

WEEDS OF PAKISTAN: CYPERACEAE

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ABSTRACT

The important weeds of Cyperaceae excluding the genus Carex infesting various crops number approximately 34. These include the genera Bolboschoenus, Bulbostylis, Cyperus, Eleocharis, Fimbristylis, Pycneus and Schoenoplectus. Cyperus esculentus and C. digitatus are often reported as weeds but the identification in most of the cases is to be re-confirmed. Cyperus esculentus in most of the cases is being confused with C. alulatus, sometimes with C. rotundus and C. iria; therefore, a recollection of the plants as weeds is required from the fields for further study. Cyperus difformis is a serious weed in rice, C. rotundus is distributed throughout the country propagating by tubers and seeds. The annual nature of Fimbristylis is an important feature of the weeds in rice. Pycneus species are rice weeds effectively competing for light by the rapid growth of the culms. Kyllinga has a great variation in size, many small plants or a few large plants compete for nutrition in the crop. Schoenoplectus species are all important as rice weeds.

Key words: Cyperaceae, Pakistan, weeds.

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INTRODUCTION

Although this family is well distributed worldwide, it is interesting to note that the majority of the Cyperaceae occur within the temperate and cold regions of the world (Hafliger *et al.*, 1982). The members of Cyperaceae rarely appear in dry areas. Anatomical surveys indicate that Cyperaceae leaves and culms exhibit many of the structural features characteristic of wetland plants, one prominent feature is the presence of extensive intercellular spaces (Bruhl, 1995).

The family is a large and widespread one, most suited to damp habitats with a preference for waterlogged, often acid soils (Strasburger, 1965), rich in humus (Chopra, 1970). Cyperaceae are the third largest family in the monocotyledons. In conservation they

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are found as dominant components of many wetland ecosystems and are reliable indicators of habitat deterioration (Simpson *et al.*, 2003).

There are many adaptations to particular habitats. Many species survive the unfavorable season as rhizomes, corms or tubers; others have succulent, water-storing leaf sheaths. In arid areas and crops many species have become annuals, completing their life cycles in a short period. In fire-regulated grasslands species develop thickened and hardened or fibrous leaf sheaths. The survival of weeds in Cyperaceae is in part due to the ability of the rhizomes to grow anaerobically at least for some period.

The importance of sedges lies in their densely tangled rhizomes that contribute to erosion control and water purification. A modern usage for sedges is in artificially constructed water purification beds, *Schoenoplectus lacustris* is commonly used for this in Europe. Starchy, protein-rich corms of tiger-nut or chufa (*Cyperus esculentus* var. *sativus*) and Chinese water chestnut (*Eleocharis dulcis* varieties) are utilized by humans for food, drinks, perfume and as medicine. They are traditionally used for thatching, paper-making (*Cyperus papyrus*) and for weaving household items like various mats and bread baskets.

Several species such as *Cyperus papyrus* and *Cyperus alternifolius* (umbrella sedges) are used in horticulture for waterside planting. Two of the world's worst weeds, *Cyperus rotundus* and *C. esculentus* are weeds of irrigated land where ploughing spreads their tubers and corms to such an extent that the crop plant is sometimes totally smothered.

The sedges (Grass-like monocots) often resemble the true grasses so much that they are commonly mistaken for them. Grasses and sedges are often referred to as graminoid; in order to reduce confusion, the term graminoid may be restricted to grasses (Poaceae) and the term cyperoid to members of the sedge family (Archer, 2005). The Cyperaceae is perhaps closest to the grasses (Gramineae), but the relationship is not close despite the superficial similarities in habit and appearances.

General features of Cyperaceae

The sedges are generally distinguished by the often solid and three angled stems, closed leaf sheath and the absence of ligules. Another distinctive feature is that each individual flower is subtended by a single glume (Heywood, 1993). The gynoecium consists of a single compound pistil of usually 2 or 3 carpels, a single style usually with 2 or 3 lobes or branches, and a superior ovary with single locule containing a basal ovule.

There are no specific features which can be applied to all the species of this diverse family. An important distinction between the anatomy of the Cyperaceae and Poaceae is that the volume of intercellular space is greater for both C₃ and C₄ species of Cyperaceae; this is likely correlated with differences in ecological distribution (Soros and Dengler, 1998). Several species exhibit Kranz anatomy (Martins and Alves, 2009).

Intercellular space functions both as a reservoir for O₂-enriched air important for plants rooted in O₂ poor, waterlogged soils and as a pathway facilitating the diffusion of O₂ and CO₂ between photosynthetic organs and rhizomes (Li and Jones, 1995). Aerenchyma also provides the greatest mechanical strength with the least investment in tissue volume (Kaul, 1971). Climate change may lead to ecological succession, particularly the invasion of sedges into currently wet sites. During wet periods, the sedges may cause CH₄ fluxes to be higher than is currently predicted for climate change scenarios (Strack *et al.*, 2006).

Mostly perennial, rarely annuals perennating by means of an underground rhizome that gives rise to solitary or clustered 3-angled and solid stems. The stem is usually triangular, apparently leafless above, non-branching, without nodes and is rarely hollow. Leaves three-ranked and principally basal frequently having a leaf-blade; the leaf sheath is united to form a tube, ligules absent. The basic unit of the inflorescence in sedges is the spikelet. In the sedges there is enormous variation in spikelet and inflorescence structure. The spikelet consists of one to several, tiny, male, female or bisexual flowers, each borne in the axil of a boat-shaped glume (tiny bract) variously coloured in shades of green or brown, red, sometimes white or bright yellow.

Flowers are grouped in spikelets and these spikelets are frequently grouped in different ways to form inflorescence subtended by foliaceous bracts. The different forms of inflorescence include anthela (modified cyma), corymb, capitulum and spike. The spike is a fairly frequent inflorescence being a basic unit of the anthela. Estimates of numbers vary greatly due to differing taxonomic concepts of individual researchers. The family comprises of 104 genera and more than 5000 species worldwide (Archer, 2005).

An attempt has been made to represent the important weeds of the genera *Bolboschoenus*, *Bulbostylis*, *Cyperus*, *Eleocharis*, *Fimbristylis*, *Pycreus* and *Schoenoplectus* (Table-1). The *Carex* species need to be collected and identified as little collection is available from the point of view as weeds. The *Carex* species reported as weeds by Kukkonen (2001) are *C. pycnostachya*, *C. diandra* and *C. divisa*. *Carex fedia* reported by Ahmad (1954) from Lahore, is also found along

ditches and wet places around Islamabad. Therefore a thorough collection of *Carex* is required before status of these weeds can be ascertained.

RESULTS AND DISCUSSION

***Bolboschoenus* (Aschers.) Palla**

Bolboschoenus (Asch.) Palla is a genus widely distributed around the world, comprising about 15 species. It is a perennial with tuberous swollen bases to the culms (Table-2). Leaves cauline laminate. Flowers hermaphrodite, with or without up to 6 hypogynous bristles, spirally arranged in large, pedunculate spikelets, several leaf like bracts. Style base not enlarged, persistent. Achene surface smooth.

