

Taxonomic Status of Cyperaceae of Southern Assam

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Abstract

The study on Cyperaceae family was carried out during 2009 - 2011, in three southern districts of Assam, namely, Cachar, Karimganj and Hailakandi and has revealed the presence of 75 species of sedges belonging to 11 genera.

Key words: Cyperaceae, Taxonomy, Southern Assam

INTRODUCTION

Cyperaceae is one of the most widely distributed plant groups. It was formally described by De Jussieu in 1789; the name is derived from the genus name *Cyperus*, originally from the Greek kupeiros, meaning sedge. The Cyperaceae are grass like herbaceous plants found especially in wet regions throughout the world. Cyperaceae members are always herbs except the African genus *Microdracoides* which is tree – like. Sedges are characterized by the grass –like or rush –like habit with or without rhizomes or stolons, the minute, inconspicuous flowers enclosed by the distichously or spirally arranged glumes on a spikelet and the indehiscent fruits known as nuts or achenes.

Sedges are usually annual or perennial herbs. Annuals are with fibrous roots and perennials with short or long creeping rhizomes. The rhizomes are usually small, woody, but sometimes are long creeping or emitting stolons which often bear tubers as *Bolboschoenus maritimes* (Linnaeus) Palla and *Cyperus rotundus* Linnaeus. The rhizomes and stolons are clothed with scales which usually disintegrate leaving fibrous remains.

Morphology

The stems, especially near the base, are often triangular in cross-section and are solid (not hollow). The leaves are alternate, commonly in 3 ranks, usually with a closed sheathing base and a parallel-veined, strap-shaped blade.

Leaves are sessile, shorter to much longer than the stem, flat, conduplicate or involute. Leaf sheaths vary from few millimeters to several centimeters, membranous or herbaceous, usually closed; loosely or tightly enclosing the stem.

Inflorescence in this family is constituted by the arrangement of spikelets because of the flowers in sedges are very minute and inconspicuous. Spikelets in the Cyperaceae vary in the size, shape and color and are found either solitary or in the inflorescence. Each spikelet

is generally subtended by a prophyll and below that a bract. It consists of a rachilla bearing glumes and flowers. Inflorescence is normally anthelate or capitates. Number of the bracts varies from one to several.

An accessory whorl is absent in most of the genera like *Cyperus*, *Fimbristylis*, *Scleria*, *Carex* etc. but it is found in the form of hypogynous bristles in genera like *Eleocharis*. The bristles are divided to a base into many hair- like segments. Perianth is modified to scales in *Lipocarpa* sp.

Fruits in Cyperaceae are one seeded, indehiscent and usually known as nuts or achenes. Surface of the nut varies according to the species.

HABITAT

In general, members of Cyperaceae are found in varied habitats. There are certain genera confined to particular habitats. For example, species of *Carex* are generally found in hilly forest areas. *Cyperus* one of the most dominant genera in Southern Assam is found in different habitats but mostly in lowland, wet or marshy areas. Many species, especially of *Cyperus*, *Fimbristylis*, *Mariscus*, *Eleocharis* etc. are the dominant weeds crop fields.

EASTIMATED NUMBER OF SEDGES IN THE WORLD

There is a substantial disagreement about taxonomic limits and circumscriptions of many genera. Consequently, estimates of numbers of taxa (genera/ species) vary considerably as presented in Table 1.

Table 1. Estimated number of sedges as suggested by different workers

Sources	Author(s)	Number of	
		Genera	Species
<i>The Flora of British India</i> , Volume 6.	Hooker (1894)	60	3000
<i>An integrated system of classification of flowering plants</i>	Cronquist (1981)	70	4000
<i>The plant-book: a portable dictionary of the vascular plants</i>	Mabberley (1997)	98	4350
<i>Cyperaceae. The families and genera of vascular plants. Volume 4</i>	Goetghebeur (1998)	104	5000
<i>Cyperaceae Jussieu: sedge family</i>	Ball <i>et al.</i> (2002)	100	5000
<i>World checklist of Cyperaceae Sedges</i>	Govaerts <i>et al.</i> (2007)	109	5500

THE STUDY AREA

Assam, a premier state of North Eastern Region covers a total geographical area of 78,520 sq km spreading over 23 districts with a population of 22.2 millions. The State contributes 2.4 % of the total geographical area of the country. Located between 24°82' to 28°82' North latitude and 84°42' to 95°15' East longitude, the state comprises of swamps, flood prone low land, low to medium agriculture lands, flat and undulated uplands and highlands consisting of hillocks and hills of gentle as well as steep slopes.

