

## Diversity of sedges in the erstwhile Kamrup District of Assam, India

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### Abstract

A systematic study was carried out to enumerate the present status of sedges (members of Cyperaceae) in the Kamrup District (*sensu lato*) of Assam and recorded a total of 57 species belonging to 14 genera. Artificial Keys to different ranks of minor taxa have been provided for their easy recognition.

**Key words**: Cyperaceae, Diversity, Kamrup District, Assam.

### INTRODUCTION

Sedges are grass-like herbaceous plants of Cyperaceae, which are characterized by their solid, jointless and triangular stems and/or scapes. The family is known to consist of about 4000 species distributed among about 100 genera, occurring world-wide in moist habitats in all the major climatic zones (Bruhl *et al.* 1992). The major importance of sedges is their prominent role in many types of ecological communities and they form an important source of food for many species of grazing animals. The sedge flora in India was inadequately studied due to difficulty in their identification and visual differentiation in field condition. Some works were carried out by earlier taxonomists like Clarke (1884, 1893-94, 1898, 1908, 1909), Graham (1913), Sedgwick (1918) and Haines (1924) for different parts of the country. Of the recent investigations on Cyperaceae in India, mention may be made of Chavan & Sabnis (1960), Sabnis (1962), Tiwari & Maheshwari (1964), Vyas (1966), Sabnis & Chavan (1967), Stewart (1967), Rao and Verma (1982), Chowdhury (2005) and others.

In the present contribution the author attempts to present a detailed account of the different taxa of sedges growing in the Kamrup District (*s.l.*) of Assam.

### Study area

Kamrup is one of the districts of Assam in North-East India. Presently the district has been divided into two, Kamrup Metro and Kamrup Rural. The present work is on Kamrup (*sensu lato*) i.e. covering both the new districts.

Geographically, Kamrup district (*s.l.*) is surrounded by hills and lies approximately between 25.46° and 26.49° North Latitude and between 90.48° and 91.50° East Longitude. It covers an area of 6882 sq km. The mighty Brahmaputra flows through it from east to west. Climate is sub-tropical with semi-dry summer and cold winter. Annual rainfall ranges from 1500 mm to 2600 mm.

Physiography, geology, soil, climatic factors and the Brahmaputra river with its turbulent tributaries have a great impact on the growth of sedges in the study area. The sedges are found to grow well all along the banks of rivers, ponds, ditches, marshes, wastelands where the soil is saturated with water at least in the early part of plant life. Most of them continue to thrive even after the substratum has considerably dried.

## MATERIALS AND METHODS

The present report is the outcome of 3 years of critically detailed and systematic study on the members of Cyperaceae growing in the Kamrup district (*s.l.*) of Assam. Field trips were carried out in every season and almost in all the localities of the district. Along with the visual observations, voucher specimens were collected at different reproductive stages, which were, later on, processed in to mounted herbarium specimen following Jain & Rao (1977). The plants were identified with the help of available literature like *Flora of Sikkim* (Hajra & Verma 1996), *Flora of Maharastra State* (Sharma, Karthikeyan & Singh, 1996), *Sedges and Grasses, Dakshina Kannada and Udupi Districts* (Bhat & Nagendran, 2001), *Flora of Bhutan* (Noltie, 1994) and also by matching with the pre-identified specimens at ASSAM Herbarium. The specimen collected are all deposited at Herbarium of Gauhati University. Recent nomenclature changes were incorporated by using the specialized online web resources [www.theplantlist.org].

## RESULTS

The present survey recorded 57 species of sedges under 14 genera and is enumerated below with their correct name, synonyms (if any), protologues, records in nearby floras, brief description, habitat and flowering & fruiting period. Currently valid scientific names have been bold-faced and synonyms are in italics.

## ENUMERATION

### Key to genera

- 1a. Nuts enclosed in bottle-shaped utricles with an entire or notched or shortly slit mouth ... **Carex**
- 1b. Nuts not enclosed in a utricle: .....2
- 2a. Flowers unisexual ..... **Scleria**
- 2b. Flowers bisexual: .....3
- 3a. Flowering glumes 1 or 2 ..... **Rhynchospora**
- 3b. Flowering glumes many: ..... 4
- 4a. Flowering glumes spirally arranged: ..... 5
- 4b. Flowering glumes distichously arranged: ..... 11
- 5a. Style-base constricted or articulate above the nut: ..... 6
- 5b. Style-base passing gradually into the nut: ..... 8
- 6a. Hypogynous bristles present: ..... 7
- 6b. Hypogynous bristles absent ..... **Fimbristylis**
- 7a. Leaves absent ..... **Eleocharis**
- 7b. Leaves present ..... **Actinoscirpus**
- 8a. Leaves reduced to sheaths ..... **Schoenoplectiella**
- 8b. Leaves with well developed blades: ..... 9

- 9a. Leaves with a collar around stem ... *Fuirena*
- 9b. Leaves without a collar around a stem: ..... 10
- 10a. Hypogynal structures scaly, membranous ... *Lipocarpha*
- 10b. Hypogynal structures setaceous ... *Scirpus*
- 11a. Styles 2-fid: ..... 12
- 11b. Styles 3-fid ..... 14
- 12a. Rhachilla of spikelet deciduous ... *Kyllinga*
- 12b. Rhachilla of spikelet persistent: ..... 13
- 13a. Nuts laterally compressed ... *Pycreus*
- 13b. Nuts dorsally compressed:
- 14a. Rhachilla of spikelets persistent ... *Cyperus*
- 14b. Rhachilla of spikelets deciduous ... *Courtoisina*

**ACTINOSCIRPUS** (Ohwi) Haines & Lye, Bot. Not. 124: 481. 1971.

1 species distributed in E and S Asia, N.E. Australia and Pacific Islands and in the study area.

*Actinoscirpus grossus* (Linnaeus f.) Goetghebeur & D.A. Simpson, Kew Bull. 46: 171. 1991; Chowdhury, Assam's Flora 298. 2005; *Scirpus grossus* Linnaeus f., Suppl. Pl.: 104. 1781; C.B. Clarke in Hooker f., FBI 6: 659.1893; Rao & Verma, Cyp. N.E. India, 41. 1982; *Schoenoplectus grossus* (Linnaeus f.) Palla in Kneucker, Allg. Bot. Zeitschr. 17, Beil.: 3. 1911.

Perennial; stem trigonous; leaves half of stem length; sheaths 10 cm long; leaf-blades 70 cm long; inflorescence a terminal compound anthela; spikelets solitary; stamens 3; anthers linear; stigmas 3.

*Habitat*: In roadside ditches; *Flowers & Fruits*: July – November.

*Exsiccatae*: Bongsar gaon, 20.07.2009, *Moitreyee* 107.

**CAREX** Linnaeus, Sp. Pl. 972. 1753.

Species about 2000, distributed throughout the world. Of the about 140 species in India; 54 in N.E. India; 10 species in Assam and 2 in the study area.

**Key to species**

- 1a. Leaves shorter than or equaling stem; utricles brownish green ... *C. finitima*
- 1b. Leaves longer than stem; utricles pale brownish white with brown spots & short lines .. *C. cruciata*

*Carex cruciata* Wahlenberg, Handl. 24: 149. 1803; Rao & Verma, Cyp. N.E. India, 73. 1982; Chowdhury, Assam's Flora 298. 2005; *C. condensata* Nees in Wight, Contrib. Bot. Ind. 123. 1834; C.B. Clarke in Hooker f., FBI 6: 715. 1894.

Perennial; stem 40 – 85 cm high, 1.5 mm in diameter, trigonous; leaves longer than stem, 5 mm wide; inflorescence a compound panicle; bracts longer than inflorescence; spikes numerous, 5 – 6 mm long; glumes ovate; stigmas 3.

*Habitat*: Grow along hillsides; *Flowers & Fruits*: May – August.

*Exsiccatae*: Kharghuli Hills, 24.09.2008, *Moitreyee 041*.

***Carex finitima*** Boott, III. Gen. Carex 1: 44. 1858; Rao & Verma, Cyp. N.E. India 80. 1982; *C. finitima* Boott. var. *attenuata* C.B. Clarke in Hooker f., FBI 6: 736. 1894.

Perennial; stem tufted, 40 cm high, trigonous; leaves shorter than or equaling stem; leaf-blade 4 mm wide; involucre bracts longer than inflorescence; spikes linear; glumes ovate, apex acute.

