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Morphological and anatomical studies of *Kyllinga brevifolia* Rottb. and *Cyperus scariosus* R.Br.

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Abstract

A comparative study of morphological characters of entire plant and anatomical features of rhizome and aerial stem of *Kyllinga brevifolia* Rottb. and *Cyperus scariosus* R.Br. of family Cyperaceae was under taken. Observable differences were more pronounced in section of their stems, *Kyllinga brevifolia* shows larger air spaces and also pith was absent in it while in *Cyperus scariosus* vascular bundles were scattered and small air spaces are present. Morphologically they can be differentiated by their inflorescence. *Kyllinga brevifolia* has globose spike while *Cyperus scariosus* has ovoid spikes.

Key words: Morphological, Anatomical, Cyperaceae, *Kyllinga brevifolia* Rottb., *Cyperus scariosus* R.Br., stem, rhizome.

Introduction

Cyperaceae commonly known as sedge family, a large, cosmopolitan family with around 5,500 species. It has significant ecological and economic significance throughout the world (Govaertz et al. 2014, Simpson and Inglis, 2001). Cyperaceae is a 7th largest family in the angiosperms and 3rd largest in the monocots with approximately 103 genera currently recognized (Roalson, 2008). Sedges dominates the majority of wetland vegetation units in the globe and also considerably influence the nutrient cycle and habitat development in these ecosystems (Harper, 1992; Chambers et al., 2008). *Carex* is one of the largest genera in the world, has up to 2000 species and is widely distributed in wetlands and other seasonal wet habitats (Govaerts et al., 2007; Waterway and Starr, 2008). *Cyperus* is another well-known genus with about 600 species has important economic and horticultural species (Goetghebeur, 1998; Simpson and Inglis, 2001).

Critical study of sedges has been neglected by most of the investigators due to minute and greatly reduced floral structures, least economic importance, and intricacy due to extreme variations in vegetative as well as the reproductive parts. Thus the studies in Cyperaceae did not progress well as compared to those in grasses. It may be remarked here that the family remained taxonomically neglected throughout the world and more so in India (Khan, 2015). The sedges have very simple plant body and thus have few characters in totality.

The flower is microscopic unglamorous with reduced sepals and petals. The principal difference from its allied group is the extreme reduction of perianth which characteristically consists of hypogynous scales, bristles or hair or absent. The leaf sheath corresponding to petiole are closed, so that each one completely encircling the stem. In grass family the sheath is open to one side. Both annual & perennial habits are found in Cyperaceae often with adventitious root system. The underground parts in perennial show remarkable variability. The floral structures of monocotyledonous type that is the perianth (if present) and the sex organs are mostly timorous and the fruit is often called nut or achene. Both the microscopic and macroscopic morphological features are highly variable in Cyperaceae. The sedges are distributed in every farming (except epiphytes). They form major component of wet land flora (with very few exceptions). Many species are indeed more or less grass like but often with a characteristic yellowish or brownish tinge or often partly or wholly reddish or purplish colored but few species have white color that is why Cyperaceous plants are easily recognizable among the grasses and other flora.

Many sedges are used as food, food additives, drinks, fibers, animal poisons and in the manufacturing of paper, perfumes, mats, boats, clothing, shoes, ropes and roofing (Kukenthal 1935-1936, Zhukovsky 1975, Durby et al, 1977, Allan 1978, Burkill 1985, Negbi 1992, Stephens 1994, Bryson et al., 1988, Simpson and Inglis 2001).

Kyllinga brevifolia is commonly known as green kyllinga it is worst weed among the worlds weed having reported in 17 crops, and 43 countries (Holma et al. 1997). *Cyperus scariosus* is commonly known as nagarmotha. It is widely used as phytotherapeutic agent against dysentery, fever, diarrhoea, cholera and vomiting (Shafiqur Rahman and Nural Anwar, 2008).

Materials and Methods

Collection of plants material:

Plants of *Cyperus scariosus* R. Br., *Kyllinga brevifolia* Rottb. of family cyperaceae were collected from field and near damp water of Degloor, Dharmabad and Kinwat of Nanded Dist, Maharashtra state. The plants were identified by Dr. M. A Wadood Khan, Plant taxonomist, M.S.P Mandal's Majalgaon Arts, Science and Commerce College, Majalgaon, Dist. Beed, M.S.

Macroscopic study:

The morphological assessment was carried out by physical observations and measurement of physio-gnomic features of plant specimens (Idu et. al, 2009).