***Bolboschoenus affinis* (Roth) Drobov,**

Trav. Mus. Bot. Acad. Sci. Petersb. 16: 139 (1916) (Fig. 1)

Synonym: *Scirpus affinis* Roxb.

Life form	Perennial.
Roots	Short fibrous
Stem	Rhizome creeping or stolons ending in dark tubers. Stem trigonous above, 10-60 cm leafy throughout.
Leaves	As long as or longer than stem. Sheaths green or yellow brown, blades up to 30 cms flat or folded, grey green.
Inflorescence	Simple compact umbel. One to 15 spikes sometimes with 1-2 branches ending with cluster of 1-3 spikes. Involucral bracts often 2-5, foliaceous, the longest usually erect and much longer than the inflorescence. Spike turgid yellow brown to brown.
Seed	Nut 2.1-3.8 (4) mm long, ovoid to obovoid, lenticular or trigonous and plano-convex, apex rounded to conical, surface reticulate, white or yellowish brown, flossy.

***Bulbostylis* Kunth**

Bulbostylis differs from *Fimbristylis* is being much more slender, with filiform stems and leaves, sheaths with long white hairs at apex and above all in the thickened style base which persists as a disc on the nut rather than whole style being deciduous (Noltie, 1994). In *Bulbostylis densa* the Fl of Frt. is from June-Oct. Found in open to shady places, on sandy-loam to gravelly substratum and rock-crevices, often a common weed in the paddy-fields. It is one of the few species common in pine forests; 600-2000 m.

***Bulbostylis densa* (Wall. Ex Roxb.) Hand.-Mazz.**

Karsten and Schenk, Vegetationsbilder 20:16(1930); Hera:467 (1942), Kern: 538 (1974); T. Koyama: 324 (1985). Type: India, Wallich 3514(c).

Synonym: *Scirpus densus* Wall. ex Roxb.

Life form Densely tufted annual.

Roots Fibrous

Stem 4-30 cm leaf like, 4-6 angled, deeply grooved, grey green

Leaves Basal and sub-basal erect very acute half or more of stem length, filiform, sheaths yellowish, grey or pale brown, membranous.

Inflorescence Umbellate (occasionally reduced to a single spikelet), spikelets sessile and rayed, rays 1-3, 0.4-2.5cm each bearing a single spikelet or again branched, lowest bract with filiform tip shorter than infl.

Seed Nuts crowned with small brown disc, strongly trigonous, faces abovate to shallowly obcordate, 0.6-0.7 x 0.9 mm, cream initially, finally greyish, surface densely but finely papillose.

***Bulbostylis barbata* (Rottboell) C.B. Clarke, Fl. Brit. India 6: 651 (1893) (Fig. 2)**

Differs from *B. densa* in its densely congested terminal head of spikelets 0.2-1.5 cm diameter; glumes uniformly orange-brown, with midrib continued into short, slightly recurved apiculus; nut smooth. It is an annual.

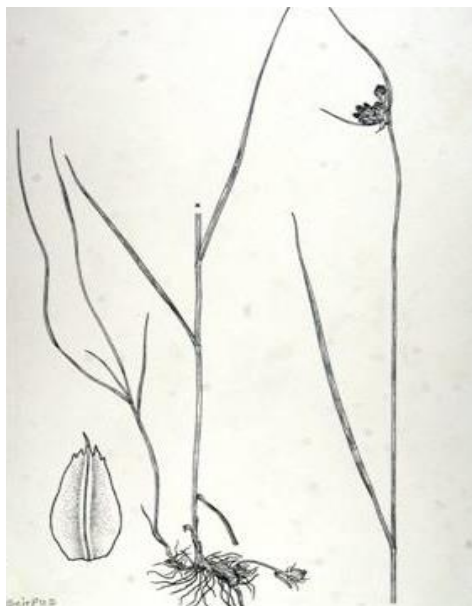


Figure 1. *Bolboschoenus affinis* (Roth) Drobov Figure 2. *Bulbostylis barbata* (Rottb.) C.B. Clarke

Cyperus L. Sp. Pl. 1: 44. 1753

According to Kukkonen (2001) the classification of the highly variable genus *Cyperus* is still unstable. Mostly perennials sometimes annuals, some exceed 150 cm. it is a creeping rhizome, producing stolons or tillers and sometimes tubers. Inflorescence varies from few spikes to compact heads or compound anthelodium (Table-3), flowers bisexual; nut trigonous or biconvex. *Cyperus* species are of no importance as fodder as they contain a large amount of silica (Chopra, 1970) however the tubers of some species are edible. Leaves and stems used in mat and basket making. *Cyperus esculentus* and *C. digitatus* often reported as weeds but the identification in most of the cases is to be re-confirmed with additional collection. *Cyperus esculentus* propagating by stolon bearing tubers can be readily distinguished from *C. rotundus* by its golden-yellow clearly curved glumes. *Cyperus esculentus* is confused with *C. iria* and *C. rotundus* at younger stage (Virginia Tech, 2009). In most cases it is being confused in the fields with *C. alulatus*.

Cyperus compressus is recognized by its annual habit, the usually very large compressed spikelets and the large smooth nutlet. Large plants with up to 70 tillers collected from Islamabad. *Cyperus difformis*, a therophytic aquatic plant, disseminating by wind, water and a serious weed of rice. *Cyperus nutans* is a fairly robust perennial with a thick, sometimes nodular, creeping rhizome and numerous crowded roots, mostly in streams and canal banks. This species is recognized by its grayish brown clustered spikes with crowded spikelets carrying spreading mucronate glumes.

Cyperus haspan is closely related to *C. denudatus*, but differs from that species in being annual or with very short rhizome and in having well developed leaves. It is also similar to *C. tenui spica*, but differs from that species in having a straight mucro on the glumes and also smaller surface-cells on the nutlet. "C. haspan" is considered as an orthographic error it should be "halapan" (The type from Ceylon Herb. Hermann BM.); however, Kukkonen (2001) differs.

Cyperus rotundus is a variable species readily propagating vegetatively by tubers, but frequently producing seeds in S.W. Asia. Three subspecies are subsp. *rotundus*, subsp. *retzii* (Nees) Kuk. and subsp. *tuberosus* (Rottb.) Kuk. are commonly recognized. The pale coloured subsp. *retzii* is often mixed with *C. esculentus* (Kukkonen, 2001). The world's worst weed (Holm *et al.*, 1979) distributed in the Mediterranean, Europe, W. Asia, Tropical Africa and many warm

regions of the world. *Cyperus rotundus* showed the maximum infestation in potato in Punjab plains of Pakistan reducing the yield from 31-40% (Shaikh *et al.*, 2005). It can penetrate the root crops thereby reducing the quality of the crop. In the genus *Cyperus*, it appears that C₄ photosynthesis evolved in a wetland context for this genus. The high nitrogen use efficiency associated with the C₄ pathway is largely responsible for the evolution and ecological success of C₄ *Cyperus* (Mei-Rong *et al.*, 1999).

