7. Spikelet solitary, terminating the stem *Eleocharis*
 7. Spikelets many, terminal or lateral *Scirpus*
 6. Nut with hypogynous scales, or scales and bristles
 8. Hypogynous scales 6, divided to base into innumerable hair-like segments ... *Eriophorum*
 8. Hypogynous processes 6, in 2 series, the outer (sepals) bristly, the inner (petals) typically scales *Puirena*
1. Flowers 1-sexual, nut white, bony, exerted *Scleria*

* I have followed Kuenthal (Das pflanzenreich) including under the genus *Cyperus*, the genera *Pycnus*, *Juncellus*, *Mariscus*, and *Kyllinga*. C. B. Clarke in Flora of British India gives a generic status to all of them, while Cooke in Flora of the Presidency of Bombay retains *Kyllinga* as a distinct genus and merges generic *Pycnus*, *Juncellus* and *Mariscus* with genus *Cyperus*.

Key to the various species of the genera of Cyperaceae has been avoided. Instead an artificial key to the identification of all the cyperaceous plants has been presented in a separate paper.

DESCRIPTION OF THE PLANTS

1. *Cyperus brevifolius* (Rottb.) Hassk.

Syn. *Kyllinga brevifolia* Rottb.

A plant with a creeping rhizome and distant stems. It is found growing in soft sticky soils; along the

banks of streams and often enters stagnant waters of fields. It was collected from a few localities from the plains in Central Gujarat; rare. (Sabnis 50, 68)

2. *C. metzii* (Hochst.) Mattf. et Kuenth.

Syn. *Kyllinga squamulata* Vahl

An erect annual found on open grasslands near the banks of river Banas at Balaram; also along road-side. (Sabnis 241a)

3. *C. sanguinolentus* Vahl

Syn. *Pycnus sanguinolentus* Nees

An erect, marsh-loving plant with reddish spike-

lets on the rays of a simple umbel; in a marsh near the banks of River Banas. (Sabnis 242, 243).

4. *Cyperus hyalinus* Vahl

Syn. *Pycneus hyalinus* Dom.

Pycneus pumilus Nees

A small tufted annual; spikelets straw-coloured, few flowered; it was collected from a few localities in North, Central and South Gujarat.

Blatter remarks that the plant is restricted to Sion, Bombay and is mistaken for *P. pumilus* Dom. by Sedgwick, in his 'Plants of Northern Gujarat'. (Sabnis 248-253, 335, 394 395, 396).

5. *C. leucocephalus* Retz.

A slender, erect annual; spikelets in white, globose terminal heads. The plants resemble *Kyllinga* in habit; found in open spaces and also under the canopy of trees in the various forest areas of Gujarat. (Sabnis 92-98, 107, 162).

6. *C. panicus* (Rottb.) Boeck.

Syn. *Mariscus panicus* Vahl

The plant is a slender, stolon-bearing sedge. It is found under the shade of forest trees or rocks in the different forest areas of Gujarat. (Sabnis 112, 163, 164, 178, 179, 186, 187, 310, 311, 415).

7. *C. dilutus* Vahl

Syn. *Mariscus compactus* Druce.

A stout, erect sedge; spikelets red in globose heads on the rays of a compound umbel. It was collected from the banks of river Ambika at Bhavandagad in Dangs Forests of South Gujarat; very rare. (Sabnis 412).

8. *Courtoisia cyperoides* Nees

An erect, herbaceous annual; spikelets, usually in compound umbels, yellowish brown in globose heads; glumes with a continuous glistening wing at the back.

The plant was collected from the gravelly banks of river Ambika at Waghai in Dangs and also from dried ditches at an altitude of 615 meters above MSL at Ratanmahals. (Sabnis 400, 401, 477).

9. *Eleocharis fistulosa* Link.

It is a stout, stoloniferous sedge with a solitary terminal spikelet as in other species of genus *Eleocharis*. The stem is triquetrous and of a pale green colour. It was found growing as an amphibious hydrophyte along with *Eleocharis plantaginea* and *Cyperus esculentus*. (Sabnis 79).

10. *Fimbristylis tetragona* R. Br.

A small slender annual with a solitary terminal spikelet; nut narrowly elongate, cylinder and curved; found on the wet sandy banks at Dummas; not common. (Sabnis 271).

11. *F. polytrichoides* Vahl

Resembles very much the above one; plant with a solitary terminal spikelet; nut obovate with obcordate apex, minutely tuberculate. It has been met with on the wet sandy banks at Dabka, Dummas and Bulsar. (Sabnis 157, 270, 305).

12. *F. digitata* Boeck.

