Pleione 11(2): 195 - 207. 2017. **ISSN: 0973-9467**

doi:10.26679/Pleione.11.2.2017.195-207

Cyperaceae: a review of its taxonomic treatments

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[Received 12.07.2017; Revised 16.10.2017; Accepted 25.11.2017; Published 31.12.2017]

Abstract

Cyperaceae, commonly known as sedges or weeds, is the third largest family in the Monocotyledons and comprises 109 genera and 5500 species. Clarke's pioneer contribution (1893, 1894) in J.D. Hooker's Flora of British India which even after 90 years still continues to remain source of information on Indian Cyperaceae. The accounts of the family in Indian Regional Floras by Prain (1903), Cooke (1908), Haines (1924), Parker & Turill (1929) and Fischer (1931) are largely based on Clarke's contribution. Classification of Cyperaceae is a bit complicated due to the complex nature of certain floral parts. The family has been classified for more than 200 years, starting with division into unisexual and hermaphrodite flowered groups. After that, the family was further divided into as sub-families, groups (today recognized as tribes). Many regional treatments have appeared which provide incomplete coverage of the family, still there is infinite scope for making such classifications more comprehensive. This taxonomic review attempts to up-date our awareness of the family Cyperaceae.

***Key words*:** Cyperaceae; Sedge; Monocotyledons; Classification; Review

INTRODUCTION

Traditional or classical taxonomic classifications of plants were mainly based broadly on the external morphology of their different body parts including flowers, leaves, stems and roots. From the very beginning, there were many competing arguments and ways in which classifications were done. Consequently, the species/genus hierarchies developed were not congruent (Rao & Verma 1982). However, in recent years, the scope of taxonomic classification of plants has broadened much beyond just the morphology. Other branches like chemotaxonomy, numerical taxonomy, embryo-taxonomy, cytotaxonomy, molecular taxonomy, etc. are also contributing much useful data. In each of these branches of systematics, plants are put into different hierarchal classes based on different characteristics of the plant. For example, while in chemotaxonomy, plants are classified by their biochemical composition, it is on chromosomal characteristics in cytotaxonomic treatments. As a result of these modern methods of taxonomical classifications, the whole plant system is getting reorganized according to specific properties, such as chemical properties, genetic properties etc. Although historically much interest was given to the identification and classification of plants of this family, but most of those works focused mainly on external morphological characters. In recent times, Cyperaceae has received very little attention and hence plants in this family have not been classified or reorganized according to different modern concepts used/implemented in plant taxonomy.

Members of Cyperaceae are commonly known as sedges or weeds. Sedges are usually annual or perennial herbs. Annuals have a thick bunch of fibrous roots and perennials have

short or long creeping rhizomes and roots are emerging out of it. Aerial stems/ pseudostems of sedges are usually tufted but occasionally solitary. As the flowers of this family are minute and inconspicuous, the arrangement of the spikelet is considered to be the inflorescence instead of that of the flowers (Prasad & Singh 2002). In general, Cyperaceae are found in diverse habitats, for example, they are found in marshy areas, near ponds, on valley sides, and also sometimes in roadside areas. Specifically for example, species of *Carex* L. are generally found in hilly forest areas. Also, genera like *Cyperus* L., *Fimbristylis* Vahl, *Mariscus* Vahl, *Eleocharis* R.Br., etc. are found as weeds in agricultural fields.

Dispersal of sedges very much depends on the habitat of the species. Species growing in and around water is mostly dispersed through water only. Species found in and around fresh water bodies like marshes, swampy areas, rice fields and other wet land or along riverbanks, lakes etc. are also dispersed through water. Most of these nuts sink in water and are often carried by flowing water or may survive till the water dries up in the seasonal water bodies. There are few species in which some devices are found for their dispersal. For eg. in *Carex* the nut is enclosed by a sac like utricle, which floats on water surface and is dispersed by water current. Nut of many sedges found as weeds are brought to agricultural lands, especially rice fields through irrigation water or along with the crop seeds. Tubers and stolons of some species like *Cypenes rotundus* are also dispersed through irrigation water.

Phenology: The most favorable season of flowering and fruiting in sedges is during August to December.