***Cyperus alulatus* Kern in Reinwardtia 1: 464.1952 (Fig. 3)**

Synonyms: *Cyperus iria* L. var. *rectangularis* Kuk. and *C. iria* var. *paniciformis* C.B. Clarke

Life form	Annual.
Roots	Fibrous, numerous.
Stem	6-36 cm long, tufted, triquetrous glabrous.
Leaves	Equal or smaller than the stem, three ranked linear, glabrous flat or slightly keeled, with brown dots and stripes sheath yellowish or grey, mouth margin deeply concave.
Inflorescence	Umbel, involucre bracts 3-6, leaf like, subtending the inflorescence. Rachis of the spike scabrous, spikelets narrowly oblong 6-12 flowered, yellowish-brown.
Seed	Nut 1.5-1.75x0.75 mm, obovoid trigonous, dark brown, brown, finely reticulate..

***Cyperus bulbosus* Vahl, Enum. Pl. 2: 242. 1805 (Fig. 4)**

Synonyms: *Cyperus jeminicus* Retz., Obs. Bot. 4:11. 1786.

Life form	Perennial
Roots	Fibrous stolons thin, ephemeral.
Stem	10-30 cm sharply trigonous, smooth, base swollen, leafy to about ½ the length.
Leaves	Numerous longer than the stem, sheaths yellowish, grey or brownish, soft; leaf blades more than 20 cm, often curved, green or grayish-green margin smooth, apex trigonous long attenuate and acute scabrous.
Inflorescence	A much reduced anthelodium or multiple spike, surrounded by several leaf-like bracts much longer than the spike. Spikes brown, compressed bearing 3-12 spikelets
Nut	Nut 1.3-1.5 mm, trigonous, plano-convex, obovoid, grey, finely reticulate.

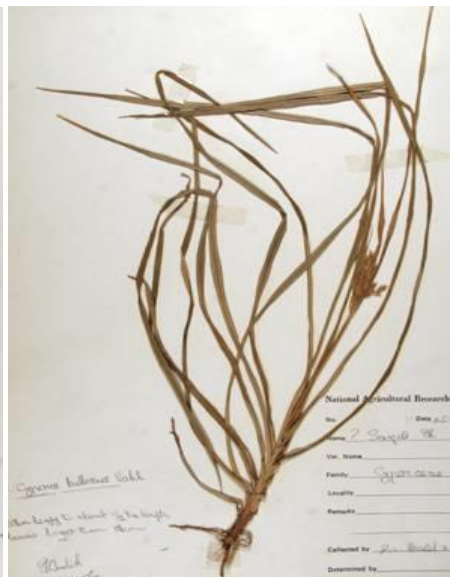


Figure 3. *Cyperus alulatus* Kern

Figure 4. *Cyperus bulbosus* Vahl

***Cyperus compactus* Retz Observ. Bot. 5:p10, 1789**

Synonym: *C. dilutus* Vahl. and *Mariscus compactus* (Retz.) Druce

- Life form Perennial, rhizomatous
 Roots Fibrous.
 Stem 15-50 (100) cm long tufted. with the base not thickened. Sheath on less than half the stem.
 Leaves Well developed sometimes longer than the stem.
 Inflorescence A rounded anthelodium compound or simple umbel with nearly globose spikes. Involucral bracts many. Many spikelets, stellately arranged in globose 1-2(4) cm wide brown spikes. Spikelets 3-8(20) flowered.
 Seed Nut trigonous, plano-convex, yellow to brown or chestnut to black.

***Cyperus compressus* L., Sp.Pl.1:46 1753 (Fig. 5)**

- Life form Annual.
 Roots Fibrous.
 Stem 14-44 (60 cm) glabrous 10-20(40)cm tall, tufted trigonous.
 Leaves As long as or shorter than the stem 10-20x0.15-0.25cm tapering to a point 3 ranked, linear, glabrous, sheaths membranous.

- Inflorescence Simple umbel, rays 2-4 in number, upto 3.5cm long, involucre bracts 3-4 in no., 3.5-18 x 0.2-0.3cm, leaf-like, glabrous, longer than inflorescence.
- Seed Nut broadly trigonous, ½ as long as the glume, dark brown to black.

***Cyperus difformis* L., Cent.Pl.2, 6:1756 (Fig. 6)**

- Life form Annual.
- Roots Fibrous.
- Stem 20-70cm. erect, un branched. Glabrous (smooth) three angled. Linear, shorter than the stem smooth 3-5 mm wide tapering to a pointed apex, sheaths surrounding the stem bases.
- Leaves Compound, 5-9 primary rays with dense, globose, umbellate heads, spikelets up to 12 mm diameter. Involucre bracts 3-4 longer than the inflorescence, linear-oblong.
- Inflorescence Nut 0.5-0.7x0.3-0.4 mm obovoid ellipsoid, trigonous, yellowish-brown.



Figure 5. *Cyperus compressus* L. Figure 6. *Cyperus difformis* L.

***Cyperus haspan* L., Sp. Pl. 1:45 (1753)** (Fig. 7)

Life form	Annual or perennial, with or without a very short rhizome.
Roots	Fibrous, reddish.
Stem	Often tufted 10-60 (5-40)cm tall, base sometimes thickened, sharply triquetrous.
Leaves	Often with a well-developed lamina sometimes reduced to sheaths.
Inflorescence	Simple or compound umbel, 2-3 involucral bracts shorter than the inflorescence. Primary rays 10-15 cm long, very unequal, secondary rays rarely up to 2.5 cm long. Spikelets digitately arranged in clusters of 3-6 (10), 10-30(40) flowered, bisexual. Spikelets flattened, sessile, persistent.
Seed	Trigonus, 0.4-0.7mm long, subglobose, white.

***Cyperus iria* L. Sp. Pl., 1:45 (1753) Mant. Alt 179(1771)** (Fig. 8)

Synonym: *Chlorocyperus iria* (L) Rikli in Jahrb. Wiss. Bot. 27: 564 (1895)

Life form	Annual perhaps perennial in favorable circumstances
Roots	Fibrous.
Stem	Tufted, solid un-branched 10-45(75) x 0.5-0.25 cm striate, glabrous, three sided.
Leaves	Linear, basal, as long as or shorter than the stem, 3-6 mm wide, tapering to a pointed apex.
Inflorescence	Compound terminal umbels, 5-10 cm. wide subtended by 3-5 leafy bracts 8-30 (50) x 0.3-06 cm, linear, flat, margin and midvein scabrous. Spikes 4-10mm erect, oblong and composed of flattened, golden spikelets.
Seed	3 angled, dark-brown nut, 1-1.5mm long, abruptly pointed, trigonus, papillose

Figure 7. *Cyperus haspan* L.Figure 8. *Cyperus iria* L.

