

BOTANICAL AND PHYTOCHEMICAL STUDIES ON *Cyperus Rotundus* L. (MYET-MON-NYIN)

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Abstract

Cyperus rotundus L. (Myet-mon-nyin) belong to the family Cyperaceae. It was collected from East Dagon Township, Yangon Region. The collected plants were studied, classified and identified by the literature sequences to confirm its identify. The histological character of leaves, stems and rhizomes of fresh specimens and dried powdered were also examined. These plants were perennial rhizomatous herbs spreading, scale dark brown and ellipsoid aromatic tubers. In this paper, to study the morphological and histological characters, fresh specimens of leaves, stems and rhizomes were used. Moreover, the powder of rhizomes was used in phytochemical properties that were investigated.

Keywords : *Cyperus rotundus* L., ellipsoid aromatic tubres, phytochemical.

Introduction

Myanmar is rich in medicinal plants. Among them, *Cyperus rotundus* L. was selected which belongs to the family Cyperaceae. This family contains about 90 genera and 4,000 species, widely distributed worldwide, Trease and Evans (1978). Holm *et al.* (1979) has recorded its occurrence in 92 countries but its presence can be assumed in all countries of the tropics and subtropics. The selected plant is commonly known as Myet-mon-nyin-ahnet in Myanmar. The plants are widely distributed in Myanmar, especially Yangon, Bago and Tanintharyi Region, Kress *et al.* (2003).

Parsons and Cuthbertson (1992) mentioned that *Cyperus rotundus* L. is an important medicine in India and China and noted its use by pharmaceutical companies to produce antidiarrhoeal drug, diuretics, anthelmintics and treatments for coughs, bronchial asthma and fever. In this research, the morphological characters and microscopical characters of leaves, stems, roots, rhizomes and the dried powder of whole plants of *Cyperus rotundus* L. were studied to ascertain the identification of the specimens.

Materials and Methods

The plant specimens of *Cyperus rotundus* L. were collected from East-Dagon Township, Yangon Region. The collected specimens were identified by using literatures Shukla and Misra (1979). The rhizomes were cleaned cut and air-dried for several days. The dried rhizomes were crushed and powdered with a grinding mill. The powder was stored in airtight containers. The histological study of the plants was also examined by free hand sections according to the literature of Trease and Evans (2002) at the Department of Botany, Dagon University.

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Preliminary phytochemical tests, physiochemical properties were carried out in the laboratory phytochemistry, Department of Botany, Dagon University and to examine the organic constituents by using the methods of Trease and Evans (1978).

Results

Morphological description of *Cyperus rotundus* L.

Family	-	Cyperaceae
Scientific name	-	<i>Cyperus rotundus</i> L.
English name	-	Nutsedge or nutgrass
Local name	-	Myet - mon - nyin

Perennial rhizomatous herbs, the rhizomes are initially white, fleshy with scaly leaves, fibrous, dark brown with age, ellipsoid, aromatic, 1.4 - 2.5 cm long, 0.5 - 1.0 cm wide. Stems slender (solid), glabrous, triangular in cross section, 10.0 - 45.0 cm tall, 0.2 - 0.3 cm wide, base of the stem thicken. Leaf blade linear, glabrous, acute, at the apex, ligule not distinct, 17 - 20 cm long, 0.2 - 0.3 cm is wide. Leaf-sheath tubular and fibrous, near the base of the plant, 2.5 - 5.0 cm long, 0.3 - 0.5 cm wide. Three to four leaf - like bracts subtended, the inflorescence which is umbel like consisting of 3-8 unequal length from 2.0 - 7.0 cm long, Spike of 3 - 9 spikelets. Spikelets are flattened and linear ranging in length from 1.0 - 1.7 cm long, narrow oblong and reddish brown in colour. Each of the 20 or 25 flowers (Florists) in a spikelet are each subtended by a keeled scale (glumes), 0.4 - 0.6 cm long, midvein green, margin publish brown, acuminate at the apex, bisexual, hypogenous, rachilla persistent. Stamens 3, yellow, filaments long and flattened when spikelet mature, 0.3 - 0.5 cm long; anther linear oblong, basifixed, ditheous, inferior. Ovary superior, unilocular, ovule 1, basal, erect, 0.1 - 0.2 cm long, stigma trifid. Flowering and fruiting period is from July to October.