Table 1. Comparative status of Cyperaceae family

Place	Sources	Reference	Cyperaceae	
			No. of Genera	No. of Species
World	*An integrated system of classification of flowering plants*	Cronquist (1981)	70	4000
World	*The Flora of British India*. Volume 6.	Hooker (1894)	60	3000
World	The plant-book: a portable dictionary of the vascular plants	Mabberley (1997)	98	4350
World	Cyperaceae. *The families and genera of vascular plants*. vol. 4	Goetghebeur (1998)	104	5000
World	Cyperaceae : sedge family	Ball *et al*. (2002)	100	5000
World	*World checklist of Cyperaceae Sedges*	Govaerts *et al*. (2007)	109	5500
Southern California	*Flora of Southern California*	Philip A. Munz (1974)	60	2600
New Zealand	*Flora of New Zealand*, Volume III.	Healy *et al*. (1980)	90	4000
Cyprus	*Flora of Cyprus*, volume 2.	Meikle, R. D. (1985)	90	4000
Assam	Notes on Cyperaceae of Assam	Rao & Verma (1982)	14	173
Assam	Assam's Flora (Present Status of Vascular Plants	Chowdhury *et al*. (2005)	15	131

There is substantial disagreement about taxonomic limits and circumscriptions of many genera of Cyperaceae. Consequently, estimates of numbers of taxa (genera/species) under the family also vary considerably: 70/4000 (Cronquist 1981); 98/4350 (Mabberley 1997); 104/5000 (Goetghebeur 1998); ca. 100/ ca. 5000 (Ball *et al.* 2002); 109/5,500 (Govaerts *et al.* 2007). (Table 1)

Brief history of systematic classification:

Taxonomy and classification of Cyperaceae is exciting but a bit complicated due to the presence of a very large number of species and the highly complex nature of inflorescence. The Cyperaceae have been classified for more than 200 years, starting with de Jussieu's (1789) division of the family into unisexual and hermaphrodite flowered groups. After that, the family was further divided into sub-families and groups (today recognized as tribes) (e.g. Bentham & Hooker 1883; Koyama 1961, 1969, 1971; Goetghebeur 1986). Coverage of the family still remains incomplete as most of the treatments were regional and covered only scattered genera.

A monographic study of the whole family at the global level is very difficult and such study has been done at regional levels mainly for selected genera only, like *Carex* L. as done by Ohwi (1936 – 1944) and Akiyama (1935 – 1955) for Eastern Asia, by Mackenzie (1931 – 1940), Beetle (1940 – 1953), and Svensen (1929 – 1939) for North America, by Krechetovich (1935) and others for the former USSR, and Nelmes (1946 – 1955) and Kern (1955 – 1974) for the Malaysian region. A monographic study of the family for the Indian subcontinent or for the country as a whole has not yet been done, except Bruhl's (1995) work, Sedge Genera of the World: Relationships and a New Classification of the Cyperaceae. In his publication, he briefly described the whole family with systematic relationships and proposed a new classification. Tables 2 and 3 summarizes the more recent and less comprehensive classifications of Cyperaceae. In most of the classifications of the family reflected giving weightage on unisexual versus bisexual flowers; the Diclines (unisexual) / Caricoideae comprises the unisexual flowered tribes and the Monoclines (bisexual) / Cyperoideae/ Scirpoideae the bisexual flowered tribes. Tribes and subfamilies are recognized in all these schemes, except Hooper (1973) who adopted only tribes. The classifications of Bentham and Hooker (1883) and Schultze-Motel (1964) at the subfamily and tribal level were ostensibly based on flower and spikelet characters. Hooper (1973) presents her classification, without subfamilies, in the form of a key to the tribes largely based on floral and spikelet characters. The classifications of Koyama (1961) have broadened, from being limited largely to consideration of floral, spikelet, and inflorescence morphology to later inclusion of substantial evidences from the anatomical features of fruits and vegetative parts (Koyama 1969, 1971).

