

CYPERACEAE OF GUJARAT

S. D. SHIBBIS

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

ABSTRACT

The family Cyperaceae, because of the difficulty experienced in identifying its members, has been utterly neglected. The aim of this 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 30. To this have been added 14 species which are new to Gujarat. Notes on the habit, habitat of these plants along with a distribution chart of all the species 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 (1938)". The rest of the areas in Gujarat have not been touched by him. Blatter (1921) in his unfinished revision of the flora of Bombay Presidency worked out a few families, Cyperaceae being one of them. Thorein has 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.

The family Cyperaceae, because of the difficulty experienced in identifying its members, has 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 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.

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, Sapliya, Chhota Udepur, Devgadhi Baria and Rajmahal 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	Pycnos	1	5
3	Juncus	1	3
4	Cyperus	16	17**
5	Mariscus	—	2
6	Carex	—	1
7	Eleocharis	3	4
8	Fimbristylis	12	16
9	Bulbostylis	1	1
10	Scirpus	0	8
11	Littoraleum	1	1
12	Fairma	1	1
13	Scleria	1	2
Total		39	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

* Genus *Kyllinga*, *Pycnos*, *Juncus*, *Mariscus* and *Cyperus* have been brought under one genus *Cyperus*, following Kriemhild.

** Blatter combines *C. nigres* with *C. nebulosus*. 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 Kherdabrahma)

In addition to the places visited by Sedgwick, places like Kherdabrahma, Idar (hitherto unvisited by any botanist), Himmatnagar, Balaran, Polanpur, Pivai, Mahudi, Vippar were visited.

CENTRAL GUJARAT—(North of river Narmada upto Ahmedabad)

The forests of Devgad Baria, Ratanmahal, Paragadh and Chhota Udupar have been thoroughly explored.

The places which are on the plains include Baroda, Kelanpur, Kanohala, Padra, Dabha, Vaman, Singharor, Umata, Sandarpura Shahapara, Savli, Bhadarva, Manjanar, Meval.

SOUTH GUJARAT (South of river Narmada)

Bharuch, Shuklarcha, Mangaleshwar, Rajpipla forests, Surat, Damma, Kosamba, Kim, Sradara.

Gijam, Kara, Valis, Vankal, Bulsar, Vansda, Dharanapur, Unai, Waghal, Bhorvadagad, Ahwa (Daaga).

The present state of Gujarat includes Catch 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 following 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* (Roth.) Hassk.
2. *C. metzii* (Hochst.) Nutt. et Kuhnth.
3. *C. sanguinolentus* Vahl
4. *C. hyalinus* Vahl
5. *C. leucocephalus* Retz.
6. *C. panicus* (Roth.) Boeck.
7. *C. difusus* Vahl
8. *Coarctata cyperoides* Nees
9. *Eleocharis fistulosa* Link.
10. *Fimbristylis tetragyna* R. Br.
11. *F. polytrichoides* Vahl
12. *F. digitata* Boeck.
13. *F. woodsonii* C. B. Clarke
14. *Scleria tessellata* Willd.

KEY TO GENERA OF CYPERACEAE (adapted from Cooke and Sedgwick)

1. Flowers 2-merous, solitary in the glumes of a simple spikelet
2. Flowering panicle all dichotomously branched
3. Keels of the fringed panicle not winged *Cyperus**
3. Keels of the fringed panicle with 2-merous glumes winged *Coarctata*
2. Flowering panicle all spirally imbricate or the lower only dichotomous
4. Hypogynous bristles or scales 0
(rare also 1-2)
5. Style base swollen, discoid, protruding from the nut *Fimbristylis*
5. Style base persistent, leaving a tumor on the nut *Bambusa*
4. Hypogynous bristles or scales present
6. Nut with hypogynous bristles
7. Spikes solitary, terminating the stem *Eleocharis*
7. Spikes many, terminal or lateral *Scleria*
5. Nut with hypogynous scales, or scales and bristles
8. Hypogynous scales 0, divided to base into innumerable hair-like segments *Eriophorum*
8. Hypogynous processes 6, in 2 rows, the outer (perianth) beakly, the inner (petals) typically coiled *Festuca*
1. Flowers 1-merous, nut white, lustrous, covered *Scleria*

* I have followed Kuhnth (Die Pflanzenwelt) including under the genus *Cyperus*, the genera *Panicum*, *Juncus*, *Meyen*, 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 *Panicum*, *Juncus* and *Meyen* 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* (Roth.) Hassk.
Syn. *Kyllinga brevifolia* Roth.
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. (Salinis 30, 68)

2. *C. metzii* (Hochst.) Nutt. et Kuhnth.
Syn. *Kyllinga squamulata* Vahl
An erect annual found on open grasslands near the banks of river Banas at Balaran; also along roadside. (Salinis 241a)

3. *C. sanguinolentus* Vahl
Syn. *Pycnos sanguinolentus* Nees
An erect, marsh-loving plant with reddish spike

lets on the rays of a simple umbel; in a month near the banks of River Hansi. (Salmis 242, 243).