Histological characters of leaves, stems, leaf-sheath, roots and rhizomes of *Cyperus rotundus* L.

Lamina

In surface view, both upper and lower surface of epidermal cells are thin - walled, slightly wavy, and rectangular in shape. Stomata are present on lower surface and paracytic (Gramineous type). Stomata with markedly rectangular subsidiary cells (Figures.2). In transverse section, the epidermis is one layered on both side, irregular and barrel shaped. The sclerenchymatous patches are present between the upper epidermis. The parenchymatous cells are 1 - 2 layered with air cavities. The bulliform cells are present above the lower epidermis, 1 - 2 layered, oval or polygonal in shape, distinct. The vascular bundles are oval or rounded in shape. The bundle sheath of small bundle is single layered and large bundle is double layered. The vascular bundles are embedded in the cortical region.

Midrib

In transverse section; epidermal cells are irregular, barrel in shaped, tightly arranged and between the epidermal cells sclerenchymatous patches are present.

Parenchymatous cells are 2 - 6 layered, polygonal in shaped and various sizes. Above the vascular bundles, air cavities are present. The bulliform parenchymatous cells are 1 - 2 layered. The girdle of bulliform cells, single sclerenchymatous patches are present. Largest bundle is oval and smaller bundles are rounded in shaped. Vascular bundles are collateral and closed type.

Leaf sheath

In surface view, both surfaces of upper and lower epidermis cells are parallel rows, rectangular and polygonal in shape. The lower epidermal cells are smaller than the upper epidermal ones. In transverse section, both lower and epidermal cells single-layered, polygonal or parallel-shaped cells. The ground parenchymatous cells are 2 - 6 layered, compact, thin walled, polygonal in shape, variable in size. The vascular bundles are rounded or oval. The bundle sheath of small rounded bundle singled layered, parenchymatous, large bundle double layered, the outer parenchymatous and the inner sclerenchymatous, The air cavities are present between the small and large vascular bundles. The vascular bundles are scattered, closed collateral type.

Stem

In surface view, the cells are irregular and rectangular in shaped, cell walls are wavy. Gramineous types of stoma are also found on the surface of the stem. Transverse section of stem is triangular in outline. Epidermal cells are composed of single layer and compactly arranged. Below the epidermal cells sclerenchymatous patches are present. The ground tissue consists of two type of cells; sclerenchymatous and parenchymatous. The sclerenchymatous cells at the periphery of vascular bundle. Cortex is made up of parenchymatous cells, irregular and polygonal in shape. The vascular bundles are embedded in the cortical region. Small bundles are nearer the periphery. The bundles are oval or rounded. Large bundles are oval in shape rounded by sclerenchymatous bundled sheath. Phloem lies outside the xylem. Vascular bundles are closed collateral type. Pith is made up of parenchymatous cells.

Root

In transverse section, the root is circular in outline. Epiblema was single layered and the cells are rectangular to barrel shape. Internal to the epiblema is the cortex which is made up of many layers of tightly arranged parenchymatous cells. Ground tissue is thin walled, parenchymatous consists of cortex, endodermis, pericycle and pith. The endodermis is the innermost layer of the cortex and forms a definite ring, one layered, cells parenchymatous. The cells are ellipsoidal to rectangular in shape. The pericycle layer is lying internal to the endodermis, ring - like, one layered, cells parenchymatous, irregular and rectangular in shaped. Xylem strands alternating with the phloem, arranged in radial, polyarch type. Pith is present.

Rhizome

In transverse section, the epidermal cells are compact, thin - walled parenchymatous cells of different sizes. Periderm consists of 2 - 6 layers of thin - walled parenchymatous cells, polygonal in shaped. Layer of epidermis with brown colour pigment, is often peeling of during maturity. The cortex is delimited from the central cylinder by an endodermoid (Pseudoendodermic) layer surrounding by a

narrow zone of small cells. Cortex consists of 7 - 12 layered, polygonal in shaped, thin-walled parenchymatous cells with small the wide central zone beneath endodermic and the stellar region is composed of cells with intercellular spaces. Vascular bundle surrounded by bundle sheath of fibers, scattered in stellar region. The vascular bundle Y - shaped in outline. Xylem layer thickness, cells sclerenchymatous, thick-walled, polygonal, compact. Phloem cells parenchymatous, thin-walled, irregular, compact vascular bundles are concentric and amphicribal type. Starch grains are abundant in ground parenchymatous rhizome.