Koyama (1961) discussed the history of the classification of Cyperaceae with reference to floral, spikelet and inflorescence morphology. In the beginning, he used four sub-families and six tribes: Cypereae, Hypolytreae, Scirpeae, Rhynchosporeae, Sclerieae, and Cariceae; but later on he divided the family into three sub-families with analyses of fruit anatomy and vegetative anatomy (Koyama 1969, 1971). Bentham and Hooker (1883) used reproductive morphology of the flowers to divide the family into two subfamilies, the Monoclines having bisexual flowers and Diclines bearing unisexual flowers. They grouped three tribes under the Monoclines: Scirpeae, Hypolytreae, and Rhynshosporeae and another three tribes under Diclines: Cryptangieae, Sclerieae, and Cariceae. The classifications of Bentham and Hooker (1883) and Schultze-Motel (1964) were similar in terms of the groups recognized at the subfamilial and tribal level and both were ostensibly based on flower and spikelet characters. Clarke's (1908) classification was published without further explanation, but his (Clarke

Table 2. Placement of different genera of Cyperaceae under different tribes by different authors

Author	Subfamily & Tribe	Genus
Bentham & Hooker 1883	**Subfamily: Monoclines** Tribe I: Scirpeae	*Cyperus* L., *Kyllinga* Rottb., *Courtoisina Soják, Androtrichum* Brongn , *Dulichium* Pers., *Heleocharis* P.Beauv. ex T. Lestib., *Dichromena* Michx., *Psilocarya* Torr., *Fimbristylis* Vahl, *Pentasticha* Turcz., *Scirpus* L., *Eriophorum* L., *Ficinia* Schrad., *Hemichlaena* Schrad., *Fuirena* Rottb., *Hemicarpha* Nees, *Lipocarpha* R.Br.
	Tribe II: Hypolytreae	*Ascolepis* Nees, *Hypolytrum* Rich. ex Pers., *Diplasia* Rich., *Mapania* Aubl., *Scirpodendron* Zipp. ex Kurz, *Exocarya* Benth., *Lepironia* Rich., *Chorisandra* Benth., *Chrysitrix* L.
	Tribe III: Rhynchosporeae	*Oreobolus* R.Br., *Remirea* Aubl., *Arthrostylis* R.Br., *Actinoschoenus* Benth., *Rhynchospora* Vahl, *Cyathochaete* Benth., *Carpha* Banks & Sol. ex R.Br., *Mesomelaena* Nees, *Trianoptiles* Fenzl, *Schoenus* L., *Cyclocampe* Steud., *Elynanthus* P.Beauv. ex T.Lestib., *Tricostularia* Nees ex Lehm., *Lepidosperma* Labill., *Cladium* P.Browne, *Gahnia* J.R.Forst. & G.Forst., *Caustis* R.Br., *Reedia* F.Muell., *Evandra* R.Br.
	Subfamily: Diclines Tribe IV: Cryptangieae	*Lagenocarpus* Nees, *Cryptangium* Schrad. ex Nees, *Fintelmannia* Kunth, *Cephalocarpus* Nees, *Pteroscleria* Nees, *Calyptrocarya* Nees, *Becquerelia* Brongn., *Hoppia* Nees
	Tribe V: Sclerieae	*Eriospora* Hochst. ex A.Rich., *Scleria* P.J.Bergius, *Kobresia* Willd.
	Tribe VI: Cariceae	*Hemicarex* Benth., *Schoenoxiphium* Nees, *Uncinia* Pers., *Carex* L.
Hooker 1894	**Subfamily: Cypereae** Tribe I: Eucypereae	*Kyllinga* Rottb., *Pycreus* P.Beauv., *Juncellus* C.B.Clarke, *Cyperus* L., *Mariscus* Vahl, *Courtoisia* Nees
	Tribe II: Scirpeae	*Eleocharis* R.Br., *Fimbristylis* Vahl, *Bulbostylis* Kunth, *Scirpus* L., *Eriophorum* L., *Fuirena* Rottb., *Lipocarpha* R.Br.
	Tribe III: Rhynchosporeae	*Rhynchospora Vahl, Schoenus* L., *Cladium* P.Browne, *Micropapyrus* Suess., *Lepidosperma* Labill., *Gahnia* J.R.Forst. & G.Forst., *Remirea* Aubl.
	Subfamily: Hypolytreae	*Hypolytrum* Rich. ex Pers., *Thoracostachyum* Kurz, *Mapania* Aubl., *Scirpodendron* Zipp. ex Kurz, *Lepironia* Rich.
	Subfamily: Sclerieae	*Scleria* P.J.Bergius
	Subfamily: Cariceae	*Kobresia* Willd., *Carex* L.
Clarke (1900)	Subfamily: Scirpo-Schoeneae Tribe I: Cypereae	*Kyllinga* Rottb., *Pycreus* P.Beauv., *Juncellus* C.B.Clarke, *Cyperus* L., *Mariscus* Vahl, *Torulinium* Desv. ex Ham.
	Tribe II: Scirpeae	*Eleocharis* R.Br., *Bulbostylis* Kunth, *Fimbristylis* Vahl, *Lipocarpha* R.Br., *Scirpus* L., *Eriophorum* L., *Fuirena* Rottb.,