A slender, short-lived sedge; spikelets whitish in

a capitate head. The plant resembles very much *Bulbostylis barbata* Kunth. It was collected from wet, sandy banks of river Mahi at Umeta, west of Baroda. (Sabnis 347, 348).

13. *F. woodrowii* C. B. Clarke

A very slender annual; spikelets usually in compound umbels; nut faintly ribbed and trabeculate. It was found growing along with *F. dichotoma*, from which it was difficult to distinguish; only on the banks of river Dhadhar at Shahapura, near Baroda. (Sabnis 375).

14. *Scleria tessellata* Willd.

A grass like sedge; spikelets in panicles; nut white, sculptured; leaves with scabrid margins. The plant was found along with grasses at Nimetta, where possibly it has localised growth; not common. (Sabnis 59, 60, 60 a).

The distribution of the Cyperaceae in Gujarat

Serial No.	Name of the plant	1 North Gujarat	2 Central Gujarat	3 South Gujarat
1	<i>Cyperus triceps</i> (Rottb.) Endl.	X P	*P & H	X P & H
2	<i>C. brevifolius</i> (Rottb.) Hassk.	—	X P	—
3	<i>C. metzii</i> (Hochst.) Matlf. et Kuenth.	X P	—	—
4	<i>C. globosus</i> All.	X P	—	—
5	<i>C. hyalinus</i> Vahl	X P	X H	X H
6	<i>C. polystachyos</i> Rottb.	—	—	X P
7	<i>C. sanguinolentus</i> Vahl	X P	—	—
8	<i>C. pumilus</i> L.	X P	X P & H	—
9	<i>C. michelianus</i> sub. sp. <i>pygmaeus</i> (Rottb.) Aschers et Graebner	X P	*P	*P
10	<i>C. laevigatus</i> L.	*P	*P	—
11	<i>C. alopecuroides</i> Rottb.	X P	*P	X P
12	<i>C. difformis</i> Linn.	*P	*P & H	*P & H
13	<i>C. flavidus</i> Retz.	X P	X P	—
14	<i>C. niveus</i> Retz.	X P	X P	—
15	<i>C. leucocephalus</i> Retz.	—	*H	—
16	<i>C. arenarius</i> Retz.	*P	X P	X P
17	<i>C. conglomeratus</i> Rottb.	X P	—	—
18	<i>C. compressus</i> Linn.	*P	*P & H	X P
19	<i>C. aristatus</i>	X P	X P & H	X P
20	<i>C. iria</i> Linn.	*P	*P & H	*P
21	<i>C. iria</i> Linn. var. <i>paniciformis</i> C. B. Clarke	X P	X P	—
22	<i>C. eleusinoides</i> Kunth	X P	X P	—
23	<i>C. bulbosus</i> Vahl	*P	X P	—
24	<i>C. articulatus</i> Linn.	X P	—	—
25	<i>C. corymbosus</i> Rottb.	X P	X P & H	X P
26	<i>C. tegetum</i> Roxb.	—	X P	X P
27	<i>C. macer</i> C. B. Clarke	X P	—	—
28	<i>C. rotundus</i> Linn.	*P	*P	*P
29	<i>C. rotundus</i> L. sub. sp. <i>tuberosus</i> (Rottb.) Kuenthal.	—	X P & H	—
30	<i>C. esculentus</i> L.	X P	X P & H	X P & H
31	<i>C. exaltatus</i> Retz.	X P	X P	X P
32	<i>C. panicus</i> (Rottb.) Boeck.	—	*H	X H
33	<i>C. dilutus</i> Vahl	—	—	X H
34	<i>Courtoisia cyperoides</i> Nees	—	X H	X H
35	<i>Eleocharis capitata</i> R. Br.	—	X P	—
36	<i>E. atropurpurea</i> Kunth	X P	X P & H	X P
37	<i>E. fistulosa</i> Link	—	X P	—
38	<i>E. plantaginea</i> R. Br.	X P	X P	X P