*Habitat*: Grow along roadside ditches; *Flowers & Fruits*: June – August.

*Exsiccatae*: Ninth mile, Guwahati, 25.07.2009, *Moitreyee 118*.

#### COURTOISINA Nees, Linnaea 9: 286. 1825.

2 species occurring in Africa, Madagascar and Indo-China; 1 in the study area.

***Courtoisina cyperoides*** (Roxburgh) Soják, Cas. Nar. Muz. Praze, Rada Prir. 148: 193. 1980; *Kyllinga cyperoides* Roxburgh, Fl. Ind., 1: 187. 1820; *Mariscus sieberianus* Nees ex Cl., Chowdhury, Assam's Flora 300. 2005; C.B. Clarke in Hooker f., FBI 6: 625. 1893; Rao & Verma, Cyp. N.E. India 21. 1982;

Stems up to 60 cm high, slender; leaves several, basal, shorter than to equaling culm; leaf-blade 2 mm wide; inflorescence a compound anthela; spikes globose; glumes yellowish-brown, 3.5 mm long; stamens 3; stigmas 3.

*Habitat*: Grasslands; *Flowers & Fruits*: June – September.

*Exsiccatae*: Dharapur, 13.10.2008, *Moitreyee 066*.

#### CYPERUS Linnaeus, Sp. Pl. 44. 1753; Gen. Pl. ed. 5: 26. 1754.

Species about 600, distributed in tropics and in warm temperate regions. Of the about 100 species in India, 52 in N. E. India; 44 in Assam and 22 species in the study area.

#### Key to species

- 1a. Spikelets digitate or fasciculate on a very short rachis, or inflorescence capitate or globose: ..... 2
- 1b. Spikelets in spikes terminating rays (rachis (0.5-)1-6 cm, usually visible, sometimes covered by bases of spikelets in pressed specimens): .... 12
- 2a. Inflorescences capitate or anthelate, with very short rays (rarely with 1 or 2 elongated rays): ..... 3
- 2b. Inflorescence anthelate, with elongate rays, sometimes with secondary (compound) and tertiary (decompound) branching: ..... 5
- 3a. Spikelets 3- or 4-flowered; nutlet with spongy base of style extending downward along angles of nutlet ..... ***C. cephalotes***
- 3b. Spikelets 8-flowered or more; nutlet without enlarged spongy apex: ..... 4
- 4a. Stems usually tall; spikelets several; glumes conspicuously distichous, apex obtuse ...  
..... ***C. niveus***
- 4b. Stems dwarf; spikelets numerous, very densely arranged; glumes spirally imbricate, apex recurved ..... ***C. michelianus***
- 5a. Perennial herbs; glumes 2 mm; nutlet 0.7-1.5 mm: ..... 6
- 5b. Annual or perennial herbs; glumes 1(-1.5) mm; nutlet 0.2-0.3mm: ..... 8

- 6a. Spikelets slightly turgid; glumes 7-veined or more ... *C. diffusus*
- 6b. Spikelets compressed; glumes 3-5 veined: ..... 7
- 7a. Culms compressed triquetrous, with leaves at basal part; leaf involucre bracts 5-12, unequal in length ..... *C. platystylis*
- 7b. Culms obtusely 3-angled to subterete, with bladeless sheaths basally; leafy involucre bracts 15-20, nearly equal in length ..... *C. involucratus*
- 8a. Leaves very narrow, adaxially canaliculated, margin involute; glumes papery, apex truncate and a recurved awn; nutlet oblong-obovoid to oblong ..... *C. cuspidatus*
- 8b. Leaves flat; glumes membranous, apex obtuse and mucronate or mucicous; nutlet obovoid or ellipsoid: ..... 9
- 9a. Perennials or rarely annuals; culms with few leaves or with bladeless sheaths only; stamens (1-)3; nutlet less than ½ as long subtending glume: ..... 10
- 9b. Annuals without stolons (except *C. duclouxii*); culms usually leafy; stamens 1 or 2(or 3); nutlet ½ or more as long as subtending glume: ... 11
- 10a. Leafy involucre bracts usually longer than inflorescence; glumes laxly imbricate, with recurved apex; anther apices not white setose; nutlet 0.2-0.3 mm wide ..... *C. tenuispica*
- 10b. Leafy involucre bracts usually shorter than inflorescence; glumes densely imbricate, apex straight; anther apices white setose; nutlet 0.4-0.5 mm wide ..... *C. haspan*
- 11a. Spikelets numerous, densely congested into a dense capitulum ..... *C. difformis*
- 11b. Spikelets several to more than 10, congested into a lax capitulum ..... *C. fuscus*
- 12a. Rachilla not winged or only with very narrow white hyaline margins; style short: ..... 13
- 12b. Rachilla winged; style usually long or medium, rarely short: .... 15
- 13a. Perennials, with long stolons; spikelets slightly turgid; glumes abaxially not keeled or rarely keeled ..... *C. pilosus*
- 13b. Annuals, without rhizomes or stolons, with fibrous roots only; spikelets compressed; glumes abaxially keeled, margin not involute, apex mucronate to cuspidate: ..... 14
- 14a. Rachis of spikes short; spikelets densely arranged, subcapitate; glumes densely imbricate; nutlet half as long as subtending glume ..... *C. compressus*
- 14b. Rachis of spikes long; spikelets laxly arranged; glumes laxly imbricate; nutlet nearly as long as subtending glume ..... *C. iria*
- 15a. Spikes cylindric, with numerous spikelets: ..... 16
- 15b. Spikes broadly ovoid, turbinate, ellipsoid, oblong, orbicular, or rarely cylindric, with up to 10 spikelets: ..... 20
- 16a. Mature spikelets not deciduous with glumes and nutlets falling from rachilla: ..... 17
- 16b. Mature spikelets deciduous and falling from rachis with glumes and nutlets attached: ..... 18
- 17a. Spikelets linear, terete or subterete; rachilla broadly winged, wings lanceolate and deciduous ..... *C. digitatus*
- 17b. Spikelets narrowly oblong-obovoid, compressed; rachilla narrowly winged, wings linear and persistent ... .. *C. imbricatus*

- 18a. Spikelets 1-3(or 4)-flowered; glumes tightly included around nutlet: ..... 19  
 18b. Spikelets 4-10-flowered; glumes not tightly included around nutlet ..... *C. compactus*  
 19a. Spikes cylindric, (1-)2-3.5 x 0.6-1 cm, with parallel sides; anthers (0.6-)0.8-1 mm; nutlet 0.5 mm wide; leaf- blade margin smooth ..... *C. cyperoides*  
 19b. Spikes shortly cylindric, oblong or ovoid, 1.2-1.8 x 0.8-1.2(-1.5) cm, with sides narrowed toward base; anthers 1- 1.5 mm; nutlet 0.6-0.9 mm wide; leaf-blade margin scabrous .... *C. cyperinus*  
 20a. Rhizomes short or surculose, without stolons or tubers; glumes laxly spreading:..... 21  
 20b. Rhizomes creeping or with stolons and tubers; glumes densely imbricate... *C. rotundus*  
 21a. Spikelets laxly arranged, spreading after anthesis, 0.8-4 cm x 1 mm; glumes dark blood-red ... *C. distans*  
 21b. Spikelets densely or very densely arranged, suberect, not spreading after anthesis, 0.4-1.1 cm x 1.5-2 mm; glumes reddish-brown or yellowish- brown .... *C. alopecuroid*

*Cyperus alopecuroides* Rottboell, Descr. Pl. Rar. 20. 1772; *Juncellus alopecuroides* (Rottboell) C.B. Clarke, FBI 6: 595. 1893; Haines & Lye, Sedges & Rushes E. Afr.: fig. 384. 1983; Pullaiih & Silar Mohammed, Flora of Ranga Reddi District Andhra Pradesh, India 219. 2000.

Perennial; stems trigonous, up to 120 cm high, glabrous; leaves 145 cm long, 4 mm wide; inflorescence a compound umbel; spikes ovoid, spreading; stamens 2; stigmas 2 or 3.

*Habitat*: Wastelaces; *Flowers & Fruits*: April – September.

*Exsiccatae*: Rani, 22.08.2011, *Moitreyee* 361.

*Cyperus cephalotes* Vahl, Enum. Pl. 2: 311. 1805; Hooker f., FBI 6: 597. 1896; Rao & Verma, Cyp. N.E. India 11. 1982; Chowdhury, Assam's Flora 299. 2005.