Southern Assam, which is popularly known as Barak valley, covering an area of 7000 sq km is an undulating plain region with small hillock and swamps in between. It is a triangular area surrounded by high hills on all sides except west and gets water through the river Barak and its tributaries. Barak Valley is bounded by Mizoram on South, North Cachar district of Assam on North, Bangladesh and Tripura on West and Manipur on East. The valley presently consists of three districts viz., Cachar, Karimganj and Hailakandi.

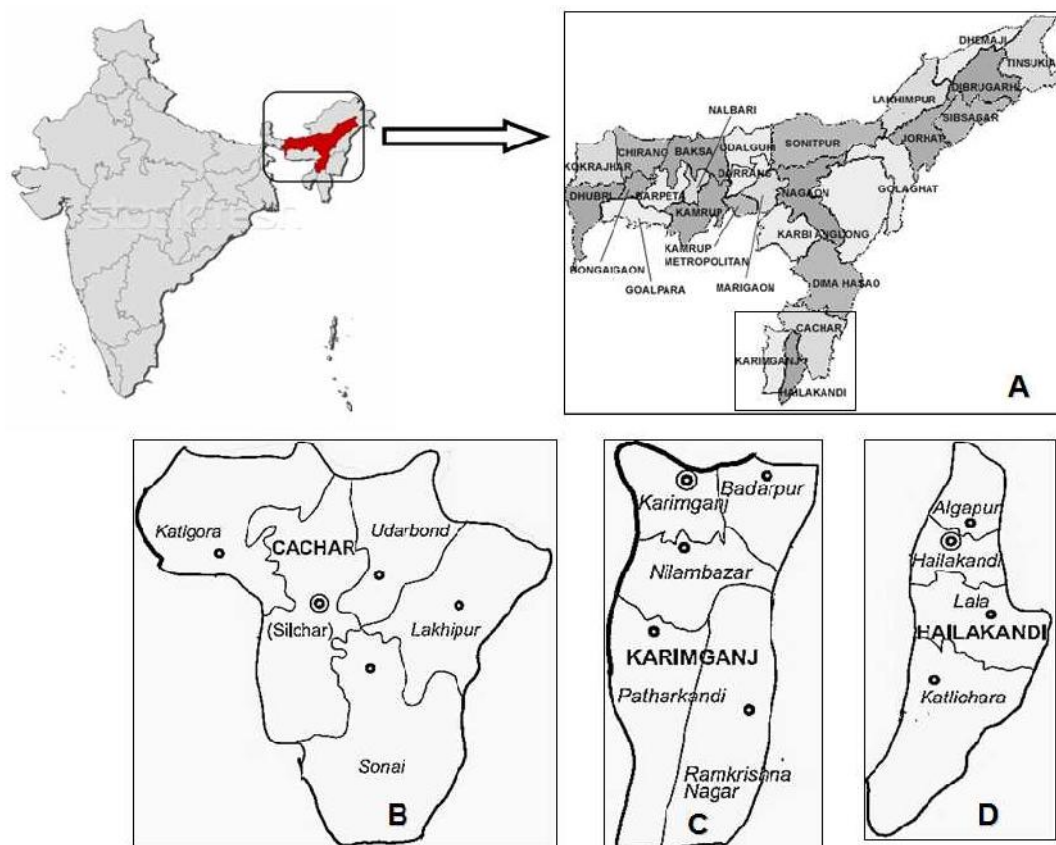


Fig. 1. Location map of the study area Source: www.mapsofindia.com/assam

MATERIALS AND METHODS

Collection of Cyperaceae from Southern Assam has been done using aesthetic sense and scientific mind. The field trips for collection of Cyperaceae from different areas of Southern Assam were made during 2009 – 2012. Critical morphological studies have been made and different floras and monographs [Hooker 1894; along with neighboring floras, Deb 1983, and Rao & Verma 1982] have been consulted to identify the collected plants. Identity of these specimens has been confirmed by matching at ASSAM herbarium. Online database like The International Plant Names Index (www.ipni.org) and The Plant Lists (www.theplantlists.org) were referred for correct nomenclature and author citations. The plants were processed into voucher specimen following standard methods of Jain & Rao (1977). After the work is over voucher specimens will be deposited in Assam University Herbarium.