***Cyperus laevigatus* L., Mant. Alt 179(1771) subsp. laevigatus**
(Fig. 9 and 10)

Synonyms: *Cyperus mucronatus* Rottb., Descr. Pl. Rar. Progr. 17(1772) *Pycreus laevigatus* (L.) Nees *Juncellus laevigatus* (L.) C.B. Clarke in Hook. F., Fl. Brit. Ind. 6:596 (1893)

Life form	Perennial, rhizomatous.
Roots	Fibrous.
Stem	9-60 cm (65) terate or obtusely trigonous, yellow green or grey green tufted or spreading, glabrous.
Leaves	Reduced to about 10 cm, rarely well developed, shorter than the stem, sheaths up to 20 cm; brown to dark brown, sometimes reddish.
Inflorescence	Capitate, 1 pseudolateral cluster of up to 30 spikelets. Involucral bracts 1-2, very unequal, the longer erect, the lower one seems to be a continuation of the stem. spikes 6-20 mm often curved, turgid. Spikelets distichous, 10-20 flowered, straw coloured, flattened, sessile, rhachilla persistent.
Nut	Biconvex, dorsally compressed.

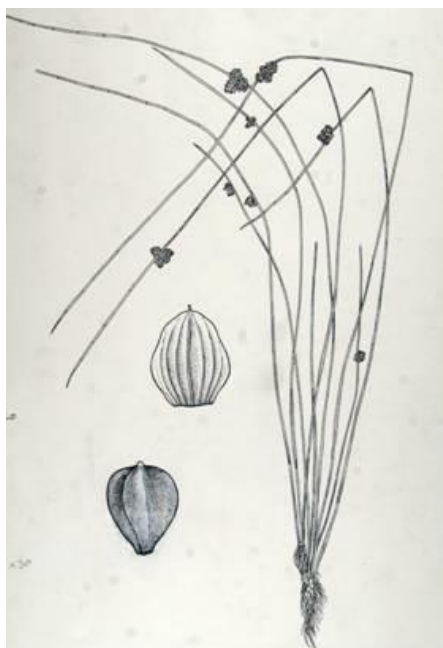
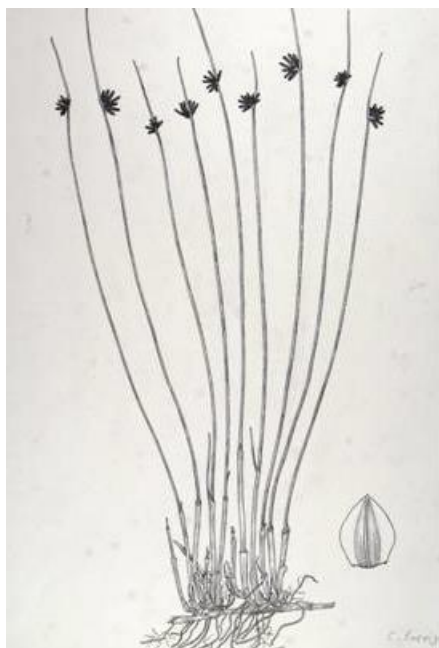


Figure 9. *Cyperus laevigatus* L. Figure 10. *Cyperus laevigatus* L.

Cyperus longus L. Sp. Pl. 1 :45,1753. (Fig. 11)

- Life form Perennial, rhizomatous.
 Roots Rhizome with short stolens
 Stem 80-100 cm tall, sharply trigonous solid, smooth
 Leaves Shorter than the stem ; sheaths 20-30 cm brown or reddish-brown
 Inflorescence Narrow anthelodium, with scarious brown tubular prophyll. Digitately arranged spikes.
 Seed Nut obovoid trigonous, grey brown finely reticulate.

Cyperus niveus Retz., Observ Bot.5:12, 1788 (Fig 12 I & ii)

- Life form Perennial perennating by woody rhizome.
 Roots Fibrous.
 Stem 16-50cm about 1mm in diameter, smooth, grey-green, upper part trigonous, lower part almost terete, base swollen.
 Leaves Basal, linear, shorter than to nearly equaling the stems, midvein and margin scabrous, brown or grayish brown not shiny.
 Inflorescence Capitata to globose group of 4-10 sessile spikelets, involucre bracts 2-3 linear, leaf-like. Spikelets 1.5-30x0.4-0.5cm narrowly oblong 8-54 flowered, white, rachilla not winged.

Seed Nut obovoid-ellipsoid, trigonous, 1.3-1.5x0.9-1 mm in size, dark brown or almost black, shiny, very weakly papillose.



Figure 11. *Cyperus longus* L. Figure 12(i) *Cyperus niveus* Retz



Figure 12(ii) *Cyperus niveus* Retz

***Cyperus nutans* Vahl, Enum. Pl. 2: 363. 1805.
subsp. *eleusinoides* (Kunth) T. Koyama, Gard. Bull. Singapore
30: 136, 1977.**

The type form India (Wallich 33466 at K). (Fig. 13 i and ii)
Synonym: *C. eleusinoides* Kunth in Enum. Plant. 2, p 39 (1837).
Life form Perennial.

Roots	Many tough fibrous roots from the base of the stem.
Stem	Rhizome short, stem tufted, 40-80cm (100), stout, three angled erect, glabrous.
Leaves	Shorter than stem, three ranked, linear flat, sheaths surround the basal portion of the stems, mouth truncate, pale green or yellowish brown. Blades grey green, scabrous.
Inflorescence	An antherodium, compound erect umbel, involucre bracts 5-8, longer than the inflorescence, leaf like, margin scabrous. Cluster of spikes sessile or pedunculate, 15-30mm with 8-24 spirally arranged spikes. Spikelets densely imbricate, flattened, many flowered.
Seed	Nut 1-1.5x0.5x0.75mm oblong or ovoid-oblong, trigonous apiculate, yellowish-brown.



Figure 13(i) *Cyperus nutans* Vahl Figure 13(ii) *Cyperus nutans* Vahl

***Cyperus rotundus* L., Sp. Pl. 1: 45 (1753)** (Fig. 14)

Synonym: *Chlorocyperus rotundus* (L.) Palla, Allg. Bot. Zeitsehr: 6:61 (1990).

Life form	Perennial
Roots	Stoloniferous herb bearing ovoid tubers at the ends of the stolons.
Stem	12-42 cm long, glabrous, triquetrous erect, dilated at the base.
Leaves	6-40 cm linear, flat scabrous towards the apex, sheaths truncate at the mouth.
Inflorescence	Compound umbel, involucre bracts 3-4 in number 3.5-10x0.2-0.3 cm longer than the inflorescence leaf like,

linear, margins scabrous.

Seed Nut oblong or obovoid, trigonous, about ½ the length of the glume grayish black (Ahmad, 1954). Rarely formed.

***Eleocharis* R. Brown.**

***Prodromus florum novae hollandiae et insuleae Van-Diemen*
1:224 (1810)**

Perennials or sometimes annual, commonly tufted with short rhizomes or sometimes stoloniferous, Stems terete or 3-4 angled, leafless. Leaves reduced to basal, bladeless, tubular sheaths. Infl. a dense terminal spike of spirally (occasionally distichously) inserted glumes, spike subtended by 1-2 sterile glume-like bracts (Table-4). Flowers bisexual, perianth of (0-)5-8 hypogynous bristles. Stamens 1-3. Stigmas 2-3, style swollen at base, with constriction between nut and swollen base, stylopodium persistent. Nut convex or trigonous crowned with persistent style base. *Eleocharis* resembles *Schoenoplectus* in having reduced leaf blades, characteristically, these are two closed sheaths at stem base and inflorescence is a single spike (Kukkonen, 2001). *Eleocharis atropurpurea* is easily recognized by the black shiny nutlet with minute appendage, the 2 branched style and the presence of a perianth.