Perennial; stems tufted, 10-30 cm tall, 3-angled; leaves shorter than to equaling culm; leaf-blade 0.5-2.0 mm wide; involucre bracts 3-5; inflorescence capitate, with numerous spikelets; spikelets 10-15 flowered; glumes distichious; stamens 1; style short; stigmas 2.

*Habitat*: Paddy fields; *Flowers & Fruits*: November - April.

*Exsiccatae*: Chandrapur Bagisa, 12/06/2009, *Moitreyee* 095

*Cyperus compactus* Retzius. Observ. Bot. 5: 10. 1788; Rao & Verma, Cyp. N.E. India 21. 1982; Chowdhury, Assam's Flora 299. 2005; *Cyperus dilutus* Vahl, Enum. Pl. 2: 357. 1805.

Perennial; stems 70 cm high; leaves basal; leaf-blade 9 mm wide; inflorescence a compound anthela; spikes with many spikelets congested into a globose spike; spikelets many; glumes oblong; stamens 3; stigmas 3.

*Habitat*: Roadside ditches; *Flowers & Fruits*: June - December.

*Exsiccatae*: Bongsar gaon, North Guwahati, 20.07.2009, *Moitreyee* 108

*Cyperus compressus* Linnaeus, Sp. Pl. 46. 1753; Hooker f., FBI 6: 605. 1896; Rao & Verma, Cyp. N.E. India 15. 1982; Chowdhury, Assam's Flora 299. 2005.

Annual; stems 30 cm high; leaf-blade obtuse, 4 mm wide; inflorescence a simple umbel; spikelets 4-9, 20-50-flowered; glumes 3 mm long; stamens 3; style short.

*Habitat*: Along roadsides; *Flowers & Fruits*: May - December.

*Exsiccatae*: Deepor Beel, 29.07.2009, *Moitreyee* 153

***Cyperus cuspidatus*** Kunth in Humboldt, Bonpland & Kunth, Nov. Gen. Sp. 1: 204. 1816; Hooker f., FBI 6: 598. 1896; Rao & Verma, Cyp. N.E. India 12. 1982; Chowdhury, Assam's Flora 299. 2005.

Annual; stems 10 cm high; leaves as long as the stem; inflorescence a simple umbel; spikelets linear; stamens 3; achene trigonous; style shorter than achene.

*Habitat*: Fairly common in moist sandy soils; *Flowers & Fruits*: August - November.

*Exsiccatae*: On the bank of Brahmaputra River, Palashbari, 04.08.2008, *Moitreyee* 016

***Cyperus cyperinus*** (Retzius) J.V. Suringar, Gesl. Mal. Arch. *Cyperus* 154. 1898; Chowdhury, Assam's Flora 299. 2005; *Kyllinga cyperina* Retzius, Observ. Bot. 6: 21. 1791; *Mariscus cyperinus* var. *bengalensis* C.B. Clarke in Hooker f., FBI 6: 621. 1893; Rao & Verma, Cyp. N.E. India 20. 1982.

Perennial; stems scattered, 15-50 cm tall, base many leaved; leaf-blade 5-7 mm wide; involucre bracts 6-10 mm; inflorescence a simple anthela; spikes oblong; spikelets 2-4 flowered; stamens 3; stigmas 3.

*Habitat*: Along roadside ditches; *Flowers & Fruits*: April - September.

*Exsiccatae*: Near LGB Airport, 13.10.2008, *Moitreyee* 067

***Cyperus cyperoides*** (Linnaeus) Kuntze, Gen. Pl. 3(2): 333. 1898; Chowdhury, Assam's Flora 299. 2005; Rao & Verma, Cyp. N.E. India 21. 1982; C.B. Clarke in Hooker f., FBI 6: 622. 1893; *Scirpus cyperoides* Linnaeus, Mant. Pl. 2: 181. 1771; *Mariscus umbellatus* Vahl, Enum. Pl. 2: 376. 1806.

Perennial; stems trigonous, robust, up to 1m tall, unbranched; leaf-blade 5 mm wide; inflorescence a simple anthelodium; spikes sessile, 2-flowered; glumes 4 mm long; flower 3.5 mm long; stamens 3; anthers linear; stigmas 3; style short.

*Habitat*: Grows as a weed in wastelands, cultivated fields; *Flowers & Fruits*: July - October.

*Exsiccatae*: Dharapur, 29.08.2008, *Moitreyee* 047

***Cyperus difformis*** Linnaeus in Torner, Cent. Pl. 2: 6. 1756; Hooker f., FBI 6: 599. 1896; Rao & Verma, Cyp. N.E. India 12. 1982; Chowdhury, Assam's Flora 299. 2005.

Annual; stem 25-40 cm tall; leaves 4 mm wide; inflorescence a simple umbel; spikelets many, in dense heads, 2 mm long; stamen 1; style short.

*Habitat*: In wastelands; *Flowers & Fruits*: July - October.

*Exsiccatae*: Near Deepor Beel, 26.07.2009, *Moitreyee* 129

***Cyperus diffusus*** Vahl, Enum. Plant. 2: 321. 1806; Rao & Verma, Cyp. N.E. India 14. 1982; Chowdhury, Assam's Flora 299. 2005.

Perennial; stems 60 cm tall, trigonous; leaves as long as culm, 12 mm wide; inflorescence a decomposed umbel; spikelets 1-4 together, digitate, 25-flowered; style short.

*Habitat*: Moist shady places; *Flowers & Fruits*: May - February.

*Exsiccatae*: Kulsi, 25.07.2010, *Moitreyee* 219

***Cyperus digitatus*** Roxburgh, Fl. Ind. 1: 205. 1832; Rao & Verma, Cyp. N.E. India 20. 1982; Chowdhury, Assam's Flora 299. 2005.

Perennial; stems trigonous, 50-70 cm tall; leaves 40-60 cm in length, 5-12 mm wide; inflorescence a compound anthela; spikelet linear, 10-40-flowered; glumes straw-coloured, imbricate; stamens 3; style long; stigmas 3.

*Habitat:* Common in swamps and paddy fields; *Flowers & Fruits:* July - December.

*Exsiccatae:* Near LGB airport, 13.10.2008, *Moitreyee 068*

***Cyperus distans*** Linnaeus f., Suppl. Pl. 103. 1781; Hooker f., FBI 6: 607. 1896; Rao & Verma, Cyp. N.E. India 16. 1982; Chowdhury, Assam's Flora 299. 2005.

Perennial; stems solitary, trigonous, 70 cm long; leaves as long as the culm; inflorescence a compound umbel; spikelets 20 mm long, 10-20-flowered; stamens 3; achene trigonous.

*Habitat:* Common along streams and in ditches; *Flowers & Fruits:* August - December.

*Exsiccatae:* Maligaon, Guwahati, 18.09.2008, *Moitreyee 030*

***Cyperus fuscus*** Linnaeus, Sp. Pl. 1: 46. 1753; Singh, Flora of Eastern Karnataka 1:106. 1988.

Annual; stems trigonous, glabrous; leaves 7-9 mm long, 3 mm wide; inflorescence a compound umbel; spikes 6 mm long; spikelet 10-flowered; flowers bisexual; stamens 2; stigmas 3.

*Habitat:* Wastelands; *Flowers & Fruits:* July - September.

*Exsiccatae:* Dharapur, 10.08.2011, *Moitreyee 311*

***Cyperus halpan*** Linnaeus, Sp. Pl. 1: 45. 1753 ('*haspan*'); Rao & Verma, Cyp. N.E. India 13. 1982; Chowdhury, Assam's Flora 299. 2005.

Perennial; stems trigonous, glabrous; leaves reduced to sheaths; inflorescence umbel, loosely digitate; spikelets 3-12; stamens 3; style 0.4 mm long.

*Habitat:* In the open field, dry soil; *Flowers & Fruits:* August - October.

*Exsiccatae:* Near IIT, North Guwahati, 12.08.2011, *Moitreyee 322*

***Cyperus imbricatus*** Retzius, Observ. Bot 5: 12. 1788; Chowdhury, Assam's Flora 299. 2005.

Perennials; stems 7-14 cm long, 3-angled; leaves basal; inflorescence a compound anthela; spikes densely arranged; spikelets 10-25 flowered; glumes ovate; stamens 3; style long; stigmas 3.

*Habitat:* Along roadside ditches; *Flowers & Fruits:* September - October.