Author	Subfamily & Tribe	Genus
Clarke (1900) contd.	Tribe III: Rhynchosporeae	*Dichromena* Michx., *Rhynchospora* Vahl, *Pleurostachys* Brongn.
	Tribe IV: Schoeneae	*Cladium* P.Browne, *Remirea* Aubl.
	Subfamily: Scleri-Cariceae Tribe V: Sclerieae	*Lagenocarpus* Nees, *Scleria* P.J.Bergius, *Diplacrum* R.Br., *Calyptrocarya* Nees
	Tribe VI: Cariceae	*Uncinia* Pers., *Carex* L.
	Subfamily: Mapanieae	*Hypolytrum* Rich. ex Pers., *Diplasia* Rich
Bruhl (1995)	Subfamily: Cyperoideae Tribe I: Cypereae	*Alinula* J.Raynal, *Ascolepis* Nees, *Ascopholis* C.E.C.Fisch., *Courtoisina* Soják, *Cyperus* L., *Hemicarpha* Nees, *Kyllinga* Rottb., *Lipocarpha* R.Br., *Mariscus* Vahl, *Monandrus* P. Vorster., *Pycreus* P.Beauv., *Queenslandiella* Domin, *Remirea* Aubl., *Rikliella* J.Raynal, *Sphaerocyperus* Lye, *Torulinium* Desv. ex Ham., *Volkiella* Merxm. & Czech
	Tribe II: Scirpeae	*Actinoscirpus* (Ohwi) R.W.Haines & Lye, *Androtrichum* Brongn, *Anosporum* Nees, *Blysmopsis* Oteng-Yeb., *Blysmus* Panz. ex Roem. & Schult., *Bolboschoenus* (Asch.) Palla, *Desmoschoenus* Hook.f., *Dulichium* Pers., *Egleria* L.T.Eiten, *Eleocharis* R.Br., *Eleogiton* Link, *Eriophoropsis* Palla, *Eriophorum* L., *Erioscirpus* Palla, *Ficinia* Schrad., *Fuirena* Rottb., *Isolepis* R.Br., *Kyllingiella* R.W.Haines & Lye, *Oreobolopsis* T.Koyama & Guagl., *Oxycaryum* Nees, *Phylloscirpus* C.B.Clarke, *Pseudoschoenus* (C.B.Clarke) Oteng-Yeb., *Schoenoplectus* (Rchb.) Palla, Scirpoides Seg., *Scirpus* L., *Sumatroscirpus* Oteng-Yeb., *Trichophorum* Pers., *Websteria* S.H.Wright
	Tribe III: Abildgaardieae	*Abildgaardia* Vahl, *Bulbostylis* Kunth, *Crosslandia* W.Fitzg., *Fimbristylis* Vahl, *Nelmesia* Van der Veken, *Nemum* Ham., *Tylocarya* Nelmes
	Tribe IV: Arthrostylideae	*Actinoschoenus* Benth., *Arthrostylis* R.Br., *Trachystylis* S.T.Blake, *Trichoschoenus* J.Raynal
	Subfamily: Caricoideae Tribe V: Rhynchosporeae	*Micropapyrus* Suess., *Pleurostachys* Brongn., *Rhynchospora* Vahl, *Syntrinema* H.Pfeiff.
	Tribe VI: Schoeneae	*Baumea* Gaudich., *Carpha* Banks & Sol. ex R.Br., *Caustis* R.Br., *Cladium* P.Browne, *Costularia* C.B.Clarke ex Dyer, *Cyathochaeta* Nees, *Cyathocoma* Nees, *Epischoenus* C.B.Clarke, *Evandra* R.Br., *Gahnia* J.R.Forst. & G.Forst., *Gymnoschoenus* Nees, *Lepidosperma* Labill., *Lophoschoenus* Stapf,