***Eleocharis atropurpurea* (Retz.) K. Presl, Reliquiae Haenkeanae
1:196(1828).** (Fig. 15) Basionym: *Scirpus atropurpureus* Retz. In Obs.5, p. 14 (1789).

Life form	Annual
Roots	Fibrous, very slender root-system.
Stem	2-15 (20)cm, forming small tufts.
Leaves	Reduced to basal, bladeless, tubular sheaths ridged. Lower sheath brown or reddish, upper green or grey green, base often reddish with 5-6 green nerves.
Inflorescence	A single spike. Spikes ovoid or globose, solitary, terminal with 30 or more glumes in five spiral rows, all fertile Perianth bristles white or pale brownish.
Seed	ii-convex, apex rounded basal part gradually tapering, nely reticulate, finely black, glossy. Stylopodium much g, white clearly constricted from nut.

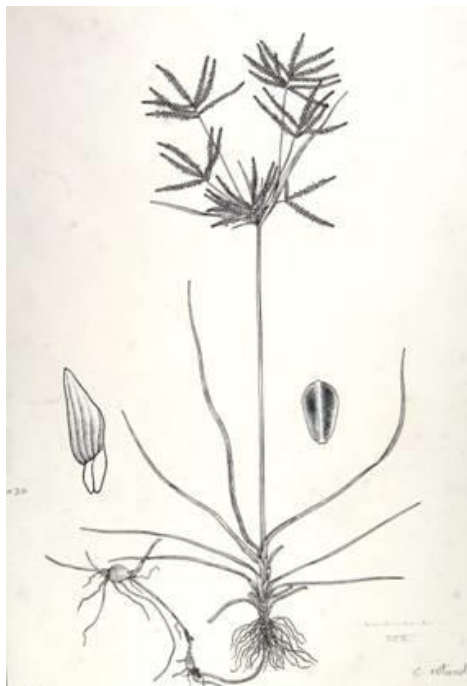


Figure 14. *Cyperus rotundus* L. Figure 15. *Eleocharis atropurpurea* (Retz.) Persl

***Fimbristylis* Vahl, Enum. Plant 2: 285 (1805)**

Annuals or perennials, inflorescence a multiple spike or anthelodium. Spikes are solitary or in pairs (Table-5). Stamens 1-3, stigmas 2 or 3. Nut lenticular or globose with a caducous stylopodium. *Fimbristylis* resembles *Abildgaardia* and *Bulbostylis*. *Fimbristylis squarrosa* is very different from all our other species of *Fimbristylis* due to its long-mucronate, recurved glumes.

***Fimbristylis bisumbellata* (Forssk.) Bubani, Dodecanthia 30:1850. (Fig. 16)**

Life form	Annual
Roots	Fibrous
Stem	Tufted greyish green 10-35 cm, glabrous.
Leaves	½ stem length, sheaths open, villous in upper parts lowest bladeless.
Inflorescence	Up to 5 cm in diameter, with 15-30 spikes mostly solitary occasionally a few sessile grouped together, lowest bract usually shorter than inflorescence, peduncles grooved.

Seed Nut About 0.8 x 0.7 mm lenticular, widely obovoid, trabeculate, yellowish to almost white.

***Fimbristylis dichotoma* (L.) Vahl, Enum. 2:287 (1806).** (Fig. 17)
 Basionym: *Scirpus dichotomus* L. in Sp. Plant p. 50 (1753). The type form India.

Life form Perennial

Roots Short woody rhizome.

Stem Greyish green tufted 30-60 cm deeply grooved.

Leaves $\frac{1}{2}$ the stem length, midrib not prominent.

Inflorescence 2-6 cm diam. with 6-50 mostly solitary or geminate (two) spikes; lowest bract leaf-like as long as or longer than inflorescence. Spikes ovoid, terate, acute, light brown to brown, glumes coriaceous widely ovate, apiculate.

Seed Nut 1-1.2x0.8 mm lenticular, trabeculate, yellowish or whitish.



Figure 16. *Fimbristylis bisumbellata* Forssk. Figure 17. *Fimbristylis dichotoma* (L.) Vahl

***Fimbristylis miliacea* (L.) Vahl, Enum. Plant 2: 287 (1805).**

(Fig. 18)

Life form	Annual
Roots	Fibrous
Stem	10-40 cm, triangular or quadrangular, sometimes compressed, sides deeply concave.
Leaves	As long as stem or longer, lower sheaths open, prominently nerved; one side of leaf green, many-nerved, nerves ending in acute apex.
Inflorescence	Longer than wide, 15-50 pedunculate or sessile, globular or ellipsoid spikes, obtuse, pale yellow to brown with form few to more than 30 glumes.
Seed	Nut 0.5-0.6 x 0.3-0.4 mm, globular to obovoid, faintly trabeculate, papillose, grey to pale yellowish sometimes white.

***Fimbristylis quinquangularis* (Vahl) Kunth, Plant 2: 229 (1837)**

(Fig. 19)

Life form	Annual
Roots	Fibrous to strong thick.
Stem	Tufted 5-15 cm with 5 sharp edges and deep groves.
Leaves	When present numerous longer than stem, lower sheaths open, with scarious margins, upper closed almost completely scarious with distinct veins or one side, mouth wide, oblique margins scarious, blades of basal leaves 1-1.5 mm wide flat barbed towards apex.
Inflorescence	10-50 solitary spikes, bracts shorter than inflorescence Spikes with 5-20 glumes, pedunculate, ellipsoid, angular, greenish to dark brown, rachis yellowish to brown.
Seed	Nut globular or widely obovoid, trigonous, pale yellow to pale brown more or less papillose and faintly trabeculate.



Figure 18. *Fimbristylis miliacea* (L.) Vahl Figure 19. *F. quinquangularis* (Vahl) Kunth

***Fimbristylis squarrosa* Vahl, Enum. Pl. 2:289 (1805).** (Fig. 20)

Synonym: *F. aestivalis* (Retz.) Vahl var. *squarrosa* (Vahl) Koyama.

Life form	Annual
Roots	Fibrous
Stem	Small tufts (few-numerous) crowded stems 4-20 cm, triangular or compressed glabrous.
Leaves	Equalling stem, sheaths up to 2.5 cm wide, green one side prominently nerved other side scarios.
Inflorescence	3 cm in diam, 4-20 spikes, the lowest bracts frequently twice as long as infl. Spikes mostly solitary, pedunculate 3-6 mm greenish to greenish brown.
Nut	0.6-0.7 x 0.5mm. Lenticular, smooth, yellowish brown.



Figure 20. *Fimbristylis squarrosa* Vahl

***Kyllinga* Rottb., Descr. Kon. Rar.Pl:12. (1973)**

Perennials or annuals tufted or creeping rhizome; stem trigonous. Inflorescence a compact multiple cluster with 50-100 spikes. Flowers bisexual, stem 2-3, stigmas 2, nut hairy or reticulate. *Cyperus brevifolius* (Rottb.) Hasskn. Subsp. *brevifolius* in Cat. Hort. Bogor., p. 24(1844)

The type from India. Syn. *Kyllinga colorata* (L.) Druce. It is a perennial plant with a horizontal creeping (subterraneous or close upon the ground) rhizome.