*Exsiccatae:* Deepor Beel, 29.07.2009, *Moitreyee 152*

***Cyperus involucratus*** Rottboell, Descr. Pl. Rar. Program. 22. 1772; *C. flabelliformis* Rottboell, Descr. & Ic. 42, t. 12, f. 2. 1773; Bailey, Encycl. Hort. 1: 941. 1958; Baijnath in Kew Bull. 30: 522. 1975; Bhatt, Invasive Alien Plants: An Ecological Appraisal for the Indian Subcontinent 203. 2011.

Perennial; stems up to 90 cm high, stout; leaves 20 cm long; inflorescence a compound umbel; spikelets digitate, 8 mm long, 2 mm wide, 10-20 flowered; stamens 3; style short.

*Habitat:* Along roadsides; *Flowers & Fruits:* August - December.

*Exsiccatae:* Islampur, Guwahati, 29.07.2009, *Moitreyee 151*

***Cyperus iria*** Linnaeus, Sp. Pl. 45. 1753; Hooker f., FBI 6: 606. 1893; Rao & Verma, Cyp. N.E. India 15. 1982; Chowdhury, Assam's Flora 299. 2005.



Annual; stems 60 cm high, trigonous; leaves 3 mm wide, acuminate; inflorescence a compound umbel; spikelets 5-20-flowered; glumes 1.2 mm long; stamens 2; style short.

*Habitat*: Along the roadside ditches and streams; *Flowers & Fruits*: May - December.

*Exsiccatae*: Deepor Beel, 29.07.2009, *Moitreyee*, 150

*Cyperus michelianus* subsp. *pygmaeus* (Rottboell) Ascherson & Graebner, *Cyperus pygmaeus* Rottb. Descr. Icon. 20. t. 14. F. 5. 1753; Syn. Mitteleur Fl. 2(2): 273. 1904; Chowdhury, Assam's Flora 299. 2005.

A small tufted, erect, annual herb, less than 12 cm tall, with conspicuous leafy bracts; leaves linear, flat or canaliculate; inflorescence a dense Kyllinga-like head; spikes several, about 12-15 mm long, strongly flattened, greenish-white; glumes distichous; stamens 1-2; stigmas 2 or 3; nut oblong, pale brown.

*Habitat*: On the bank of Brahmaputra, in marshy areas, Chandrapur; *Flowers & Fruits*: February - April.

*Exsiccatae*: Palashbari, 15/08/2011, *Moitreyee* 336

*Cyperus niveus* Retzius, Observ. Bt. 5: 12. 1789; Hooker f., FBI 6: 601. 1893; Rao & Verma, Cyp. N.E. India 14. 1982; Chowdhury, Assam's Flora 299. 2005.

Perennial; stems 10-25 cm high; leaves 20 cm long, 2 mm wide; inflorescence capitate of 3-5 sessile spikes; spikelets ovoid, compressed; glumes straw-coloured; stamens 3; style long.

*Habitat*: In marshy areas; *Flowers & Fruits*: May - October.

*Exsiccatae*: On the bank of Brahmaputra river, Chandrapur, 30.09.2008, *Moitreyee* 064

*Cyperus pilosus* Vahl, Enum. 2: 354. 1805; C.B. Clarke in Hooker f., FBI 6: 609. 1893; Rao & Verma, Cyp. N.E. India 17. 1982; Chowdhury, Assam's Flora 300. 2005.

Perennial; stems up to 70 cm high, trigonous; leaves 60 cm long, 8 mm wide; inflorescence a compound umbel; spikelets linear, 4 mm long, 10-20-flowered; glumes 1.6 mm long; stamens 3.

*Habitat*: Common in marshy places; *Flowers & Fruits*: May-November.

*Exsiccatae*: Near IIT, North Guwahati, 12.08.2011, *Moitreyee* 323

*Cyperus platystylis* R. Brown, Prodr. Fl. Nov. Holl. 214. 1810; Rao & Verma, Cyp. N.E. India 12. 1982; Chowdhury, Assam's Flora 300. 2005.

Perennial; stems 50-70 cm tall, trigonous; leaves equaling culm, 5 mm wide; inflorescence a compound anthela, about 8 mm long; spikelets digitate, flat, 15-30-flowered; glumes ovate, 2.5 mm long; stamens 3; stigmas 3.

*Habitat*: In roadside ditches; *Flowers & Fruits*: July - November.

*Exsiccatae*: Bongsar Gaon, North Guwahati, 20.07.2009, *Moitreyee* 109

*Cyperus rotundus* Linnaeus, Sp. Pl. 45. 1753; Hooker f., FBI 6: 614. 1896; Rao & Verma, Cyp. N.E. India 19. 1982; Chowdhury, Assam's Flora 300. 2005. '*Keya-ban*'

Perennial; stems up to 50 cm high, trigonous; leaves equaling culm, acuminate; inflorescence a compound umbel; spikelets spreading, linear, many-flowered; glumes 2.5 mm long; stamens 3; stigmas 3.

*Habitat*: Along roadsides ; *Flowers & Fruits*: May - November.

*Exsiccatae*: Changsari, 04.08.2008, *Moitreyee* 017.

*Cyperus tenuispica* Steudel, Syn. Pl. Glume. 2: 11. 1855; Rao & Verma, Cyp. N.E. India 13. 1982; Chowdhury, Assam's Flora 300. 2005; *C. flavidus* C.B. Clarke, J. Linn. Soc., Bot. 20: 287. 1883; in Hooker f., FBI 6: 600. 1893.

Annual; stems 10-15 cm high, trigonous; leaves bladeless; inflorescence a compound umbel; spikelets in clusters of 5-20; glume 0.9 mm long; stamen 1; stigmas 3.

*Habitat*: Roadside wastelands; *Flowers & Fruits*: July - November.

*Exsiccatae*: Near Gauhati University Campus, 14.10.2009, *Moitreyee* 159

### **ELEOCHARIS** R. Brown, Prodr. 224. 1810.

Species about 150, cosmopolitan. 14 species in India; 4 in the study area.

#### *Key to species*

- 1a. Spikelets cylindrical, more than 15 mm long: ..... 2
- 1b. Spikelets never cylindrical; less than 10 mm long: .... 3
- 2a. Hypogynous bristles as long as or exceeding achenes; glumes ovate ... *E. acutangula*
- 2b. Hypogynous bristles as long as or slightly shorter than achene; glumes oblong to sub-oblong .... *E. pellucida*
- 3a. Achene trigonous .... *E. congesta*
- 3b. Achene biconvex ... *E. geniculata*

*Eleocharis acutangula* (Roxburgh) Schultes in Roemer & Schultes, Rao & Verma, Cyp. of N.E. India 23. 1982; Chowdhury, Assam's Flora 300. 2005; *Scirpus acutangulus* Roxburgh, Fl. Ind. 1: 216. 1820; *Eleocharis fistulosa* Schult. in Roem. & Schult., Mant. 2: 89. 1824; C.B. Clarke in Hooker. f., FBI 6: 626. 1893.

Perennial; stems erect, tufted, 38 cm high; leaves reduced to sheaths, leaf-sheaths 2 or 3; spikelets pale green, cylindrical, 9 cm long; basal most glume empty, ovate; perianth bristles 6; style 3-fid.

*Habitat*: Swampy areas; *Flowers & Fruits*: June - October.

*Exsiccatae*: Dharapur, 25.07.2010, *Moitreyee* 220

*Eleocharis congesta* D. Don, Prodr. Fl. Nepal. 41. 1821; C.B. Clarke in Hooker f., FBI 6: 630. 1893; Rao & Verma, Cyp. N.E. India 26. 1982; Chowdhury, Assam's Flora 300. 2005.

Annual; stems tufted, angular; leaves reduced to sheaths; spikelet oblong, 8 cm long, 3 mm wide; glumes imbricate, 1.5 mm wide; perianth bristles present; stamens 2; stigmas 3.

*Habitat*: Swamps, paddy fields; *Flowers & Fruits*: January - November.

*Exsiccatae*: Shantipara, Chandrapur, 12.06.2009, *Moitreyee* 096

*Eleocharis geniculata* (Linnaeus) Roemer & Schultes, Syst. 2: 150. 1817; Chowdhury, Assam's Flora 300. 2005; *Scirpus geniculatus* Linnaeus, Sp. Pl. 48. 1753; *Eleocharis capitata* R. Brown, Prodr. 225. 1810; *Eleocharis retroflexa* (Poir.) Urb., Clarke in Hooker f., FBI 6: 630. 1893; Rao & Verma, Cyp. N.E. India 25. 1982.