Author	Subfamily & Tribe	Genus
Bruhl (1995) contd.	Tribe VI: Schoeneae [contd.]	*Machaerina* Vahl, *Mesomelaena* Nees, *Morelotia* Gaudich., *Neesenbeckia* Levyns, *Oreobolus* R.Br., *Ptilothrix* K.L.Wilson, *Reedia* F.Muell., *Rhynchocladium* T.Koyama, *Schoenoides* Seberg, *Schoenus* L., *Tetraria* P.Beauv., *Trianoptiles* Fenzl, *Tricostularia* Nees ex Lehm.
	Tribe VII: Cryptangieae	*Cephalocarpus* Nees, *Didymiandrum* Gilly, *Everardia* Ridl. & Gilly, *Lagenocarpus* Nees
	Tribe VIII: Trilepideae	*Afrotrilepis* (Gilly) J.Raynal, *Coleochloa* Gilly, *Microdracoides* Hua, *Trilepis* Nees
	Tribe IX: Cariceae	*Carex* L., *Cymophyllus* Mack., *Kobresia* Willd., *Schoenoxiphium* Nees, *Uncinia* Pers., *Vesicarex* Steyerm.
	Tribe X: Sclerieae	*Acriulus* Ridl., *Scleria* P.J.Bergius
	Tribe XI: Bisboeckelereae	*Becquerelia* Brongn., *Bisboeckelera* Kuntze, *Calyptrocarya* Nees, *Diplacrum* R.Br.
	Tribe XII: Hypolytreae	*Capitularina* J.Kern, *Chorizandra* R.Br., *Chrysitrix* L., *Diplasia* Rich., *Exocarya* Benth., *Hellmuthia* Steud., *Hypolytrum* Rich. ex Pers., *Lepironia* Rich., *Mapania* Aubl., *Mapaniopsis* C.B.Clarke, *Paramapania* Uittien, *Principina* Uittien, *Scirpodendron* Zipp. ex Kurz, *Thoracostachyum* Kurz

1902) regional treatment of tropical Africa and illustrations (Clarke 1909) suggest that he at least took account of broad range of inflorescence and floral characters. More recent treatments of Cyperaceae have been influenced by the accumulation of data on additional features: notably vegetative morphology and anatomy, with major contributions from Goetghebeur (1986) and Bruhl (1990, 1995).

According to Koyama (1961), *Scleria* P.J. Bergius, is closely related to Rhynchosporoideae in its spikelets. The modified prophyll, sac like utricles of *Carex* L. is not found in *Scleria*. Hence, Koyama preferred to separate Sclerieae from Caricoideae to keep it under the Rhynchosporoideae. The major division of the family is based on the morphology of flowers, the number of fruit-bearing flowers within a spikelet, and to an extent, the presence or absence of terminal flowers.

Ascherson and Graebner (1902) separated the tribe Rhynchosporeae from the subfamily Scirpoideae and raised it to the level of a subfamily as Rhynchosporoideae as it has many empty glumes with only a few fruit bearing glumes, compared to other tribes of Scirpoideae. Thus the family was divided into three subfamilies as Scirpoideae, Rhynchosporoideae, and Caricoideae. Ohwi (1944) mostly agreed with this system, but transferred the tribe Sclerieae to the subfamily Rhynchosporoideae and also added one more tribe Gahnieae to it. This system of classification is therefore based on the reproductive morphology of flowers as well as the number of empty or fertile glumes in the spikelets. Ohwi (1965) found Sclerieae to be closer to Rhynchosporeae than to Cariceae and hence placed it under Rhynchosporoideae.