***Kyllinga brevifolia* Rottb., Descr. Icon. rar. Pl:13.1773**

Synonym: *Cyperus brevifolius* (Rottb.) Hassk., Cat. Hort. bot. Bogor; 24.1844

Life form	Perennial
Roots	Fibrous.
Stem	Long creeping horizontal rhizome, aerial stem arising from every second node, sharply trigonous smooth, green.
Leaves	Much shorter than stem; sheaths 10-65mm, grey or brown, sometimes with reddish tint, scarious flat, margin smooth, apex flat, short acute, scabrous along margins and midrib below.
Inflorescence	A single, round cluster of about 100 spikes, 5-7mm, 2-3 leafy bracts glume like scarious bract and prophyll.
Seed	Nut 1mm, compressed, obovoid, yellowish surface papillose.

***Pycreus* P. Beauv., Fl. Oware 2: 48. (1816)**

Annuals or sometimes perennials, tufted or basal internodes elongated and rooting, with short stoloniferous. *Pycrus* differs from *Cyperus* in having biconvex nuts and 2 stigmas. Cluster of spikes or anthelodium forms the inflorescence (Table-6).

***Pycrus flavidus* (Retz.) T. Koyama, Journ. Jap. Bot. 51:316.1976** (Fig. 21)

Synonym: *Cyperus flavidus* Retz., Ubserv. Bot 5:13.1788

Life form	Small annual or sometimes Short lived perennial.
Roots	Fibrous
Stem	Tufted 15-50cm., stem 1-2 mm diam. Trigonous, basal parts almost terete, grooved otherwise smooth with short rhizome.
Leaves	Shorter than stem, sheaths 20-80mm, brown or yellow-brown, mouth margin straight blades up to 15cm apex long, trigonous, acute scabrous.
Inflorescence	A single globose group of up to 50 sub sessile spikes or irregular anthelodium, prophyll tubular drawn or yellowish spikes 8-30mm, compressed.
Seed	Nut 0.8-1mm, ellipsoid or obovoid, bi-convex apiculate, brown, reticulate and often papillose.



Figure 21. *Pycrus flavidus* (Retz.) T. Koyama

***Schoenoplectus* (H.G.L.Reichenb.) Palla in Bot. Jahrb. 10: 298 (1888).**

Perennials or sometimes annuals, stems tufted or on short creeping rhizomes. Stems terete to triquetrous, nodeless, sometimes hollow and septate. Leaves reduced to basal bladeless sheaths. Infl. a dense, pseudo-lateral cluster of spikelets (Table-7), sometimes with shortly stalked secondary infls., infl. bract appearing as continuation of stem. Spikelets with many spirally inserted glumes on persistent axis.

Flowers bisexual. Perianth of usually 6 retrorsely barbed bristles, occasionally absent. Stamens 1-3 Stigmas 2-3, style not thickened or articulated at base. Nut compressed or trigonous. Some members harbor disease causing organism like *Pyricularia oryzae* (Mercado, 1979).

It is important to note that the *Scirpus* species are now known as *Schoenoplectus* (Reichenbach) Palla in Verhandl. Zool. Bot. Ges. Wien 38, Sitzungsberichte p.49 (1888) and in Engl. Bot. Jahrb. 10, p. 298 (1889). *Scirpus* L. section Actaeogeton Rehb.: 78 (1830); T. Koyama: 284 (1958).

***Schoenoplectus mucronatus* (L.) Palla, in Verh. Zool.-Bot. Ges. Wien 38:49 (1888).**

Synonym: *Schoenoplectus mucronatus* (L.) Palla ex Kerner, Sched. Fl. Austr. Hung. 5:91 (1888). Basionym: *Scirpus mucronatus* L. in Spec. Plant. I, p.50 (1753).

Life form	Perennial rhizomatous or annual tufted
Roots	Small fibrous
Stem	35-70 cm long, erect, trigonous glabrous, base not thickened.
Leaves	Reduced to closed sheaths which surround the lower parts of the stems.
Inflorescence	Congested to spherical group of 6-15 sessile spikes occasionally 1-3. Lowest bract conspicuous, green up to more than 10cm at first upright, later reflexed, sharply trigonous and smooth. Glumes tightly imbricating-mid-nurve smooth extending into short mucro.
Seed	Nut obovoid, apiculate, trigonous, almost plano-convex, shallowly transversely rugulose glossy, blackish brown.

***Schoenoplectus juncooides* Roxb., Fl. Ind., 1:218 (1820) (Roxb.) Palla in Bot. Jahrb. 10:299 (1888)**

Synonym: *S. juncooides* (Roxb.) Palla (Roxb.) Krececz Fl. Uzbekist., ed. Schreder 328 (1941)

Basionym: *Scirpus juncooides* Roxb.

Life form	Annual or sometimes perennial.
Roots	Fibrous, yellow-brown
Stem	Stems densely tufted ± terete, 9-73cm, 1-3mm diameter green or yellowish-green.
Leaves	Leaves absent, Basal Sheaths 1-3 surrounding the lower portion of the stem apex usually apiculate, longest 2.5-6cm, mouth oblique.

- Inflorescence Pseudolateral, rarely reduced to a solitary spikelet. Infl. of 1-3 spikelets. Spikelets ovoid-oblong, cylindrical, glumes ovate mucronate. Perianth-5-6 equaling or slightly shorter than nut, pale brown. Bracts solitary erect, stem like 70mm long with a callous tip.
- Seed Nut unequally biconvex, widely obovate truncate, apiculate, attenuate to base, 2-2.3x1.6-2mm, pale greenish-brown becoming dark brown; surface shallowly transverse-rugulose, glossy, grey or blackish brown.

***Schoenoplectus lateriflorus* (J.F. Gmelin) Lye in Bot. Notiser 124:290 (1971).** (Fig. 22)

Basionym: *Scirpus lateriflorus* J.F. Gmelin.

Synonym: *Schoenoplectus supinus* (L.) Palla

- Life form Annual
- Roots Fibrous, short.
- Stem 4-23cm forming small tufts; angular or almost terete, finely papillose, grayish blue-green somewhat glaucose green.
- Leaves Sheaths usually 2, upper up to 80 mm mouth oblique, truncate with wide scarious margin, blades usually 5mm narrow, obtusely pointed sometimes elongated upto 10cm.
- Inflorescence A lateral compact group of 1-3 (4) sessile spikes 2-10mm dia, or small multiple spike. Spikes 2-10 x 2-4mm ellipsoid or ovoid, apex rounded yellowish brown or brown.
- Seed Nut 1.3-1.4x1.1mm, obovoid, shallowly apiculate, trigonous, plano-convex, transversely rugulose, finally dark brown to black glossy.