Annual; stems tufted, 23 cm high, angular; leaves reduced to sheaths; spikelets subglobose, 2 mm long; glumes 1.5 mm long, ovate, brown; stamens 2; style 2-fid.

*Habitat:* Marshy places; *Flowers & Fruits:* July - January.

*Exsiccatae:* Near Deepor Beel, 29.08.2008, *Moitreyee 048*

*Eleocharis pellucida* J. Presl & C. Presl Reliq. Haenk. 1: 196. 1828; *Eleocharis congesta* D. Don., Rao & Verma, Cyp. N.E. India 25. 1982; Chowdhury, Assam's Flora 300. 2005; *Eleocharis japonica* Miq., Ann. Mus. Lugd.-Bat. 2: 142. 1865; Rejani, Cyperac. Kerala 228. 1991.

Annuals; stems tufted, 26 cm high; leaves reduced; spikelets ovoid, cylindrical, many-flowered; perianth bristles as long as the nutlet; stigmas 3.

*Habitat:* Paddy fields; *Flowers & Fruits:* March - November.

*Exsiccatae:* Choudhury Khat, North Guwahati, 12.08.2011, *Moitreyee 324*

### FIMBRISTYLIS Vahl, Enum. Pl. 2: 285. 1806.

Species about 300 in the tropics and subtropics; 60 species found in India; 40 in N.E. India (Rao & Verma 1982); 9 in the study area.

#### Key to species

- 1a. Spikelets solitary; involucre bract absent; leaves with only a bladeless sheath ... *F. acicularis*
- 1b. Spikelets (1 or) 2 to many; involucre bracts present; leaves with a blade: ... 3
- 2a. Stigmas 2; style compressed, apically ciliate: .... 4
- 2b. Stigmas (2 or) 3; style not compressed or rarely slightly compressed, apically not ciliate: .... 8
- 3a. Spikelets angular because of keeled glumes, 7 mm or less: .... 5
- 3b. Spikelets terete, at least some to 10 mm or more: ..... 7
- 4a. Style base with sparse hairs covering nutlet apex ... *F. squarrosa*
- 4b. Style base glabrous: ..... 6
- 5a. Nutlet broadly obovoid, with transverse oblong reticulation; leaf-sheath greenish yellow; leaf-blade 0.7-1.5 mm wide .... *F. bisumbellata*
- 5b. Nutlet obovoid, almost smooth; leaf-sheath brown; leaf-blade 0.5-1 mm wide ... *F. aestivalis*
- 6a. Spikelets 1-3(-6) ... *F. schoenoides*
- 6b. Spikelets several to many ... *F. dichotoma*
- 7a. Basal part of stems with 1-3 leafless sheaths: ..... 9
- 7b. Stem leaves all with a leaf-blade .... *F. complanata*
- 8a. Leaf-blade bilaterally compressed, ensiform; leaf-sheaths compressed; spikelets spherical or subspherical; glumes 1-1.3 mm ... *F. littoralis*
- 8b. Leaf-blade (if present) dorsiventrally flattened but linear; leaf-sheath tubular, spikelets globose-ellipsoid; glumes 1.5-2.7 mm ..... *F. umbellaris*

*Fimbristylis acicularis* R. Brown, Prodr. Fl. Nov. Holl. 226. 1810; *Fimbristylis acuminata sensu* C.B. Clarke in Hooker f., FBI 6: 631. 1893; Rao & Verma, Cyp. N.E. India 27. 1982; Chowdhury, Assam's Flora 301. 2005.

Annual; stems 5-20 cm high; leaves reduced to sheaths; inflorescence a terminal spikelet; spikelet 5-7 mm long, acute; glumes ovate; stamens 2; style 2-fid.

*Habitat:* Wastelands; *Flowers & Fruits:* August - January.

*Exsiccatae:* Rani, 22.08.2011, *Moitreyee*, 363

***Fimbristylis aestivalis*** (Retzius) Vahl, Enum. 2: 288. 1805; Rao & Verma, Cyp. N.E. India 32. 1982; Chowdhury, Assam's Flora 301. 2005; C.B. Clarke in Hooker f., FBI 6: 637. 1893; *Scirpus aestivalis* Retzius, Observ. Bot. 4: 12. 1786.

Annual; stems 5-25 cm high, 3-angled, with few leaves at base; leaves shorter than culm, 1 mm wide; inflorescence a terminal compound umbel; spikelets 2 mm long, solitary, ovoid; glumes 1.5 mm long; stamen 1; style 2-fid.

*Habitat:* Common weed in the paddy fields; *Flowers & Fruits:* November - May.

*Exsiccatae:* Rani, 22.08.2011, *Moitreyee* 362

***Fimbristylis bisumbellata*** (Forsskål) Bubani, Dodecanthea. 30. 1850; Rao & Verma, Cyp. N.E. India 31. 1982; Chowdhury, Assam's Flora 301. 2005; *Scirpus bisumbellatus* Forsskål, Fl. Aeg.-Arab. 1: 15. 1775; *F. dichotoma* auct. non (Linnaeus) Vahl, Enum, Pl. 2: 287. 1805; C.B. Clarke in Hook. f., FBI 6: 635. 1893;

Annual; stems 15-25 cm high, 0.5 mm in diam.; leaves half of stem length; inflorescence a compound anthela with 15-20 spikes; spikelets solitary; spikes 3 mm long; glumes imbricate, ovate; stamens 1; stigmas 2.

*Habitat:* Frequent along roadside wastelands; *Flowers & Fruits:* February - July.

*Exsiccatae:* Dubjani, North Guwahati, 25.07.2010, *Moitreyee* 221

***Fimbristylis complanata*** (Retzius) Link, Hort. Berol. 1: 292. 1827; Rao & Verma, Cyp. N.E. India 37. 1982; Chowdhury, Assam's Flora 301. 2005; *Scirpus complanatus* Retzius, Observ. Bot. 5: 14. 1789; Hooker f., FBI 6: 646. 1893.

Perennial; stem 40 cm high, 2 mm wide; leaves half of stem length, 4 mm wide; inflorescence a globose anthelodium; spikes many; glumes 2 mm long, acute; stamens 3; stigmas 3.

*Habitat:* Swampy wastelands; *Flowers & Fruits:* June - September.

*Exsiccatae:* Bonda, Chandrapur, 20.08.2011, *Moitreyee* 356

***Fimbristylis dichotoma*** (Linnaeus) Vahl, Enum. 2: 287. 1805; Rao & Verma, Cyp. N.E. India 31. 1982; Chowdhury, Assam's Flora 301. 2005; *Scirpus dichotomus* Linnaeus, Sp. Pl. 1: 50. 1753; *S. diphyllus* Retzius, Obs. Bot. 5: 15. 1789; *Fimbristylis diphylla* (Retzius) Vahl, Enum. 2: 289. 1805; Hooker f., FBI 6: 636. 1896.

Perennial; stems up to 40 cm high, trigonous; leaves 25 cm long; inflorescence a terminal compound umbel; glumes ovate, 2.5 mm long; stamens 1-3; style 2-fid.

*Habitat:* Widespread in dry to swampy places; *Flowers & Fruits:* March - December.

*Exsiccatae:* Rangia, 20.07.2011, *Moitreyee* 269

***Fimbristylis littoralis*** Gaudichaud in Freyn, Voy. Bot. 413. 1826; Rao & Verma, Cyp. N.E. India 36. 1982; Chowdhury, Assam's Flora 301. 2005; Blake in J. Arn. Arbor. 35: 217. 1954; *F. miliacea* sensu Vahl, Enum. 2: 287. 1805 (*Scirpus miliacus* Linnaeus); C.B. Clarke in Hooker f., FBI 6: 644. 1896.

Annual; stems up to 40 cm long, quadrangular; leaves shorter than culm, tapering to a fine point; inflorescence compound umbel; spikelets globose; glumes 1.2 mm long, ovate; stamens 1-3.

*Habitat:* Common along roadside ditches, Paddy fields; *Flowers & Fruits:* June - September.

*Exsiccatae*: Mazgaon, North Guwahati, 12.07.2011, *Moitreyee* 257

***Fimbristylis schoenoides*** (Retzius) Vahl, Enum. 2: 286. 1805; Rao & Verma, Cyp. N.E. India 30. 1982; Hooker f., FBI 6: 634. 1896; Chowdhury, Assam's Flora 301. 2005; *Scirpus schoenoides* Retzius, Obs. Bot. 5: 14. 1789.