4. *Cyperus hypolepis* Vahl
Syn. *Pycnos pumilus* Don.

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* Don. by Seelgrub, in his 'Plants of Northern Gujarat'. (Salmis 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. (Salmis 52-98, 107, 163).

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

Syn. *Mariaca pennatus* 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. (Salmis 112, 163, 174, 178, 279, 286, 187, 316, 317, 415).

7. *C. dilatatus* Vahl

Syn. *Mariaca compertus* Drice.

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 Bhavanadag in Dang Forests of South Gujarat; very rare. (Salmis 415).

8. *Coarctata cyperoides* Nees

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

The plant was collected from the gravelly banks of river Ambika at Waghal in Dang and also from dried ditches at an altitude of 615 meters above MSL. at Ratemahals. (Salmis 400, 401, 477).

9. *Eleocharis fistulosa* Link.

It is a stout, monoliferous 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 plantaginina* and *Cyperus esculentus*. (Salmis 77).

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 Dumas; not common. (Salmis 271).

11. *F. polystrichoides* Vahl

Resembles very much the above one; plant with a solitary terminal spikelet; nut obovate with obscure apex, minutely tuberculate. It has been met with on the wet sandy banks at Dabka, Dumas and Bulsar. (Salmis 157, 276, 395).

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 Unstia, west of Baroda. (Salmis 247, 348).

13. *F. monostriata* C. B. Clarke

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

14. *Scleria woodii* 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. (Salmis 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 bracteatus</i> (Rottb.) Lindl.	X P	*P & H	X P & H
2	<i>C. leucocephalus</i> (Rottb.) Hassk.	—	X P	—
3	<i>C. setosus</i> (Retz.) MacL. ex Kunth	X P	—	—
4	<i>C. glaber</i> All.	X P	—	—
5	<i>C. hypolepis</i> Vahl	X P	X H	X H
6	<i>C. dichotomus</i> Rottb.	—	—	X P
7	<i>C. tenuisquamis</i> Vahl	X P	—	—
8	<i>C. dilatatus</i> V.	X P	X P & H	—
9	<i>C. leucocephalus</i> var. <i>sp. oppositus</i> (Rottb.) Anthonis & Graebner	X P	*P	*P
10	<i>C. bacillatus</i> L.	*P	*P	—
11	<i>C. microcarpus</i> Rottb.	X P	*P	X P
12	<i>C. difformis</i> Link.	*P	*P & H	*P & H
13	<i>C. flexuosus</i> Retz.	X P	X P	—
14	<i>C. tenuis</i> Retz.	X P	X P	—
15	<i>C. leucocephalus</i> Retz.	—	H	—
16	<i>C. setosus</i> Retz.	X P	X P	X P
17	<i>C. longicaulis</i> Rottb.	*P	*P & H	X P
18	<i>C. tenuisquamis</i> Link.	X P	X P & H	X P
19	<i>C. aridus</i> L.	X P	*P & H	*P
20	<i>C. setosus</i> Link.	*P	*P & H	*P
21	<i>C. setosus</i> Link. var. <i>paniculatus</i> C. B. Clarke	X P	X P	—
22	<i>C. flexuosus</i> Kunth	X P	X P	—
23	<i>C. setosus</i> Vahl	*P	X P	—
24	<i>C. strimata</i> Link.	X P	—	—
25	<i>C. strimata</i> Rottb.	X P	X P & H	X P
26	<i>C. hypolepis</i> Retz.	—	X P	X P
27	<i>C. minor</i> C. B. Clarke	X P	—	—
28	<i>C. strimata</i> Link.	*P	*P	*P
29	<i>C. strimata</i> L. var. <i>sp. puberula</i> (Rottb.) Kolakofsky	—	X P & H	—
30	<i>C. strimata</i> L.	X P	X P & H	X P & H
31	<i>C. setosus</i> Retz.	X P	X P	X P
32	<i>C. pennatus</i> (Rottb.) Boeck.	—	*H	X H
33	<i>C. setosus</i> Vahl	—	—	X H
34	<i>Gurania operculata</i> Nees	—	X H	X H
35	<i>Echinochloa capitata</i> B.	—	X P	—
36	<i>E. amabilis</i> Kunth	X P	X P & H	X P
37	<i>E. fistulosa</i> Link.	—	X P	—
38	<i>E. plantaginina</i> R. Br.	X P	X P	X P