RESULT AND DISCUSSION

The present study of Cyperaceae in Southern Assam revealed the presence of 75 species of sedges belonging to 11 genera and has been enumerated in Table 3. While studying *Cyperaceae of North East India* Rao & Verma (1982) reported 173 species belonging to 14 genera and “*Assam’s Flora - Present Studies of Vascular Plants*” Chowdhury *et al.* (2005) reported 131 species belonging to 15 genera. It is remarkable that from the Southern Assam region, Pal & Choudhury (2010) has newly added 8 species belonging to 3 genera and are: *Pycreus pumilus* (Linnaeus) Nees, *Pycreus sanguinolentus* Vahl, *Pycreus puncticulatus* (Vahl) Nees, *Kyllinga brevifolia* Rottboëll; *Kyllinga monocephala* Rottboëll; *Mariscus cyperinus* (Retzius) Vahl; *Mariscus dubius* (Rottboëll) Kukenth and *Mariscus sumatrensis* (Retzius) J. Raynal. The genus wise numerical representation of the sedge flora of southern Assam has been presented in Table 2.

Table 2. Numerical representation of species under different genera of Cyperaceae as recorded during the present survey

Genus	Number of Species	Percentage
<i>Cyperus</i> Linnaeus	29	38.7 %
<i>Fimbristylis</i> Vahl	22	29.33 %
<i>Carex</i> Linnaeus	6	8 %
<i>Pycreus</i> P. Beauvois	4	5.4 %
<i>Scirpus</i> Linnaeus	3	4 %
<i>Mariscus</i> Vahl	3	4 %
<i>Scleria</i> P.J. Bergius	2	2.67 %
<i>Kyllinga</i> Rottboëll	2	2.67 %
<i>Eleocharis</i> R. Brown	2	2.67 %
<i>Rhynchospora</i> Vahl	1	1.33 %
<i>Lipocarpa</i> R. Brown	1	1.33 %

Table 3. Enumeration of recorded sedges from Southern Assam

Botanical name; Local Name; voucher specimen	Flowers and Fruits	Habitat
<i>Cyperus alternifolius</i> Linnaeus; HPm3007	May – July	Swamps, wet grasslands and beside streams
<i>Cyperus articulatus</i> Linnaeus; Choufa; HPm3008	Throughout the year	Shallow standing water on wet banks of canals, ponds, lakes and irrigated areas
<i>Cyperus brevifolius</i> (Rottboell) Hasskarl; Mullimbimby couch; HPm3009	Throughout the year	Moist places along the streams and wastelands
<i>Cyperus cephalotes</i> Vahl; HPm3010	August	In large patches as floating vegetation
<i>Cyperus compactus</i> Retzius; HPm3011	September – December	Along rivers , streams and in roadside ditches

Botanical name; Local Name; voucher specimen	Flowers and Fruits	Habitat
<i>Cyperus compressus</i> Linnaeus; <i>Mutha-bon</i> ; HPm3012	August – March	Waste lands, open grasslands, muddy banks of canals, road sides, low lands and hilly areas
<i>Cyperus corymbosus</i> Rottboell; HPm3013	August - March	Muddy banks of the rivers , lakes and canals
<i>Cyperus cyperinus</i> (Retziusius) Suringar; HPm3014	May – September	Along streams and paddy fields
<i>Cyperus cyperoides</i> (Linnaeus) Kuntze; HPm3015	May – July	Wastelands, cultivated fields, stream- beds and along forest margins
<i>Cyperus difformis</i> Linnaeus; <i>Chata ghas</i> ; HPm3016	Throughout the year	River beds and streams, canals and lakes
<i>Cyperus diffusus</i> Vahl; HPm3017	May – July	Moist to marshy , open or shady places
<i>Cyperus distans</i> Linnaeus f.; HPm3018	August- March	Bank of streams and rivers , small ditches in grasslands
<i>Cyperus exaltatus</i> Retziusius; HPm3019	July- March	Marshy edges of stagnant water bodies , muddy banks of rivers and canals
<i>Cyperus flavidus</i> Retziusius; HPm3020	June – September	Wastelands and paddy fields
<i>Cyperus halpan</i> Linnaeus; HPm3021	Throughout the year	Wet sandy soil in paddy fields
<i>Cyperus iria</i> Linnaeus; <i>Uollo</i> ; HPm3022	July- March	Along roads and streams
<i>Cyperus michelianus</i> (Linnaeus) Delile; HPm3023	December – January	Sandy soil in paddy fields
<i>Cyperus multispicatus</i> J. O. Boeckeler; HPm3024	March – May	Small ditches in grasslands
<i>Cyperus nutans</i> Vahl; HPm3025	September – January	Wet rice fields and other moist places
<i>Cyperus pilosus</i> Vahl; HPm3026	May – January	Marshy places, paddy fields
<i>Cyperus platystylis</i> R. Brown; HPm3027	May – November	Swampy areas
<i>Cyperus polystachyos</i> C.F. Rottbøll; HPm3028	Jun – July	In paddy fields and moist areas
<i>Cyperus pumilus</i> Linnaeus; <i>Utha ghas</i> ; HPm3029	June – November	In moist places
<i>Cyperus rotundus</i> Linnaeus; <i>Mutha</i> ; HPm3030	May – September	Moist places in cultivated fields, along ponds and canals, muddy river banks
<i>Cyperus sanguinolentus</i> Vahl; HPm3031	April – December	Wastelands and river banks
<i>Cyperus silletensis</i> Nees; HPm3032	November – March	Streamside and marshy areas
<i>Cyperus tenuiculmis</i> J.O. Boeckeler; HPm3034	August – September	Marshy to dry places, in paddy fields and wastelands
<i>Cyperus tenuispica</i> Steudel; HPm3035	August - April	Along canal banks, streams, tanks and swampy areas