Perennial; stems 10-15 cm high; leaves reduced; inflorescence of 1-3 spikelets; spikelets ovoid, 5-7 mm long; glumes ovate; stamens 3; style 2-fid.

*Habitat*: Frequent in wastelands; *Flowers & Fruits*: July - October.

*Exsiccatae*: Thana Bazar, Chandrapur, 12.06.2009, *Moitreyee* 097

***Fimbristylis squarrosa*** Vahl, Enum. Pl. 2: 289. 1806; Rao & Verma, Cyp. N.E. India 31. 1982; Chowdhury, Assam's Flora 301. 2005; *F. aestivalis* var. *squarrosa* Koyama in J. Fac. Sci. Univ. Tokyo III. 8: 116. 1962.

Annual; stems up to 15 cm high; leaves shorter than stem; inflorescence a compound umbel; spikelets ovate, 4-5 mm long; stamens 1; styles 2-fid.

*Habitat*: Marshy places; *Flowers & Fruits*: August - November.

*Exsiccatae*: Palashbari, 15.08.2011, *Moitreyee* 337

***Fimbristylis umbellaris*** (Lamarck) Vahl, Enum. Pl. 2: 291. 1805; *Scirpus umbellaris* Lamarck, Tabl. Encycl. 1: 141. 1791; *Fimbristylis globulosa* (Retzius) Kunth, Enum. 2: 231. 1837; Rao & Verma, Cyp. N.E. India 37. 1982; Chowdhury, Assam's Flora 301. 2005; *F. assamica* C.B. Clarke ex Guha Bakshi in Bull. Bot. Soc. Beng. 24: 111. 1970.

Perennial; stems up to 60 cm high, 3-angled, with 2 or 3 bladeless sheath at base; blades of basal leaves linear; inflorescence a compound anthelodium, with up to 30 spikes; spikes globose, 3 mm wide; stamens 2; stigmas 2.

*Habitat*: Marshy places; *Flowers & Fruits*: July-September.

*Exsiccatae*: Bonda, Chandrapur, 12.06.2009, *Moitreyee* 098

#### **FUIRENA** Rottboell, Descr. & Ic. Nov. Pl. 70. 1773.

Species about 40, in tropical and subtropical regions; 7 species in India 2 in N. E. India and 1 in study area.

***Fuirena umbellata*** Rottboell, Descr. & Ic., Nov. Pl. 70, t. 19, f. 3. 1773; Hooker f., FBI 6: 683. 1893; Rao & Verma, Cyp. N.E. India 48. 1982; Chowdhury, Assam's Flora 301. 2005.

Perennial; rhizome creeping, woody; stems up to 40 cm high; leaves linear-lanceolate, acuminate; spikelets in a simple or compound, axillary and terminal pedunculate, greenish or brownish; stamens 3; stigmas 3.

*Habitat*: Swampy areas; *Flowers & Fruits*: June - December.

*Exsiccatae*: Dharapur, 05.11.2010, *Moitreyee* 249

#### **KYLLINGA** Rottboel, Descr. & Ic. Nov. Pl. 12. 1773.

Species about 60, distributed in tropics and subtropics; 7 species occur in India; 2 in the study area.

*Key to species*

- 1a. Stem caespitose or not; spikelet greenish .... *K. brevifolia*  
 1b. Stem densely caespitose; spikelets whitish ... *K. odorata*

***Kyllinga brevifolia*** Rottboel, Descr. & Ic. 13, t. 4. f. 3. 1773; *Cyperus brevifolius* (Rottboel) Hasskarl, Cat. Hort. Bog. 24: 1844; Rao & Verma, Cyp. N.E. India 6. 1982; Hooker f., FBI 6: 588. 1893; Chowdhury, Assam's Flora 298. 2005.

Rhizome creeping; stems 35 cm high; leaves 26 cm long, shorter than stems, 4 mm wide; spikes solitary ovoid, greenish, 5 mm in diameter; spikelets 2 mm long; lemma 3.5 mm long; palea 3 mm long; stamens 3, 4 mm long; carpel bifid, 4 mm long.

*Habitat*: Very common in wastelands; *Flowers & Fruits*: March - November.

*Exsiccatae*: Mirza, 13.10.2008, *Moitreyee* 069

***Kyllinga odorata*** Vahl, Enum. Pl. 2: 382. 1805; *Kyllinga cylindrica* Nees, C.B. Clarke in Hooker f., FBI 6: 588. 1893; *Cyperus sesquiflorus* (Torr.) Matff. & Kuek. Var. *subtriceps*. (Nees) Koyama, Rao & Verma, Cyp. N.E. India 6. 1982; Chowdhury, Assam's Flora 300. 2005.

Perennial; densely caespitose; stems smooth; leaves flat to slightly folded, shorter than stem, up to 20 cm long, 2 mm wide; spikes whitish, ovoid; spikelets ovate; stamens 2; style 1 mm long.

*Habitat*: Along roadsides; *Flowers & Fruits*: June - August.

*Exsiccatae*: Sonapur, 15.07.2011, *Moitreyee* 266

#### **LIPOCARPHA** R. Brown, in Turkey, Narr. Exp. Congo. 459. 1818.

Species about 15, distributed in America, Africa and Asia; 3 in India; 3 in the study area.

#### *Key to species*

- 1a. Rhizome present ... *L. gracilis*  
 1b. Rhizome absent or obscure: ..... 2  
 2a. Spikelets without glumes .... *L. squarrosa*  
 2b. Glumes present ... *L. chinensis*

***Lipocarpha chinensis*** (Osbeck) Kern in Blumea, Suppl. 4: 167. 1958; Rao & Verma, Cyp. N.E. India 48. 1982; Chowdhury, Assam's Flora 301. 2005; *Scirpus chinensis* Osbeck, Dagb. Ostind. Resa 220. 1757; *Hyphaelytrum argenteum* Vahl, Enum. Pl. 2: 283. 1805; *Lipocarpha argentea* (Vahl) R. Brown in Tuckey, Narr. Exp. Congo. 459. 1818; C.B. Clarke in Hooker f., FBI 6: 667. 1893.

Annual or perennial herbs; rhizome obscure; stems tufted, 35 cm high, trigonous; leaves shorter than stem, 2 mm wide; spikelets 3-4, 5 mm long, whitish; glumes 2.5 mm long; stamens 2; style 3-fid.

*Habitat*: In moist soils, along roadside; *Flowers & Fruits*: April - October.

*Exsiccatae*: Khanapara, Guwahati, 20.12.2008, *Moitreyee* 078

***Lipocarpha gracilis*** (L.C.M. Richard ex Persoon) Nees, Linnaea 9: 287. 1834. *Scleria gracilis* Rich. Actes de la Societe d'Histoire Naturelle de Paris 1:113. 1792. *Kyllinga triceps* Lamarck Tabl. Encycl. 1: 148. 148 1797; *Hypaelytrum sphacelatum* Vahl, Enum. 2: 283.

1806; *Tunga triceps* Roxburgh, Fl. Ind. 1: 183. 1820; *Lipocarpha sphacelata* (Vahl) Kunth, Enum. 2: 267. 1837; Rao & Verma, Cyp. N.E. India 49. 1982; C.B. Clarke in Hooker f., FBI 6: 667. 1893; Chowdhury, Assam's Flora 301. 2005.

Annual; stem glabrous, tufted, 40 cm high, trigonous, smooth; leaves shorter than stem; leaf-blade linear; spikelets clustered in a head, cylindrical; glumes obovate; stigmas 3; style short; nut trigonous.

*Habitat*: Along roadside ditches; *Flowers & Fruits*: August - October.

*Exsiccatae*: Kulsi, 22.08.2011, *Moitreyee* 364

*Lipocarpha squarrosa* (Linnaeus) Goetghebeur, Wageningen Agric. Univ. Pap. 89(1): 71. 1989; *Scirpus squarrosus* Linnaeus, Mant. Pl. Alt. 181. 1771; Rao & Verma, Cyp. N.E. India 49. 1982; Chowdhury, Assam's Flora 302. 2005; *Isolepis squarrosa* (Linnaeus) Kunth, Nov. Gen. Sp. Pl. 1: 202. 1815; *Rikliella squarrosa* (Linnaeus) J. Raynal in Adansonia, ser. 2, 13: 154. 1973; Manilal & Sivar, Fl. Calicut 328. 1982; Rejani, Cyperac. Kerala 411. 1991.