***Schoenoplectus litoralis* (Schrader) Palla in Bot. Jahrb. 10:299 (1889)** (Fig 23)

Basionym: *Scirpus litoralis* Schrader

Synonym: *Scirpus subulatus* Vahl

- Life form A stout tough perennial with thick stolons.
- Roots Fibrous, rhizome short, stoloniferous.
- Stem 60-120(150)cm long smooth. Stems 6-12mm thick but much narrowed below the inflorescence. Sharply trigonous to obtusely trigonous above and terete below.

- Leaves Basal the largest equal to stems but the blade only 70 cm long sheaths up to 25cm green, smooth.
- Inflorescence A simple spike or anthelodium with single spikelets or umbels of spikelets on branches of unequal length, main branches 1-3cm long; nearly all spikelets stalked. Lowest bract mostly equaling inflorescence, secondary multiple spikes with 3-8 peduncles. Main inf. bract 4-12cm. long, erect and stiff, leafy to stem-like, flat or angular, continuing in the direction of the main stem.
- Seed Nutlets about 2mm long (excluding the 0.5mm long apex) obovate with cuneate base and very distinct apex; yellowish brown below and dark brown above, but perhaps the whole nutlet dark when fully mature smooth, mat or semi-glossy, very finely reticulate.



Figure 22. *S. lateriflorus* (J.F. Gmelin) Lye Figure 23. *S. litoralis* (Schrad.) Palla

Table-1. Weeds of Cyperaceae (Sedge and Reed Family)

Botanical names	Common names	Local names	Habitat
<i>Bolboschoenus affinis</i> (Roth) Drobov	Sea-clubrush, saltmarsh clubrush	Kab, Dil, Tuzgh, Murk	R, Wc, Fb
<i>Bulbostylis barbata</i> (Rottb.) C.B. Clarke	Bulbostylis	Moltia	R
<i>Bulbostylis densa</i> (Wall.) Hand-Mazz			R, Wp, Wg
<i>Cyperus alulatus</i> Kern			R, Wp, Wg
<i>Cyperus bulbosus</i> Vahl			L. R, Ms
<i>Cyperus compressus</i> L.	Compressed sedge		R, Fb
<i>Cyperus difformis</i> L.	Small flower umbrella plant	Bari ghuien	R, Wc
<i>Cyperus haspan</i> L.			R,
<i>Cyperus iria</i> L.	Rice flatsedge	Kal	R, Wc
<i>Cyperus laevigatus</i> L.	Tawny sedge		R, Wc, Rb, Ss
<i>Cyperus longus</i> L.	Rough Cyperus, Sweet galingale		R, Rb
<i>Cyperus niveus</i> Retz.			Fb, Rs, Fb, Pa, Wc, Fb, S, M
<i>Cyperus nutans</i> Vahl			
<i>Eleocharis atropurpurea</i> (Retz.) Persl.	Spikerush		R,
<i>Eleocharis congesta</i> D. Don.	Spikerush genus		R, Sw
<i>Eleocharis geniculata</i> (L.) Roem & Schult	Spikerush genus		R, Ms
<i>Fimbristylis bisumbellata</i> Forssk.			R, Wc, Rb
<i>Fimbristylis dichotoma</i> (L.) Vahl	Two leaf fimbristylis,	Kaluro	R, Wc, Fb, Rb
<i>Fimbristylis falcate</i> (Vahl) Kunth	Tall fringe rush		Gl, Rs
<i>Fimbristylis miliaceae</i> (L.) Vahl	Brown fimbristylis	Ghuien	R, Wg, Rb
<i>Fimbristylis quinquangularis</i> (Vahl) Kunth		Ghuien	R, Rb
<i>Fimbristylis schoenoides</i> (Retz.) Vahl			Sw, Wg
<i>Fimbristylis squarrosa</i> Vahl			R
<i>Kyllinga brevifolia</i> Rottb.	Green kyllinga		R,
<i>Pycreus flavidus</i> (Retz.) T. Koyama			R, Rb
<i>Pycreus sanguinolentus</i> (Vahl) Nees			R, Sw
<i>Pycreus pumilus</i> (L.) Nees			R, Wp
<i>Schoenoplectus juncooides</i> (Roxb.) Palla		Dil	R, Wc
<i>Schoenoplectus lateriflorus</i> (J.F.Gmelin) Lye			R, Wc, Fb, Mr
<i>Schoenoplectus litoralis</i> (Schrud.) Palla	Coast clubrush	Dil,	R, Wc, Fb
<i>Schoenoplectus mucronatus</i> (Linn.) Palla	Roughseed bulrush, Bog bulrush	Dil,	R, Wc, Fb

grasslands (Gl), rice (R), road sides (Rs), river banks (Rb), waste place (Wp), fallow rice fields (Fr), water channels (Wc), field borders (Fb), maize (M), monsoon rice (Mr), marshlands (Ms), swamps (Sw), wet ground (Wg), cotton (Co), vegetables summer (Sv), orchards (O), potatoes (P), chick pea (Ch), sugarcane (S), pavements (P), saline soil (Ss).

Table-2. Comparison of Schoenoplectus, Fimbristylis and Bolboschoenus

	Schoenoplectus (Reichenback) Palla.	Fimbristylis Vahl.	Bolboschoenus (Ashers.).
Life form	Perennial/sometimes annual.	Small, soft annual/perennial.	Perennial.
Roots	Creeping or short with or without stolons tough, fibrous.	Short rhizome with fibrous roots.	Fibrous
Stem	Erect tufted terete or trigonous, smooth, nodless, sometimes hollow and septate. Perennating by creeping rhizomes.	Leaf less stalk bearing one or more flowers (Scapose).	Base trigonous swollen Sturdy, creeping, rhizome producing tubers.
Leaves	Reduced to basal bladeless sheaths (2-3 soft, ephemeral).	With or without ligule, cauline leaves short or sometimes present as bladeless sheaths only.	Basal, smaller or equaling stem.
Inflorescence	Pseudolateral cluster of spikes or anthelodium lowest bract in continuation to stem, erect or later often spreading or reflexed. Glumes spirally arranged.	A multiple spike or anthelodium of several to > 50 spikes, primary branches each with basal tubular prophyll. Spikes solitary or two, seldom three together on a common peduncle.	A multiple spike, sometimes anthelodium or spikes congested to head.
Seed	Nut trigonous or biconvex, compressed, rugulose or smooth surface.	Nut lenticular or globose	Avoid or obovoid, lenticular or trigonous and plano-convex surface reticulate, white or yellowish brown glossy

Table-3. Cyperus: Species and description of Inflorescence

Weeds in Pakistan	Inflorescence
<i>Cyperus alulatus</i> Kern	Umbel, 3-6 leaf like bracts, subtending the inflorescence. Spikelets oblong 6-12 flowered, yellowish-brown
<i>Cyperus bulbosus</i> Vahl	Anthelodium or multiple spike, surrounded by several leaf-like bracts, spike slightly compressed brown.
<i>Cyperus compressus</i> L.	Simple umbel, rays 2-4 in number, involucre bracts 3-4, leaf-like, glabrous, longer than the inflorescence.
<i>Cyperus difformis</i> L.	Compound, dense, globose dark grey black umbellate heads. Involucre bracts 3-4 longer than the inflorescence.
<i>Cyperus digitatus</i> Roxb.	25-30 cm long, golden brown, composed of digitately arranged cylindrical spikes.
<i>Cyperus esculentus</i> L.	Umbellate, rays 4-10, involucre bracts 2-9 in number longer than the inflorescence.
<i>Cyperus haspan</i> L.	Simple or compound umbel, 2-3 involucre bracts shorter than the inflorescence.
<i>Cyperus iria</i> L.	Compound terminal umbels, 5-10 cm. wide subtended by 3-5 leafy bracts. Spikes, oblong composed of flattened, golden spikelets.