Botanical name; Local Name; voucher specimen	Flowers and Fruits	Habitat
<i>Cyperus thomsonii</i> J.O. Boeckeler; HPm3036	June – November	In moist places
<i>Fimbristylis aestivalis</i> (Retzius) Vahl; HPm3037	November - June	Open wet places along streams and ditches, weed of paddy fields
<i>Fimbristylis alboviridis</i> C.B. Clarke; HPm3038	October	Dry grass-fields, edges of wastelands and roadsides
<i>Fimbristylis bisumbellata</i> (Forsskal) Bubani; HPm3039	November - July	River banks, edges of tanks, near stream, along roadside, rice fields
<i>Fimbristylis complanata</i> (Retzius) Link; HPm3040	June – September	Moist soils, muddy riverbanks, swampy grass fields, wet rice fields
<i>Fimbristylis dichotoma</i> (Linnaeus) Vahl; HPm3041	April – November	Moist sandy areas, open waste places, grassy roadside, along the edges of rice fields
<i>Fimbristylis eragrostis</i> (Nees) Hance; HPm3042	May – October	Grassy hill sides on low mountains
<i>Fimbristylis falcata</i> (Vahl) C.S. Kunth; HPm3043	April – November	In swamps and paddy fields
<i>Fimbristylis ferruginea</i> (Linnaeus) Vahl; HPm3044	February- April	Among grasses
<i>Fimbristylis globulosa</i> (Retzius.) C.S. Kunth; HPm3045	June- September	In marshy places
<i>Fimbristylis hookeriana</i> J.O. Boeckeler; HPm3046	August- October	Common weed of the paddy fields
<i>Fimbristylis littoralis</i> Gaudichaud; HPm3047	July- September	Edges of streams and canals, roadside ditches
<i>Fimbristylis miliacea</i> (Linnaeus) Vahl; HPm3048	November - January	Paddy fields, along ditches, drains and streams
<i>Fimbristylis monospicula</i> Govindarajalu; HPm3049	January - February	Common in wet and moist places
<i>Fimbristylis ovata</i> (N.L. Burman) J. Kern; HPm3050	March – December	In wastelands and plantation
<i>Fimbristylis rigidula</i> Nees; HPm3051	September- October	Weed of the paddy fields
<i>Fimbristylis polytrichodes</i> (Retzius) Vahl; HPm3052	August – December	Wet and moist places and also paddy field
<i>Fimbristylis schoenoides</i> (Retzius) Vahl; HPm3053	August – January	Open grasslands, frequent in wastelands and paddy fields
<i>Fimbristylis squarrosa</i> Vahl; HPm3054	February	Marshy areas, near streams and ditches
<i>Fimbristylis stolonifera</i> C.B. Clarke; HPm3055	June - August	In moist places along forest margins
<i>Fimbristylis tenera</i> J.A. Schultes; HPm3056	July – November	Among grasses in sandy soil, along roadside
<i>Fimbristylis tetragona</i> R. Brown; HPm3057	August – February	Open wet places, swampy grasslands
<i>Fimbristylis tomentosa</i> Vahl; HPm3058	August – November	In shade, a long forest margins