Annual; rhizome absent; stems 26 cm high, smooth; leaves basal, shorter than stem; leaf-blade linear, 3 mm wide; inflorescence a group of sessile cluster of spikes; spikelets without glumes; stamens 2; stigmas 3.

*Habitat*: Grows in fields along with the grasses; *Flowers & Fruits*: June - August.

*Exsiccatae*: Ninth Mile, Guwahati, 25.07.2009, *Moitreyee* 119

#### PYCREUS P. Beauvois, Fl. Oware 2: 48. 1816

Species about 100, in tropics and warm temperate regions; 19 species occur in India; 5 in the study area.

#### Key to species

- 1a. Cells on nutlet surface transversely oblong with an elevated margin resulting in nutlet surface transversely undulately striate .... *P. stramineus*
- 1b. Cells on nutlet surface hexagonally reticulately striate or punctulate: .... 2
- 2a. Glumes broadly sulcate on both surfaces ... *P. sanguinolentus*
- 2b. Glumes not broadly sulcate on both surfaces: ..... 3
- 3a. Glume apices truncate to emarginated and excurved mucronate to awned .... *P. pumilus*
- 3b. Glume apices obtuse or acute and not excurved mucronate: ..... 4
- 4a. Spikelets radiately arranged; rachilla 4-angled; glumes brown to dark brown, laxly imbricate, apex obtuse; anthers oblong .... *P. flavidus*
- 4b. Spikelets suberect; rachilla flexose, narrowly winged; glumes straw-coloured to rarely pale brown, densely imbricate, apex sometimes mucronate; anthers linear ... *P. polystachyos*

*Pycreus flavidus* (Retzius) T. Koyama, J. Jap. Bot. 51: 316. 1976; *Cyperus flavidus* Retzius, Observ. Bot. 5: 13. 1788; Rao & Verma, Cyp. N.E. India 10. 1982; Chowdhury, Assam's Flora 299. 2005; *C. strictus* Roxburgh, Fl. Ind. ed. 1.1: 203. 1820; Cooke, Fl. Pres. Bombay 2: 857. 1908.

Perennials; stems up to 30 cm high, 3-angled, with few leaves basally; leaves 20 cm long, 2 mm wide; involucre bracts longer than inflorescence; inflorescence a simple anthela; spikelets linear, 2 cm long, 1.5 cm broad; spike linear; glume 1.5 mm long; stamen 2; stigmas 2.

*Habitat:* Along roadside; *Flowers & Fruits:* June - November.

*Exsiccatae:* North Guwahati, Near IIT, 20.07.2010, *Moitreyee* 213

***Pycneus polystachyos*** P. Beauvois, Fl. de. And Owarch & Benin 2: 48. t. 86. f.2.1807; *Cyperus polystachyos* Rottboell, Descr. Rar. Nov. Pl. 21.f.1. 1773; Rao & Verma, Cyp. N.E. India 10. 1982; C.B. Clarke in Hooker f. FBI 6: 592. 1893; Chowdhury, Assam's Flora 300. 2005.

Annual; stem 25 cm long, 3 mm in diameter, trigonous; leaves 18 cm long, 1.5 mm wide; inflorescence anthela; spikelets 8 mm long, 1.5 mm wide, 10-30-flowered; glume 1.5 m long, 1 m broad, ovate; stamens 1; style 1 mm long, bifid, slender.

*Habitat:* Wastelands; *Flowers & Fruits:* August - November.

*Exsiccatae:* Gauhati University Campus, 05.08.2011, *Moitreyee* 294

***Pycneus pumilus*** (Linnaeus) Nees in Linnaea 9: 283 1835; *Cyperus pumilus* Linnaeus, Cent. L. Pl. 2: 6. 1756; Rao & Verma, Cyp. N.E. India 9: 1982; Chowdhury, Assam's Flora 300. 2005; *Pycneus nitens* (Retz.) Nees, in Hooker f., FBI 6: 591. 1893.

Annual; stem 25 cm tall, trigonous; leaves 18 cm long, 2 mm broad; inflorescence a compound anthela; spikelet 3 mm long, 8-20-flowered; glume 1.5 mm long, 1 mm broad; stamen 1; style 0.5 mm long, bifid.

*Habitat:* Along roadsides; *Flowers & Fruits:* June - November.

*Exsiccatae:* Rani, 22.08.2011, *Moitreyee* 365

***Pycneus sanguinolentus*** (Vahl) Nees ex C.B. Clarke in Hooker f., FBI 6: 590. 1893; *Cyperus sanguinolentus* Vahl, Enum. Pl. 2: 351. 1805; Rao & Verma, Cyp. N.E. India 9: 1982; Chowdhury, Assam's Flora 300. 2005.

Annual; stems 28 cm high, trigonous, with several leaves basally; leaves 18 cm long, 2 mm broad; inflorescence a simple anthela; spikelet ovoid, 20-flowered; glumes ovate; stamens 2; stigmas 2.

*Habitat:* Roadside wasteland; *Flowers & Fruits:* July - December.

*Exsiccatae:* Rani, 22.08.2011, *Moitreyee* 366

***Pycneus stramineus*** (Nees) C.B. Clarke in Hooker f., FBI 6: 589. 1893; *Cyperus stramineus* Nees in Wight, Contrib. Bot. Ind. 74. 1834, non Desf. 1820. *C. substramineus* Kükenthal in Engl. Pflanzenr. 101: 398. 1936; Rao & Verma, Cyp. N.E. India 7: 1982; Chowdhury, Assam's Flora 300. 2005.

Annual; stems up to 45 cm high; leaves shorter than stem; inflorescence an umbel; spikelet 9 mm long, 2 mm wide, 23-flowered; glumes ovate, 2.2 mm long; stamen 2; style 1 mm long.

*Habitat:* Wastelands; *Flowers & Fruits:* July - November.

*Exsiccatae:* Near Gauhati University Campus, 30.07.2011, *Moitreyee* 286

#### **RHYNCHOSPORA** Vahl, Enum. 2: 229. 1806.

Species about 200 in the warmer regions of the world; 8 species in India; 3 in Assam and 1 in the study area.

***Rhynchospora rubra*** (Loureiro) Makino, Bot. Mag. (Tokyo) 17: 180. 1903; Rao & Verma, Cyp. N.E. India 50: 1982; Chowdhury, Assam's Flora 302. 2005; *Schoenus rubra* Loureiro, Fl. Cochinch. 1: 41. 1790.



Perennial; stems trigonous, nodeless, 18-25 cm high; leaves basal, shorter than stem, 2 mm wide; inflorescence globose, dense; spikelets compressed; glumes brown; style 2-fid; stamens 3, anthers 2 mm long.

*Habitat:* Paddy fields; *Flowers & Fruits:* April - August.

*Exsiccatae:* Rani, 10.08.2011, *Moitreyee* 311

**SCIRPUS** Linnaeus, Sp. Pl. 1: 47 – 52. 1753.

Species 200, distributed all over the world; 25 species in India; 8 in Assam and 1 in the study area.

*Scirpus cyperinus* (Linnaeus) Kunth, Enum. Pl. 2: 170. 1837; *Eriophorum cyperinum* Linnaeus, Sp. Pl. ed. 2, 1: 77. 1762; *Scirpus eriophorum sensu* C.B. Clarke in Hooker f., FBI 6: 661. 1893.

Perennial, clump forming; rhizomes short; stems erect, up to 80 cm tall; leaves 5-10 per stem, 22-60 cm long; leaf-blade 3 mm wide; inflorescence terminal; spikelets in dense cymes of 5-12; spikelets ovoid; styles 3-fid.

*Habitat:* Wastelands; *Flowers & Fruits:* August-September.

*Exsiccatae:* Mazgaon, North Guwahati, 20.07.2009, *Moitreyee* 110

**SCHOENOPLECTIELLA** Lye, Lidia 6(1): 20. 2003.

Species about 26, distributed in tropics and north temperate regions; 3 in the study area.