Serial No.	Name of the plant	1 North Gujarat	2 Central Gujarat	3 South Gujarat
35	<i>Fimbristylis monostachya</i> Hook.	X P	X P & H	X P
40	<i>F. argentea</i> R. Br.	—	X P	X P
41	<i>F. polystachya</i> Vahl	X P	X P	—
42	<i>F. schomburgkii</i> Vahl	X P	X P	—
44	<i>F. aegyptiaca</i> Vahl	* P	* P & H	* P & H
45	<i>F. minutus</i> Roth.	* P	X P	—
46	<i>F. stylis</i> Vahl var. <i>ovata</i> R. et C.	X P	X P	X P
47	<i>F. ferruginea</i> Vahl	* P	X P	X P
48	<i>F. ligata</i> Benth.	—	X P	—
49	<i>F. umbrosa</i> C. B. Clarke	—	X P	* P
50	<i>F. aurea</i> R. et S.	X P	X P	—
51	<i>F. zosterifera</i> Kunth	X P	X P	X P
52	<i>F. nitens</i> Vahl	X P	* P	X P
53	<i>F. peruviana</i> Vahl	* P	—	—
54	<i>F. complanata</i> Link.	X P	—	—
55	<i>Butlostylis barbatum</i> Kunth	* P	* P & H	X P & H
56	<i>Scirpus articulatus</i> Linn.	X P	X P & H	X P
57	<i>S. setosus</i> Linn.	—	X P	X P
58	<i>S. paniculatus</i> Ham.	X P	X P	X P
59	<i>S. cernuus</i> Heyne ex Benth.	—	X P	X P
60	<i>S. varians</i> Linn.	—	* P & H	X P
61	<i>S. maritimus</i> L. var. <i>affinis</i> C. B. Cl.	X P	X P	X P
62	<i>S. linearis</i> Schrad.	* P	* P	X P
63	<i>S. macrocarus</i> Linn.	X P	X P	—
64	<i>S. sparganii</i> Linn.	—	X P	—
65	<i>Eriophorum comosum</i> Wall.	—	X P	—
66	<i>Fuirena citaris</i> (Linn.) Vahl	X P	X P	—
67	<i>Scleria strobilacea</i> Benth.	X P	—	—
68	<i>S. trinitatis</i> Willd.	—	X P	—

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

DISTRIBUTION

The family Cyperaceae is represented in Gujarat by 9 genera and 66 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 6, 4 & 2 species respectively and *Eriophorum*, *Courtinia*, *Butlostylis* 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 leucoccephalus*, *C. paniculatus* and *C. diuturnus* 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 Ratannahal hills in Central Gujarat. *Courtinia 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 Ratannahal hills. *Eriophorum comosum*, though not collected by the

author even after intensive search, has been included on the authority of Woodrow, who cites Champapur or possibly Fert Pavagadh as the sole locality for the plant. *Butlostylis barbata* is abundantly found on loose, gravelly soils of the plains and also of the high hills. *Fuirena citaris* 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. stocktonia* is restricted to the red upland plateau at Talod in North Gujarat while *S. trinitatis* 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 bresifolius* (Roth) Hassk., *Cyperus eximius*, *Cyperus corymbosus* Roth, 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 rotundus, *C. compressus*, *C. bulbosus*, *C. triceps* (Roth) Endl., *Fimbristylis monostachya* Hassk., *F. Schoenander* Vahl, *F. argentea*, *F. junceiformis* 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 pomilus* Linn., *C. michelianus* sub. sp. *pygmaeus* (Roth) Aschers & Grabner., *C. nuceus*, *C. arenarius*, *C. conglomeratus* and *Butlostylis barbata*.

There are a few species, which show much variability depending upon the nature of the soil and availability of water. For example, *Cyperus lasiocarpus* L. which grows stout and erect in water-logged soils, shows prostrate growth in dry, sandy soils. *Cyperus rotundus* L., *C. difformis* L., *C. vicia* 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.

ACKNOWLEDGMENTS

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.

LITERATURE CITED

- BLAYDEN E. AND C. McCLECK. *Journ. Bot. Nat. Hist. Ind.* 37(1) : 16-33, 37(2) : 254-277, 37(3) : 532-548, 1931.
- *Journ. Bot. Nat. Hist. Ind.* 37(4) : 764-779, 38(1) : 6-16, 1962.
- CHAVAN, A. T. AND S. D. SARDAR. *Journ. M. S. Univ. Bot.* 7(5) : 57-66, 1958.
- *Journ. M. S. Univ. Bot.* 8(2) : 11-26, 1959.
- COOPER, T. *Flora of the Presidency of Bombay* 2(5) : 551-956, 1900.
- HOOGER, J. D. *Flora of British India* 6 : 451-606, 1894.
- KRISHNAN, G. *Phytomorphia* 10, 20, 166, 161, 1936.
- SANTON, W. T. AND L. J. SEDGWICK. *Re. Bot. Ind. Ind.* Vol. 6, No. 7, 1918.
- SEDGWICK, L. J. *Journ. Bot. Nat. Hist. Ind.* 25(4) : 682-760, 26(1) : 192-209, 1913.