Botanical name; Local Name; voucher specimen	Flowers and Fruits	Habitat
<i>Scirpus articulatus</i> Linnaeus; HPm3059	November – January	In swampy areas and along the pond side
<i>Scirpus juncoides</i> Roxburgh; HPm3060	March – July	Common in marshy places, along ponds and ditches, a common weed in the paddy fields
<i>Scirpus ternatanus</i> Reinwardt ex Miquel; HPm3061	April – July	Along the paddy fields
<i>Scleria levis</i> Retzius; HPm3062	July - May	Open moist grasslands, moist shady places
<i>Scleria terrestris</i> (Linnaeus) N.C. Fassett; HPm3063	August – December	In marshlands
<i>Rhynchospora corymbosa</i> (Linnaeus) N.L. Britton; HPm3064	July - April	Open swampy areas, riverbanks, rice fields
<i>Eleocharis acutangula</i> (Roxburgh) J.A. Schultes; HPm3065	July - May	Rice field
<i>Eleocharis dulcis</i> (N.L. Burman) Trinius ex Henschel; HPm3066	August – November	Swamps, pools, rice fields
<i>Kyllinga brevifolia</i> C.F. Rottboëll; HPm3067	January – April	Moist soil near canals, Streams, rivers
<i>Kyllinga monocephala</i> C.F. Rottboëll; HPm3068	June – September	Along paddy field margins
<i>Lipocarpa sphacelata</i> (Vahl) Kunth; HPm3069	August – January	Open wet areas, margins of swamps and paddy fields, damp grassy areas
<i>Mariscus cyperinus</i> (Retzius) Vahl; HPm3070	May – October	Moist soil near streams, rivers, canals
<i>Mariscus dubius</i> (C.F. Rottboëll) Hutchinson; HPm3071	May – October	Moist grasslands, rocky slopes, sandy soil and waste place.
<i>Mariscus sumatrensis</i> (Retzius) A. Raynal; HPm3072	June – November	Wet sandy soil, along roadsides, wet grasslands
<i>Pycneus pumilus</i> (Linnaeus) Nees; HPm3073	June – February	Around paddy field
<i>Pycneus puncticulatus</i> (Vahl) Nees; HPm3074	November - February	Rice field and margins of lake, river
<i>Pycneus sanguinolentus</i> (Vahl) Nees; HPm3075	October - March	Wet soil canals, tanks, streams
<i>Pycneus stramineus</i> C.B. Clarke; HPm3033	August – October	Moist sandy soil, along ponds and streams
<i>Carex dimorpholepis</i> Steudel; HPm3001	January – March	Roadside and streams
<i>Carex filicina</i> Nees; HPm3002	May – August	In moist to swampy places
<i>Carex indica</i> Linnaeus; HPm3003	August – September	In wastelands and along streams
<i>Carex olivacea</i> Boott; HPm3004	April – August	Common along roadside and moist places
<i>Carex phacota</i> Sprengel; HPm3005	March – April	Along streams, in swamp and moist areas
<i>Carex viscosa</i> Boott; HPm3006	June – November	In dry to moist, open places

While comparing the species diversity it is seen that while as much as 49 species of *Carex* has been recorded from North East India, the present survey has recorded only six species. Table 2 also revealed that *Cyperus* is dominant genus in Southern Assam with 38.7 % of the recorded species. It is followed by *Fimbristylis* with 29.33 % of species. Hence, these two genera together form ca 69 % of the total sedge species in Southern Assam. On the other had *Rhynchospora* and *Lipocarpha* are represented by one species (1.33 %) only.

Table 4. Comparison of Cyperaceae of Southern Assam with other floras of adjoining regions

Genus	Number of the species			
	India [Hooker 1894]	North East India [Rao & Verma 1981 – 1982]	Assam [Chowdhury <i>et al.</i> 2005]	Southern Assam [Present work]
<i>Cyperus</i>	70	42	45	29
<i>Fimbristylis</i>	115	33	23	22
<i>Carex</i>	160	49	18	6
<i>Pycreus</i>	33	0	0	4
<i>Scirpus</i>	120	12	10	3
<i>Mariscus</i>	14	0	0	3
<i>Scleria</i>	27	14	12	2
<i>Kyllinga</i>	10	0	0	2
<i>Eleocharis</i>	21	8	9	2
<i>Rhynchospora</i>	10	5	3	1
<i>Lipocarpha</i>	3	2	2	1
Total	583	165	122	75

Only the 5th volume of the *Flora of Assam* (Bor 1940) has dealt with monocotyledonous plants but with only one family, Gramineae. Rao & Verma (1981-1982) in their *Cyperaceae of North East India*, given insufficient emphasis Southern Assam particularly on Cachar as only a few references has been provided for this region. While listing Assam's vascular plants flora Chowdhury *et al.* (2005) reported 131 species belonging to 15 genera of Cyperaceae. From these it appear that the monocot flora of southern Assam, particularly of Cachar region is extremely under explored and needs immediate attention.

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