Table 3. Comparison of four important classifications of Cyperaceae at the subfamily (in bold) and tribe levels.

Koyama (1961)	**Schultze-Motel** (1964)	**Koyama** (1969/1971)	**Goetghebeur** (1986)
Mapanioideae Hypolytreae **Scirpoideae** Scirpeae Cypereae **Rhynchosporoideae** Rhynchosporeae Sclerieae **Caricoideae** Cariceae	**Cyperoideae** Hypolytreae Dulichieae Scirpeae Rhynchosporeae Cypereae **Caricoideae** Sclerieae Lagenocarpeae Cariceae	**Mapanioideae** Sclerieae Lagenocarpeae Mapanieae **Scirpoideae** Scirpeae Cypereae Rhynchosporeae **Caricoideae**	**Mapanioideae** Hypolytreae Chrysitricheae **Cyperoideae** Scirpeae Fuireneae Eleocharideae Abildgaardieae Ficinieae Cypereae Dulichieae Arthrostylideae Rhynchosporeae Schoeneae **Sclerioideae** Cryptangieae Trilepideae Sclerieae Bisboeckelereae **Caricoideae** Cariceae

Flowers hermaphrodite:
Spikelets many; flowered
Tribe 1. Scirpeae
Spikelets 1- 2; flowered
Tribe 2. Rhynchosporeae
Flowers unisexual:
Achenes (Nuts) naked
Tribe 3. Sclerieae
Achenes in a closed sac
Tribe 4. Cariceae

The systems based on the reproductive morphology and the number of flowers can be summarized as proposed by Mackenzie (1931–1935) for the North American Flora (vol. 18)

The subfamilies Scirpoideae and Rhynchosporoideae are morphologically similar and usually treated together under Scirpoideae. But Koyama separated them because there are fewer flowers in Rhynchosporoideae compared to Scirpoid genera. Usually in all the Scirpoid genera all the glumes are flower bearing but in Rhynchosporoid genera some glumes are empty and hence fewer flowers (Koyama 1961). According to him, Scirpoid spikelets are

not fundamentally different from the Rhynchosporoid type, but they are a reduced condition of the latter type only. Usually *Scleria* is treated under the subfamily Caricoideae. But Koyama **(**1961**)** transferred the tribe Sclerieae to the subfamily Rhynchosporoideae.

Although there are some differences among the systems discussed above, all are based on the supposition that the strictly unisexual flowers of caricoid genera have evolved from the primitive bisexual flowers of Cyperoideae. But the link between the bisexual flowers of the Cyperoideae and the unisexual flowers of the Caricoideae is not yet found in the form of a vestige of the other sex or of the hypogynous bristles or scales in the flower of Caricoideae. But according to Kern (1974), if the so called partial inflorescence of Hypolytreae is considered homologous with the bisexual flowers in Cyperaceae, this tribe should be placed at the beginning of the subfamily Cyperoideae and not at the end of Caricoideae. He classified the family as shown below:

A. Subfamily	**Cyperoideae**
I Tribe	Hypolytreae
II Tribe	Cypereae
III Tribe	Rhynchosporeae
B. Subfamily	**Caricoideae**
IV Tribe	Sclerieae
V Tribe	Cariceae

Bruhl (1995) proposed a new Suprageneric classification of the family. He divided the family into two subfamilies and 12 tribes. There are four tribes under the subfamily Cyperoideae viz. Cypereae (17 genera), *S*cirpeae (27 genera), Abildgaardeae (7 genera) and Anthrostylideae (4 genera). The subfamily Caricoideae has 8 tribes as Rhynchosporeae (4 genera*),* Schoeneae (27 genera), Cryptangieae (5 genera), Trilepideae (4 genera), Cariceae (6 genera), Sclerieae (2 genera), Bisboeckelereae (4 genera), and Hypolytreae (14 genera).

DISCUSSION

This paper primarily reviews knowledge available in reviewed scientific literature, books, and academic theses. Some additions would have made this more comprehensive. An overview of the phylogeny of Cyperaceae would have been useful for overall context. In this article we have presented a historical review of classical taxonomy of the Cyperaceae. We can observe from this review that historically there has been quite a lot of interest in the taxonomy of this family, but there were huge time gaps between each study, it is highly probable that a large number of species of Cyperaceae have not yet been identified and properly classified.