Microscopic study:

For the anatomical studies the fresh samples were used. Sections were independently stained with heamatoxyline and safranin. A light microscope was used to view the slides and adjusted to finest resolution. Micro photographs were taken by using smart phone camera focus through the microscope eyepiece (Kokate et al., 2008).

Results and Discussion

Morphologically *Kyllinga brevifolia* is an erect perennial herb. It is 20- 25 cm tall. The leaves are glabrous, acuminate, leathery and smaller than stem. The aerial stem is triangular and erect. The rhizome are horizontally creeping to which adventitious roots are present on intervals. The Inflorescence is whitish globose, contains 01-03 spikes, involucular, bracteate, 03 foliaceous lowest longer, 04-06 cm long. The spikes are solitary, globose, and 04-06 mm long. The spikelets are numerous, ellipsoid, 01-02 fruited, glumules, persistant on rhachilla. Stamens are 02, anther linear about 01 mm long. The style is bifid. The nuts are biconvex and ellipsoid.

Cyperus scariosus is 20-100 cm tall and arises from underground rhizomes and tubers. The stolons of this herb are slender with aromatic blackish tubers (ovoid). The aerial stem is terete/ trigonous at least the lower part, 1.5-03 mm thick. The leaves are smooth, incrassate near base, sheath often purplish. The inflorescence of this plant is simple to sub compound, erect or spreading, 01-04 foliaceous, lowest one is long pushing aside the inflorescence.

The spikes are ovoid and 02-04 mm long. The spikelets are 03-06, linear, pale brown and rhachilla is broadly winged. Stamens contains 03 anthers, which are linear and about 01 mm long. The style is trifid. The nuts are trigonous, obvoid, orange yellow.



Cyperus scariosus



Kyllinga brevifolia

Fig 1: Morphological Features

The morphological features observed in both specimens used in the present study were consistent with the description reported by Khan W. (2015). However, the major differences in morphological features in the studied plant species are outlined in table 1.

Table 01: Comparison of Morphological features of *Kyllinga brevifolia* Rottb. and *Cyperus scariosus* R.Br.

Sr.no	Observation	<i>Kyllinga brevifolia</i> Rottb.	<i>Cyperus scariosus</i> R.Br.
1.	Height	20-25 cm tall	20-100 cm tall
2.	Rhizome	Horizontally creeping	Stolon slender with aromatic blackish tubers.(ovoid)
3.	Aerial stem	Trigonous 01-1.5 mm thick	Terete/ trigonous at least the lower part, 1.5-03 mm thick
4.	Leaves	Glabrous, acuminate	Smooth, incrassate near base, sheath often purplish
5.	Inflorescence	Whitish, 01-03 spikes, involuclar, bracteate, 03 foliaceous lowest longer 04-06 cm long	Simple to sub compound, erect or spreading, 01-04 foliaceous, lowest one is long pushing aside the Inflorescence.
6.	Spikes	Solitary, globose, 04-06 mm long	Ovoid, 02-04 mm long
7.	Spikelet	Numerous, ellipsoid, 01-02 fruited, glumules, persistant on rhachilla	03-06, linear, pale brown, rhachilla broadly winged
8.	Stamens	02, anther linear about 01 mm long	03 anther, linear about 01 mm long
9.	Style	Bifid	Trifid
10.	Nuts	Biconvex, ellipsoid	Trigonous, obvoid, orange yellow

Anatomical characters of *Kyllinga brevifolia* Rottb. and *Cyperus scariosus* R.Br.:

T.S. of Rhizome:

T.S. of *Kyllinga brevifolia* rhizome shows prominent pericycle. Large air spaces are present in cortex and vascular tissues are scattered. Pith is present.

T.S. of Rhizome of *C. scariosus* consist of typical parenchymatous cells forming epidermis. The inner part of cortex is aerenchymatous, very small air spaces are present. Pith is parenchymatous. Vascular tissue scattered in small bundles.