Diagnostic characters of powdered leaves, stems and rhizomes of *Cyperus rotundus* L.

The powdered leaves of *Cyperus rotundus* L. was yellowish brown and had slightly aromatic odour. It was slightly bitter and fibrous in texture. The diagnostic characters of powdered stems were yellowish green and had slightly aromatic odour. It was slightly bitter and fibrous in texture. The powdered rhizomes of *Cyperus rotundus* L. was dark brown and pleasant. It was slightly pungent bitter and astringent and fibrous in texture. The results were shown in Table (1) and (Figures.3).

Table 1. Sensory characters of leaves, stems and rhizomes of *Cyperus rotundus* L.

Sample / Sensory character	Leaves	Stems	Rhizomes
Colour	Yellowish brown	Yellowish green	Dark brown
Odour	Slightly aromatic	Slightly aromatic	Pleasant
Taste	Slightly bitter	Slightly bitter	Slightly pungent bitter and astringent
Texture	Fibrous	Fibrous	Fibrous

Morphological characters of *Cyperus rotundus* L.

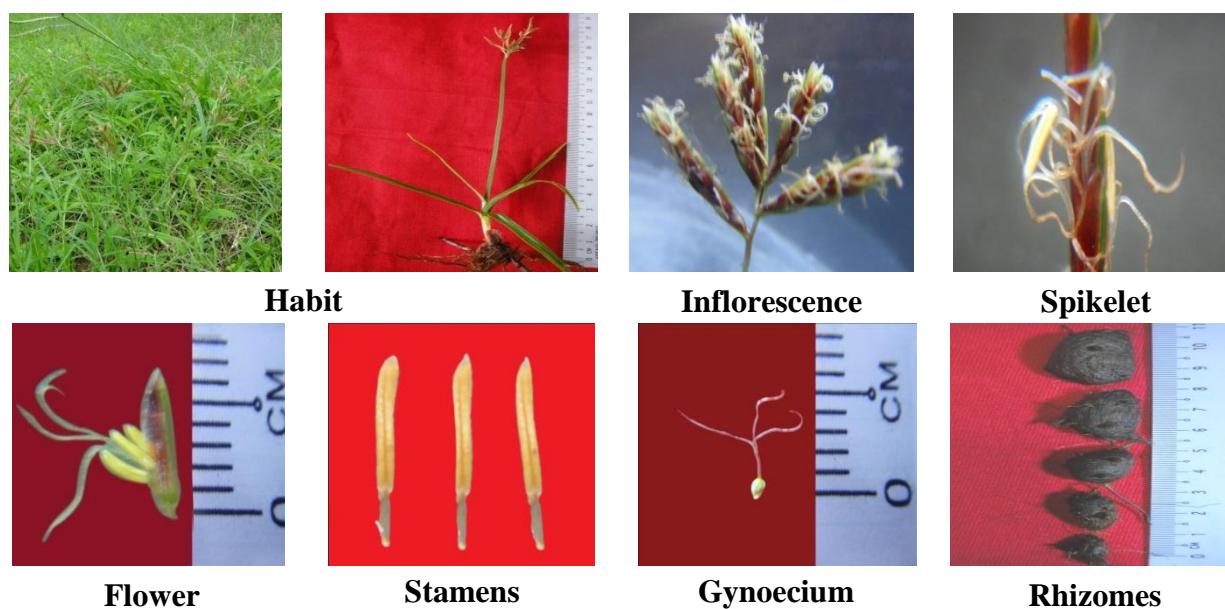


Figure (1) Morphological characters of *Cyperus rotundus* L.

Histological characters of leaves, stems, roots and rhizomes of *Cyperus rotundus* L.