Serial No.	Name of the plant	1 North Gujarat	2 Central Gujarat	3 South Gujarat
39	<i>Fimbristylis monostachya</i> Hassk.	X P	X P & H	X P
40	<i>F. tetragona</i> R. Br.	—	—	X P
41	<i>F. polytrichoides</i> Vahl	—	X P	X P
42	<i>F. schoenoides</i> Vahl	X P	X P	—
43	<i>F. argentea</i> Vahl	X P	X P	—
44	<i>F. dichotoma</i> Vahl	*P	*P & H	*P & H
45	<i>F. spathacea</i> Rottb.	*P	X P	—
46	<i>F. diphylla</i> Vahl var. annua R et C.	X P	X P	X P
47	<i>F. ferruginea</i> Vahl	*P	X P	X P
48	<i>F. digitata</i> Boeck.	—	X P	—
49	<i>F. woodrowii</i> C. B. Clarke	—	X P	—
50	<i>F. tenera</i> R. et S.	X P	X P	*P
51	<i>F. junciformis</i> Kunth	X P	X P	—
52	<i>F. miliacea</i> Vahl	X P	*P	X P
53	<i>F. quinquangularis</i> Vahl	*P	*P	X P
54	<i>F. complanata</i> Link.	X P	—	—
55	<i>Bulbostylis barbata</i> Kunth	*P	*P & H	X P & H
56	<i>Scirpus articulatus</i> Linn.	X P	X P & H	—
57	<i>S. supinus</i> Linn.	—	X P	X P
58	<i>S. quinquefarius</i> Ham.	X P	X P	X P
59	<i>S. corymbosus</i> Heyne ex Roth.	—	—	X P
60	<i>S. maritimus</i> Linn.	X P	*P & H	X P
61	<i>S. maritimus</i> L. var. affinis C. B. Cl.	X P	X P	X P
62	<i>S. littoralis</i> Schrad.	*P	*P	X P
63	<i>S. mucronatus</i> Linn.	X P	—	—
64	<i>S. squarrosus</i> Linn.	—	X P	—
65	<i>Eriophorum comosum</i> Wall.	—	X P	—
66	<i>Fuirena ciliaris</i> (Linn.)	X P	X H	—
67	<i>Scleria stocksiana</i> Boeck.	X P	—	—
68	<i>S. tessellata</i> Willd.	—	X P	—

— = absent, X = present, * = abundant, P = plains, H = hilly forest area.

DISTRIBUTION

The family Cyperaceae is represented in Gujarat by 9 genera and 68 species including the varieties and sub-species. The genus *Cyperus* is the most dominant with 33 species. Next comes the genus *Fimbristylis* with 16 sps. Other genera are *Scirpus*, *Eleocharis*, *Scleria* with 9, 4 & 2 species respectively and *Eriophorum*, *Courtoisia*, *Bulbostylis* and *Fuirena* with only one species each.

The genus *Cyperus* is widely distributed both on the plains as well as in the hilly forest areas. Some of the species such as *Cyperus leucocephalus*, *C. panicus* and *C. dilutus* are the denizens of 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* 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 confined to the plains, although *E. atropurpurea* was recently collected from the Ratanmahal hills in Central Gujarat. *Courtoisia cyperoides*, the only species of the genus is a forest species, collected from the banks of river Ambika in the Dangs forest and also from a dried ditch on the open plateau of the Ratanmahal hills. *Eriophorum comosum*, though not collected by the

author even after intensive search, has been included on the authority of Woodrow, who 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 of Nimetta, 7 miles east of Baroda.

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 the deserts and some forests.

A majority of the sedges grow as amphibious hydrophytes. The most outstanding examples are *Eleocharis plantaginea* R. Br., *Scirpus littoralis* Schrad, *Cyperus brevifolius* (Rottb.) Hassk., *Cyperus esculentus*, *Cyperus corymbosus* Rottb. etc.

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

Cyperus rotundas, *C. compressus*, *C. bulbosus*, *C. triceps* (Rottb.) Endl., *Fimbristylis monostachya* Hassk., *F. Schoenoides* Vahl, *F. argentea*, *F. junciformis* Vahl 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* Linn., *C. michelianus* sub. sp. *pygmaeus* (Rottb.) Aschers et Graebner., *C. niveus*, *C. arenarius*, *C. conglomeratus* and *Bulbostylis barbata*.

There are a few species, which show much variability depending upon the nature of the soil and availability of water. For example, *Cyperus laevigatus* L. which grows stout and erect in water-logged soils, shows poor growth in dry, sandy soils. *Cyperus rotundus* L., *C. difformis* L., *C. iria* L., *Scirpus maritimus* Linn also show considerable variation. It is quite probable that sub-species or varieties of some of these are nothing but mere ecotypes. Experimental work on this aspect is in progress and the results will be made available very soon.

ACKNOWLEDGEMENTS

The author is indeed grateful to Prof. M. B. Raizada, F.R.I., Dehra Dun for confirmation of some of the plants. His thanks are due to Prof. A. R. Chavan, Head, Department of Botany, M. S. University of Baroda for guidance at all stages. He is

deeply indebted to Dr. H. Santapan, Director, Botanical Survey of India and Dr. K. Subramanyam, Deputy Director, Botanical Survey of India for the stimulating hours of discussion the author was fortunate to spend with them during his participation in the Summer School in Botany at Kodaikanal held in June 1962.

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