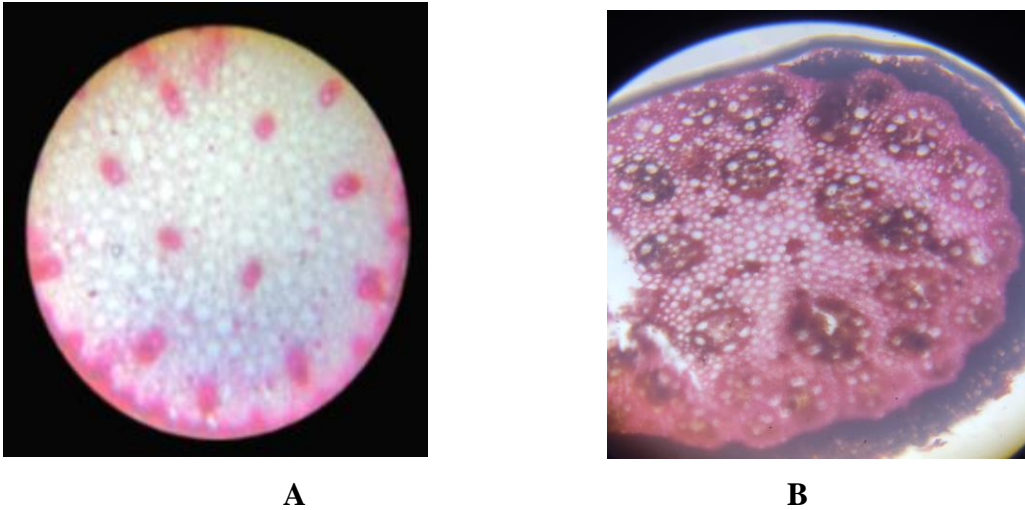
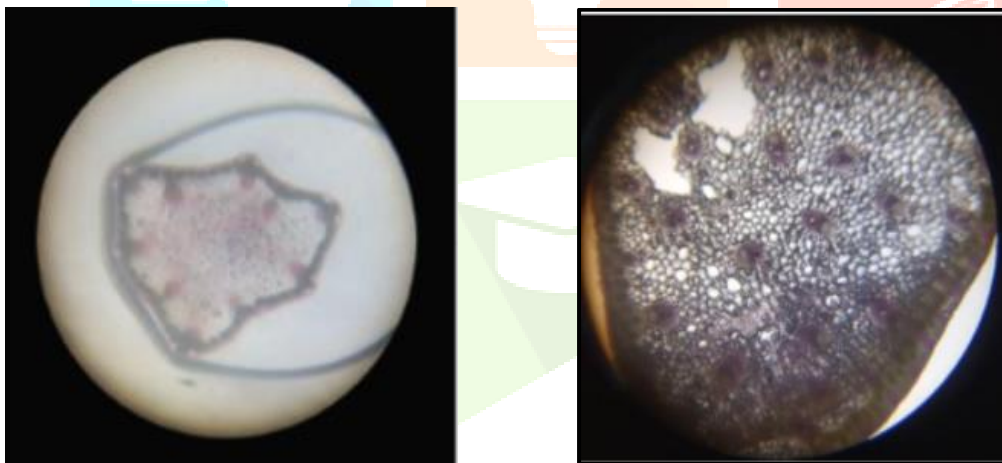


Fig.2: A and B photo micrograph of section of rhizomes of *Kyllinga brevifolia* Rottb. and *Cyperus scariosus* R.Br.

T.S. of Aerial Stem:

T.S. of *Kyllinga brevifolia* aerial stem consist of 2-3 layers of thick wall cell and conjoint vascular bundles which are arranged around the Centre. Pith is absent.

T.S of aerial stem of *C. scariosus* shows 2-3 layers of compactly arranged sclerenchymatous cells. While cortex consist of aerenchymatous cells. Vascular bundles are numerous and scattered, conjoint, collateral and closed.



A

B

Fig. 3: A and B photo micrograph of section of aerial stems of *Kyllinga brevifolia* Rottb. and *Cyperus scariosus* R.Br.

The above observations revealed variations between the *Kyllinga brevifolia* Rottb. and *Cyperus scariosus* R.Br. as far as morphology and anatomy of plant parts was concerned.

Conclusion:

The study of morphological and anatomical features plays crucial role for the identification of *Cyperus scariosus* R. Br., and *Kyllinga brevifolia* Rottb. of family cyperaceae. Observable differences were more distinct in transverse section of their rhizomes, *Kyllinga brevifolia* shows larger air spaces and absence of pith while in *Cyperus scariosus* vascular bundles were found to be scattered and small air spaces were present. Morphologically they can be differentiated by their inflorescence. *Kyllinga brevifolia* has globose spike while *Cyperus scariosus* has ovoid spikes. The present study will help to improve the existing data for identification purpose.

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