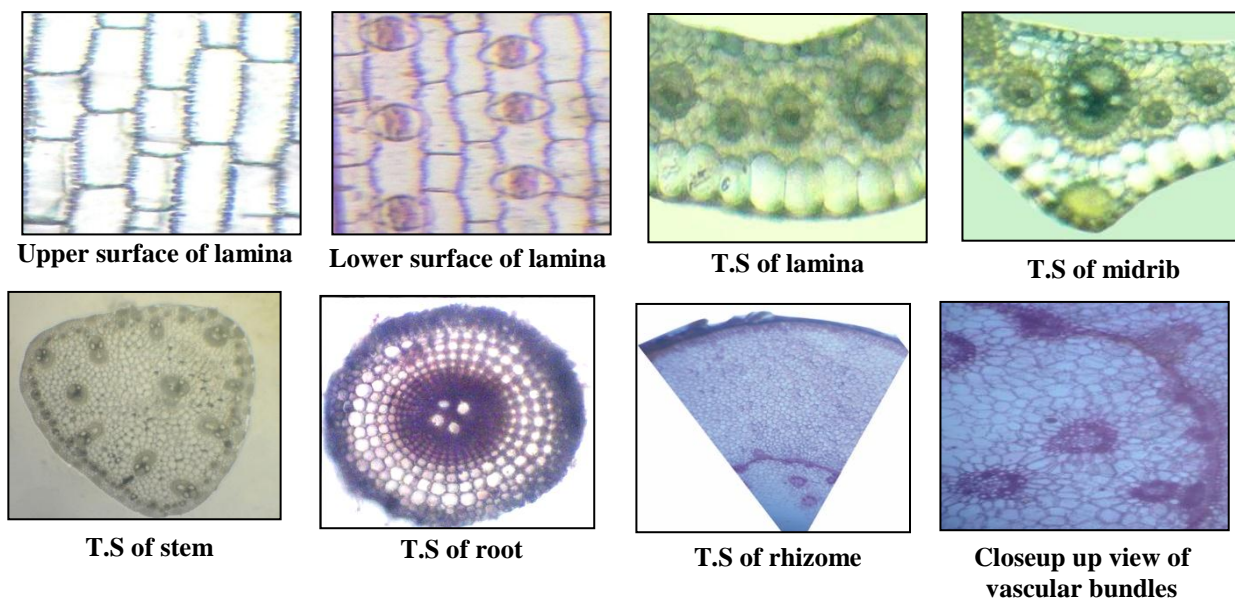


Figure (2) Histological characters of leaves, stems, roots and rhizomes of *Cyperus rotundus* L.

Diagnostic characters of powdered leaves, stems and rhizomes from *Cyperus rotundus* L.

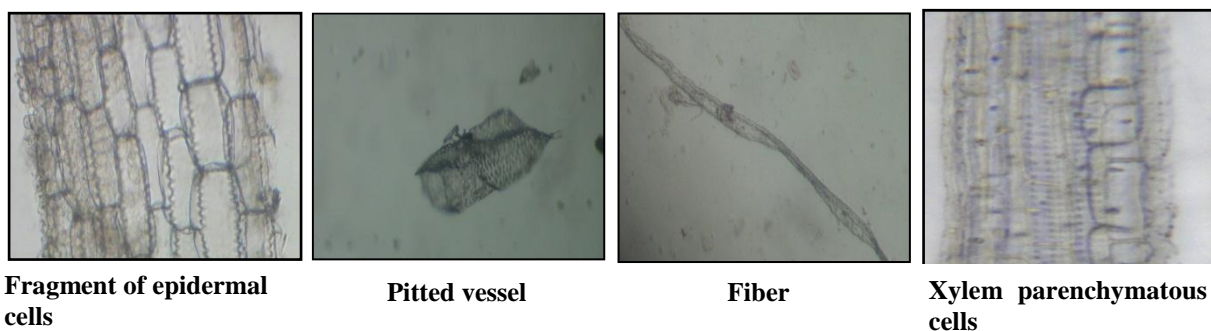


Figure (3) Diagnostic characters of powdered leaves, stems and rhizomes from *Cyperus rotundus* L.

Preliminary phytochemical test of powdered rhizomes of *Cyperus rotundus* L.

In preliminary phytochemical investigation of alkaloids, amino acid, carbohydrates, glycosides, flavonoids, starch, saponins, phenolic compound, steroids and terpenoids were observed but tannins and reducing sugar were absent in powdered rhizomes of *Cyperus rotundus* L. The results were shown in Table (2).