Cyperaceae or the sedge family with its wide range of distribution & habitat adaptability found a place even in the pre-Linnaean contributions of Tournfort (1719) & Micheli (1729). Linnaeus (1753 & 1754) described 5 genera & 81 species. Subsequent floristic works include many novelties in Cyperaceae also & of these historical works, in particular relation to Indian plants, Burman (1768), Linnaeus (1767 & 1771), Rottboell (1773), Retzius (1786-1791), Willdenow (1797-1830), Vahl (1805/1806), Brown (1810), Roxburgh (1820, 1824, 1832) & Miquel (1855-1859). These were followed by more comprehensive treatments of Cyperaceae by Nees (1834), Kunth (1837), Steudel (1854 – 1855), Boott (1858-1867), Boeckeler (1868-1877), Bentham (1881, 1883) and Pax (1888). It is Clarke's pioneer contribution (1893, 1894) in J.D. Hooker's Flora of British India which even after 90 years

still continues to be remain source of information on Indian Cyperaceae. The accounts of the family in Indian Regional Floras published afterwards in the first half of 20th century also deals with sedges of corresponding regions as Bengal (Prain, 1903), Bihar and Orissa (Haines, 1924), Gangetic Plains (Parker & Turill, 1929) and erstwhile presidencies of Bombay (Cook, 1908) and Madras (Fischer, 1931). Sedgewick (1918) published a detailed account of Cyperaceae alone and Blatter & McCann (1934-1935) added many species of sedges to the flora of Bombay presidency while revising the flora of the region.

Charles Baron Clarke, who came to India in 1866 as a mathematics teacher seems to have been particularly attracted towards Cyperaceae & made special collections of this family in the Khasi hills in 1867, 1872 & later as Ispector of schools between 1883 – 1887, extensively at Shillong & nearby areas, & along Golaghat. All these collections from this region, along with those from other parts of the country, were the basis of Clarke's account of the Indian Cyperaceae (in Hook.f., F1. Brit. Ind. 6: 585 – 748. 1893 – 1894) & his subsequent phyto-geographical interpretation (in J. Linn. Soc. Bot. 34:1 – 146. 1898). With particular reference to the North Eastern region, it observed that most of the collections came only from the Khasi & Jaintia hills & the Brahmaputra Valley, & very little or nothing from the rest of this botanical bountiful area.

The Flora of Assam, first four volumes are on Dicots and the fifth volume is on Poaceae, which indicates that, so far as the Flora of Assam is concerned, monocots are not fully explored other than Poaceae. Although Rao and Verma (1981 – 1982) has published "Cyperaceae of North East India", where reported species 173 belonging to 14 genera. Cyperaceae of Assam was given insufficient emphasis and Southern Assam particularly, remained very poorly explored as only a few references from Cachar appear in that publication. While studying Assam's Flora (Present Studies of Vascular Plants)" Chowdhury *et al.* (2005) reported 131 species belonging to 15 genera. Our study of Cyperaceae in Southern Assam revealed the presence of 75 species of sedges belonging to 11 genera Pal *et al.* (2010). It is remarkable that from the Southern Assam region, Pal & Choudhury (2010) has newly added 8 species belonging to 3 genera viz., *Pycreus pumilus* (L.) Nees; *Pycreus sanguirolentus* Vahl; *Pycreus puncticutus* Vahl; *Kyllinga brevifolia* Rottb.; *Kyllinga monocephala* Rottb.; *Mariscus cyperinus* (Retz.) Vahl; *Mariscus dubius* (Rottb.) Kukenth and *Mariscus sumatrensis* (Retz.) J. Raynal.

Acknowledgments

The authors thank Dr. Timothy A. Pearce of Carnegie Museum of Natural History in Pittsburgh, for his opinion on nomenclature and editing the first manuscript. Thanks are due to Bonnie Isaac, Carnegie Museum of Natural History in Pittsburgh, for access to Library facilities.

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