<i>Cyperus laevigatus</i> L.	Capitate, one pseudotateral cluster of up to 30 spikelets. Spikes often curved, turgid. Spikelets, 10-20 flowered, straw coloured.
<i>Cyperus longus</i> L.	Narrow anthelodium, with scarious brown tubular prophyll, brown to reddish brown.
<i>Cyperus niveus</i> Retz.	Capitate to globose, 4-10 sessile spikelets, involuclral leaf-like, spikelets narrowly oblong 8-54 flowered, white
<i>Cyperus nutans</i> Vahl	An anthelodium, compound erect umbel, involuclral bracts longer than the inflorescence, leaf like, margin scabrous. Cluster of spikes sessile or pedunculate. Spikelets densely imbricate, flattened, many flowered, dark grey brown.
<i>Cyperus rotundus</i> L.	Compound umbel, involuclral bracts 3-4 in number longer than the inflorescence leaf like, flowers reddish brown to dark brown.

Table-4. Eleocharis : Species and description of Inflorescence

Weeds in Pakistan	Inflorescence
<i>E. congesta</i> D.Don	Spike 4-6 mm, ellipsoid or ovoid to globular brownish green, 30-100 tightly imbricate glumes basal glume sterile, clasping, longer and wider than others.
<i>E. atropurpurea</i> (Retz.) K. Presl	Spike 2-7 x 1-3mm ovoid or globose with 30 or more glumes in five spiral rows, all fertile, basal glume not distinct or slightly larger.
<i>E. geniculata</i> (L.) Roem. & Schult.	Spike 3-6x3-4 mm, ovoid or globular with 50 or more very closely imbricating glumes., basal glume fertile, not distinct from other glumes.

Table-5. Fimbristylis: Species and description of Inflorescence.

Weeds in Pakistan	Inflorescence
<i>F. miliacea</i> (L.)Vahl	Upto 50 mm diam taller than wide 15-50 spikes. Bracts up to 20 mm longer than spike, pale yellow to brown
<i>F. quinquangularis</i> (Vahl) Kunth	1-3 cm diam, 10-50 solitary spikes
<i>F. dichotoma</i> (L.) Vahl	2-6 cm diam with 6-50 mostly solitary occasionally two spikes lowest bract leaf-like, as lone as or longer than infl.
<i>F. bisumbellata</i> (Forssk.) Bubani	15-30 spikes, mostly solitary occasionally a few sessile grouped together, lowest bract usually shorter than inflorescence peduncles grooved
<i>F. squarrosa</i> Vahl	4-20 spikes, the lowest bracts frequently twice as long as infl. Spikes mostly solitary, pedunculate 3-6mm. greenish to greenish brown.

F. falcate (Vahl) Kunth	Anthelodium with 20-40 spikes,, primary branches 5-8, secondary branches ending with groups of 1-4 sessile spikes. Stamens 3, stigmas 3, nut obovoid, obscurely reticulate, glossy,
F. schoenoides (Retz.) Vahl	1-3 spikes, peduncles with tubular prophyll, spikes with 30-35 ovoid of ellipsoid glumes, rounded yellow-brown. Stigmas 2, nut obovoid pale yellow brown.

Table-6. Pycurus: Species and description of Inflorescence.

Weeds in Pakistan	Inflorescence
<i>P. sanguinolentus</i> (Vahl) Nees	One single digitate rather loose cluster of 3-12 spikes, or with 1-2 primary branches, bracts 1-3, leaf like, spreading.
<i>P. flavidus</i> (Retz.) T. Koyama	A single globose group of up to 50 subsessile spikes or anthelodium spikes 8-30 mm, compressed.
<i>P. flavescens</i> (L.) Reichenb.	Globose cluster of spikes or small anthelodium
<i>P. pumilus</i> (L.) Nees	A single cluster of spikes or more often a small anthelodium, cluster 10-20 mm diam., 5-12 digitately arranged spikes, 1-3 spreading foliose bracts.

Table-7. Schoenoplectus: Species and description of Inflorescence.

Weeds in Pakistan	Inflorescence
<i>S. litoralis</i> (Schrad.) Palla	Multiple spike or anthelodium, lowest bract more than 12 cm.
<i>S. juncoides</i> (Roxb.) Palla	1-3 (pseudo) lateral spikes
<i>S. mucronatus</i> (L.) Palla	Congested to spherical group of sessile spikes.
<i>S. lateriflorus</i> (J.F.Gmelin) Lye	group of 1-3 spikes. Up to 10 mm diameter or small multiple spike.

Management of Cyperaceous Weeds

An integrated approach is required for the management of annual and perennial species of Cyperaceae. The growth and development of underground rhizomes and tuber depends on tuber desiccation, depth of burial and water management. Tuber can be effectively desiccated at 40°C on soil surface and at depth less than 10cm in dry weather. Flooding suppresses tuber sprouting however these sprout quicker once the water is removed.

Intensive cultivation in nutsedge infested areas may be harmful and responsible for intensification of these weeds. Chains of tubers are produced in *Cyperus rotundus* during one season. There is dominance exhibited by the terminal tuber that sprouts first and prevents other attached from sprouting. However when the rhizome chain is cut all the tubers have a capacity to sprout. This gradually increases the infestations to unmanageable levels. In an intensive management program small tubers were prone to depletion and were prevented from forming larger tubers (Bangarwa *et al.*, 2008).

Foliar application of DSMA, MSMA with a surfactant insures penetration in *Cyperus*, while glyphosate distributes well through the plants by symplastic translocation and gives substantial control over sedge population (Mandira and Sansamma, 2005). Pre-emergence application of pyrazosulfuron-ethyl in rice significantly controlled *Fimbristylis miliaceae* (Mondal, 2005). A mixture of atrazine and metolachlor gave complete control of *Panicum maximum*, *Commelina benghalensis*, the sedges; *Maricus alternifolium*, *Kyllinga squamulata* and *Cyperus* spp. (Chikoye *et al.*, 2005).

CONCLUSION

There are 34 important weeds of cyperaceae that infest different crops in the world. The important genera that include these 34 weed species are *Bolboschoenus*, *Bulbostylis*, *Cyperus*, *Eleocharis*, *Fimbristylis*, *Pycreus* and *Schoenoplectus*. *Cyperus difformis*, *Fimbristylis*, *Pycreus* and *Schoenoplectus* are serious weeds in rice crop in Pakistan. *Cyperus rotundus* that propagates by tubers and seeds is distributed country wide heavily infesting all summer crops.

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