Table (2) Preliminary phytochemical tests of powdered rhizomes of *Cyperus rotundus* L.

No	Test	Extract	Test Reagents	Observation	Remarks
1	Alkaloids	1% HCl	(1)Mayer's Reagent	White ppt	+
			(2) Wagner's Reagent	Orange ppt	+
			(3) Dragendtorff's Reagent	Orange ppt	+
2	Glycosides	H ₂ O	10% lead acetate solution	Pale Yellow ppt	+
3	Reducing sugar	H ₂ O	Benedict's solution	No ppt	-
4	Saponins	H ₂ O	Distilled water	Frothing	+
5	Carbohydrates	H ₂ O	10% α-naphthol + Con: H ₂ SO ₄	Red ring	+
6	α-amino acid	H ₂ O	Ninhydrin reagent	Purple spot	+
7	Phenolic compound	H ₂ O	Ferric chloride	Deep brown ppt	+
8	Flavonoids	EtOH	HCl / Mg	Pink colour	+
9	Tannins	H ₂ O	Ferric chloride	No colour change	-
10	Starch	H ₂ O	Iodine solution	Blue colour	+
11	Terpenoids	P.E	Acetic anhydride Conc : H ₂ SO ₄	Deep blue	+
12	Steroids	P.E	Acetic anhydride Conc : H ₂ SO ₄	Blue green	+

(+) present (-) absent (ppt) precipitate

Discussion and Conclusion

In morphological study, this plants were perennial rhizomatous herbs, stem slender (solid), glabrous; leaf blade linear; leaf sheath sometimes fibrous, both margin glabrous, ligule not distinct. However, Hooker (1894) stated that grass or rush-like perennial herbs, stem solid, leaves 3 - ranked, sheath closed. In the present study, three to four leaf like bract subtended, the inflorescence which is umbel like spike of spikelets. Florets small, bisexual, subtended by glumes distichous, acuminate at the apex; hypogonous. Stamens 3, yellow, filaments long and flattened anthers linear - oblong, basifixed, ditheous, inferior. Ovary superior, unilocular, ovule 1, basal, erect, style long and slender are continuous with ovary stigma trifid. Meena (2010) stated that inflorescence umbelled, simple or compound or capitates. Rachilla of spikelet are persistent after fall of glumes. Rhizomes are initially white, fleshy with scaly leaves, fibrous dark brown with age, ellipsoid, aromatic. Sharma and Singh (2011) mentioned that the rhizomes are dark brown, ovoid and cover with fibers, brownish black externally and white internally fragrant.

According to the microscopical studies of the surface view of leaf blade and

midrib, the epidermal cells are parallel and in rows. Paracytic (Graminaceous types) of stomata are present on lower surface. In transverse section of leaf blades and midrib, the epidermis is one layered on both side. The sclerenchymatous patches are present between upper epidermis. The bulliform cells are present above the lower epidermis, 1 - 2 layered, distinct. Rad and Sonboli (2005) reported the hypodermis large solitary or occasionally pairs translucent cells at abaxial epidermis. Vascular bundles are four of them much larger than remainder. Bundle sheaths are double. In surface view of the stem, the cells are parallel, elongated along the length of the stem. The transverse section of the stem is triangular in outline. The sclerenchymatous cells are surrounded at the periphery of large vascular bundle. The vascular bundles are embedded in the cortical region. Rad and Sonboli (2005) stated that stem is triangular, side almost flat to slightly concave, grooved, with rounded corners. In transverse section of rhizomes, the epidermal cells are compact, thin - walled parenchymatous cells of different size.

Periderm consists of 2 - 6 layers thick - walled cork cell. Sharma and Singh (2011) stated that epidermis consists of typical parenchymatous cell with brownish pigments. Hypodermis consists of 2 - 3 layers of thick walled cells. Cortex is composed of parenchymatous cells. Vascular bundles are loosely distributed around the central pith.

The macroscopic characteristics of the plant parts, such as root, stem, leaf, flower, fruit, or seed, as well as examination the histological (microscopic) features. Hence, the histological characteristics are necessary for identification of plant species.

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