*Key to species*

- 1a. Achene biconvex; hypogynous bristles present ... *S. juncooides*
- 1b. Achene trigonous or triquetrous; hypogynous bristles absent..... 2
- 2a. Stems up to 90 cm high; glumes ovate ... *S. articulata*
- 2b. Stems up to 40 cm high; glumes elliptic ... *S. supina*

*Schoenoplectiella articulata* (Linnaeus) Lye, Lidia 6: 20. 1994; *Scirpus articulatus* Linnaeus, Sp.Pl. 1: 47. 1753; Rao & Verma, Cyp. N.E. India 43: 1982; Chowdhury, Assam's Flora 302. 2005; *Schoenoplectus articulatus* (Linnaeus) Palla, Bot. Jahrb. Syst. 10: 299. 1888; C.B. Clarke in Hooker f., FBI 6: 656. 1893.

Annual; stems up to 84 cm tall, terete; leaves reduced to sheaths; inflorescence of many sessile spikelets, capitate; spikelets ovoid, 7 mm long; glumes ovate, 5 mm long; stamens 3; stigmas 3; nuts 3-sided.

*Habitat:* Marshy wastelands; *Flowers & Fruits:* May - November.

*Exsiccatae:* Mirza, 10.08.2011, *Moitreyee* 312

*Schoenoplectiella juncooides* (Roxburgh) Lye, Lidia 6: 25. 1994; *Scirpus juncooides* Roxburgh, Fl. Ind. 1: 216. 1820; Rao & Verma, Cyp. N.E. India 42: 1982; Chowdhury, Assam's Flora 302. 2005; *Schoenoplectus juncooides* (Roxburgh) Palla, Bot Jahrb. Syst. 10: 299. 1888.

Annual; stems tufted, up to 60 cm high, 1.5 mm thick, stiff, with a few bladeless leaf sheaths; leaf sheaths 8 cm long; inflorescence a head; spikelets brown, 10-12-flowered; glumes ovate, 3 mm long; stamens 3; stigmas 2.

*Habitat*: Paddy fields; *Flowers & Fruits*: August - November.

*Exsiccatae*: Aamgaon, Chandrapur, 12.06.2009, *Moitreyee* 099

*Schoenoplectiella supina* (Linnaeus) Lye, Lidia 6: 27. 2003; *Scirpus supinus* Linnaeus, Sp. Pl. 1: 49. 1753; *Isolepis supina* (Linnaeus) R. Brown, Prodr. Fl. Nov. Holl. 1: 77. 1810; *Schoenoplectus supinus* (Linnaeus) Palla, Bot. Jahrb. Syst. 10: 299. 1888; *Cyperus supinus* (Linnaeus) Missbach & E.H.L. Krause, Deut. Fl. ed. 2, 2: 20. 1900; *Scirpus lateriflorus* Gmel., Rao & Verma, Cyp. N.E. India 42: 1982. Chowdhury, Assam's Flora 302. 2005.

Annual; stems 25 cm high, terete, 1 mm in diameter; leaf sheaths 10 mm long; inflorescence capitate with 7-8 sessile spikelets; spikes ovoid, 8 mm long; glumes imbricate; style 1.5 mm long; stigmas 3.

*Habitat*: Found to be growing in between grasses in wet soil; *Flowers & Fruits*: July - November.

*Exsiccatae*: Ninth mile, Guwahati, 22.07.2011, *Moitreyee* 274

#### **SCLERIA** P.J. Bergius, K. Vet. Acad. Handl. Stockholm 26: 142. 1765.

Species about 200, found in all tropical and subtropical regions; 20 species occur in India and 2 in the study area.

*Key to species*

1a. Stems 0.3-0.6 m tall; leaf-blade lanceolate; sheaths conspicuously winged or not .....

***S. parvula***

1b. Stems 0.6-3 m tall; leaf-blade linear; sheaths winged

... ***S. terrestris***

*Scleria parvula* Steudel, Syn. Pl. Glumac. 2: 174. 1855; Rao & Verma, Cyp. N.E. India 57: 1982; *Scleria coreana* Palla ex Nakai, Bot. Mag. (Tokyo) 30: 274. 1916; Chowdhury, Assam's Flora 302. 2005; *S. tessellata* Boeck. in. Linnaea 38: 470. 1874. p.p.; Clarke in Hooker f., FBI 6: 686. 1894 p. p.; *non* Willd. 1805.

Perennial; stem 55 cm tall; leaves lanceolate; inflorescence a panicle; spikelets unisexual; nutlet 0.8 in diameter, smooth shining white.

*Habitat*: Along roadside; *Flowers & Fruits*: June - September.

*Exsiccatae*: Kharguli Hills, 24.09.2008, *Moitreyee* 042

*Scleria terrestris* (Linnaeus) Fassett, Rhodora 26: 159. 1924; Rao & Verma, Cyp. N.E. India 60: 1982; Chowdhury, Assam's Flora 302. 2005; *Zizania terrestris* Linnaeus, Sp. Pl. 2: 991. 1753; *S. radula* Hance in Ann. Sc. Nat. Bot. 18: 232. 1862; Clarke in Hooker f., FBI 6: 691. 1894.

Perennials; rhizomes woody; stems up to 1 m tall, 4 mm wide, trigonous; leaf-sheaths papery; inflorescence a panicle; spikelets entirely unisexual; female spikelets grow ahgt base of branch; stigmas 3; anthers linear; nutlet white, spherical.

*Habitat*: Wastelands; *Flowers & Fruits*: May – October.

*Exsiccatae*: Sualkuchi, 30.07.2011, *Moitreyee* 287

#### **DISCUSSION**

During the present investigation 57 species under 14 genera of Cyperaceae are recorded for the sedge flora of the Kamrup district (s.l.) of Assam. The present contribution also adds 5 new species which were not recorded earlier by Rao and Verma (1982) in their work on

**Table 1.** Numerical representation of sedges in the flora from erstwhile Kamrup District of Assam

| Name of Genus            | No. of species |
|--------------------------|----------------|
| <i>Actinoscirpus</i>     | 1              |
| <i>Carex</i>             | 2              |
| <i>Courtoisina</i>       | 1              |
| <i>Cyperus</i>           | 22             |
| <i>Eleocharis</i>        | 4              |
| <i>Fimbristylis</i>      | 9              |
| <i>Fuirena</i>           | 1              |
| <i>Kyllinga</i>          | 2              |
| <i>Lipocarpha</i>        | 3              |
| <i>Pycreus</i>           | 5              |
| <i>Rhynchospora</i>      | 1              |
| <i>Schoenoplectiella</i> | 3              |
| <i>Scirpus</i>           | 1              |
| <i>Scleria</i>           | 2              |

**Table 2.** Sedges of economic potentialities in the flora of Kamrup district (s.l.)

| Plant name                     | Use  |
|--------------------------------|--|
| <i>Cyperus compactus</i>       | Making mats and baskets                        |
| <i>Cyperus involucratus</i>    | As an ornamental plant                         |
| <i>Cyperus iria</i>            | Whole plant used to treat diabetes             |
| <i>Cyperus rotundus</i>        | Rhizome used as anti-poison and as nerve tonic |
| <i>Fimbristylis dichotoma</i>  | Making mats and baskets                        |
| <i>Fimbristylis umbellaris</i> | Making mats and baskets                        |
| <i>Kyllinga odorata</i>        | Making mats and baskets                        |
| <i>Scirpus cyperinus</i>       | Making mats and baskets                        |
| <i>Lipocarpha gracilis</i>     | Decoction of whole plant is given in fever     |

Cyperaceae of North East India. They are *Cyperinus alopecuroides*, *Cyperus involucratus*, *C. fuscus*, *Cyperus imbricatus*, and *Cyperus michelianus* subsp. *pygmaeus*. The study also adds 5 new species to the flora of Assam, namely *Carex finitima*, *Cyperus alopecuroides*, *Cyperus involucratus*, *Cyperus fuscus*, *Scirpus cyperinus* and as those were not recorded by Chowdhury (2005). Thus this type of taxonomic study would definitely help in preparing a modern Flora of Assam.

The analysis of the sedge flora of Kamrup District (s.l.) shows that there are four endangered species as previously listed by Chowdhury (2005) and are: *Cyperus difformis*, *C. platystylis*, *Fimbristylis acicularis*, and *Lipocarpha gracilis*.

There are quite a few species of sedges those are known to be useful to the human society. A scan through the literature (Borthakur 1976; Hartwell 1967 – 1971; Patiri & Borah 2007) nine such species (Table 2) has been recognized.

Till date no any visible attempt is there to conserve these plants but, on the other hand, modification of land for the extension of civilization endangering the habitat and population of these plants along with numerous other species.

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