



E-ISSN: 2278-4136  
P-ISSN: 2349-8234  
JPP 2017; 6(6): 1995-1998  
Received: 03-09-2017  
Accepted: 04-10-2017

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## Pharmacognostical and phytochemical evaluation of stem of *Cynodon dactylon*

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### Abstract

*Cynodon dactylon* (Family: Poaceae), a common weed in the fields have been used in Ayurvedic and Unani medicines to cure various ailments. Its anatomical adaptations are made them to survive in any drastic environmental condition which made to pursue the present investigation on its anatomy, pharmacognostical features, including macroscopic, microscopic features, physico chemical parameters of aerial constituents and phytochemical screening in the preliminary level.

**Keywords:** *Cynodon dactylon*, Ayurvedic, Unani

### Introduction

Traditional systems of medicine are popular in developing countries and up to 80% of the population relies on traditional medicines or folk remedies for their primary health care need. Natural product researchers have sharper eye on herbal products to obtain medicinally important bioactive compounds. Chemical studies of Indian medicinal plants afford an important material for the detection and development of new drugs of natural origin. In the recent years, secondary plant metabolites (phytochemicals) with unknown pharmacological activities have been extensively investigated as a source of medicinal agents <sup>[1]</sup>.

The *Cynodon dactylon* (Family: Poaceae) commonly known as "arugum pillu" (Tamil), popularly known as Bermudagrass grows throughout India. It is a rapid growing perennial grass, native to East Africa, Asia and Australia and southern Europe. A hardy perennial grass abundant on road sides and paths, and readily takes possession of any uncultivated area. It creeps with culms, rooting at nodes and forming spreading mats on the surface of the soil and flowers nearly throughout the year. The flowers are green or brinjal in colour and the fruit grains are tiny and grayish in colour <sup>[2]</sup>. It is a weed and has been found to possess various medicinal properties. According to the Ayurvedic Pharmacopoeia, the plant is pungent and bitter in nature with characteristic fragrance and has cold potency. According to Unani system of medicine, the plant posses sharp and hot taste with good odour. The aerial parts and rhizomes of *Cynodon dactylon* was reported for its cardioprotective action, antibacterial, antimicrobial, antioxidant, wound healing, anti-diabetic, diuretic effects. *Cynodon dactylon* is reported to contain cynodin, hydrocyanic acid and triticin. The plant is traditionally used for jaundice, diuretics, and astringent, to stop bleeding in piles, skin infections in India at West Bengal, Assam, Manipur, and Mizoram parts <sup>[3]</sup>. *C. dactylon* is used by traditional healers for purifying the blood, anuria, biliousness, conjunctivitis, diarrhoea, gonorrhoea, itches and stomach ache <sup>[4]</sup>. Traditionally, juice of this plant is commonly consumed as health drink during the early morning in south India for healthy life. It forms an important part of Ayurvedic medicine, the juice of *C. dactylon* was used to treat hysteria, epilepsy and insanity <sup>[5]</sup>. The present study is concerned with its anatomical, pharmacognostical and preliminary phytochemical screening of aerial parts of *Cynodon dactylon*.

### Materials and Methods

#### Plant material

*Cynodon dactylon* stem were collected during the month of March 2011, from Anna University Campus, Guindy, Chennai, India and authenticated by Dr. P. Jayraman, Director of plant Anatomy Research Centre Chennai. The fresh aerial parts were separated and kept for shade drying. Dried specimen was powdered using mechanical grinder and passed through 60 mesh sieve to get the powder of desired coarseness. Powdered material was preserved in an air tight container.

### Pharmacognostical features

Morphological studies were done by using simple microscope to determine the shape, size, taste and odour of the leaf and sheathing leaf base. Microscopic studies were done by preparing a thin section of the culm, sheathing leaf base and lamina with the help of Rotary Microtome with the thickness of 10-12mm and stained [6, 7], and photographed using Nikon lab photo 2 and described [8]. The section was cleared with chloral hydrate solution and was stained as per the protocol. Histochemical reactions were applied with concentrated hydrochloric acid and phloroglucinol and were mounted in glycerine for the identification of lignified elements, iodine solution for identification of starch grains, ruthenium red for mucilage, 60% sulphuric acid for calcium oxalate crystals by reported methods [9, 10].

### Physico chemical parameters

The parameters were done to evaluate the proceedings of total ash; water soluble ash; acid insoluble ash and sulphated ash were calculated as per Indian pharmacopoeia [11]. Extracts of the powdered stem was prepared with different solvents for the study of extractive value. Fluorescence analysis was also carried out for the powder and for extract as per standard procedure [12].

### Powder analysis

Preliminary analysis of the powder of the aerial parts of *Cynodon dactylon* with different chemical reagents was carried out microscopically [13, 14].

### Extraction of Plant material

For preliminary phytochemical analysis, extract was prepared by weighing 1kg of the dried powdered aerial parts were subjected to hot successive continuous extraction with different solvents as per the polarity, petroleum ether, benzene, chloroform, ethanol and finally with aqueous. The extracts were filtered in each step using Whatman filters paper. The filtrate was concentrated using a rotary evaporator at low temperature (40-45 °C) and pressure. The presence or absence of the primary and secondary phytoconstituents was detected by usual prescribed methods [15].

## Results

### Anatomy of the Culm

There is a shallow furrow in the Culm towards the midrib of the leaf –sheath, and (fig 1). The epidermis is thin, unistratose, squarish cells with thick cuticle. Ground cortical tissue consists of parenchyma cells which gradually increase in centripetal direction. Vascular tissue consists of a 2 layers of vascular bundle covered by 4 to 6 layer of sclerenchyma cell. Pith cells get lysed to form the pith canal in matured stage.

### Anatomy of Leaf sheath

In transactional view, the sheath is folded adaxially along the median line, where the sheath is thicker and gradually tapers along the wings (fig 2). The adaxial and abaxial surfaces are smooth and even. The abaxial epidermal layer has oblong cells having Dumb-bell shaped stomata with thin cuticle; with parallel subsidiaries and cubical small silica cells are abundant on the abaxial epidermis (fig 6) and the adaxial epidermal cells are small, having thick radial walls with thick cuticle. The ground tissue consists of parenchyma cells with 2 or more air chambers near the mid rib (fig 3) and 12 to 20 collateral vascular strands placed more are less equidistantly along the leaf sheath;

### Anatomy of Lamina

The lamina is a typical, C<sub>4</sub> type with bulliform cells in epidermis and Kranz cells in vascular bundle (fig 4, 5)

### *Cynodon dactylon*

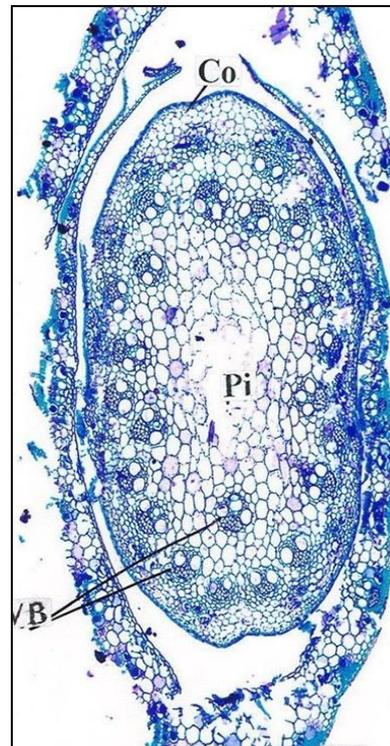


Fig 1: T.S of the Stem covered by leaf sheath

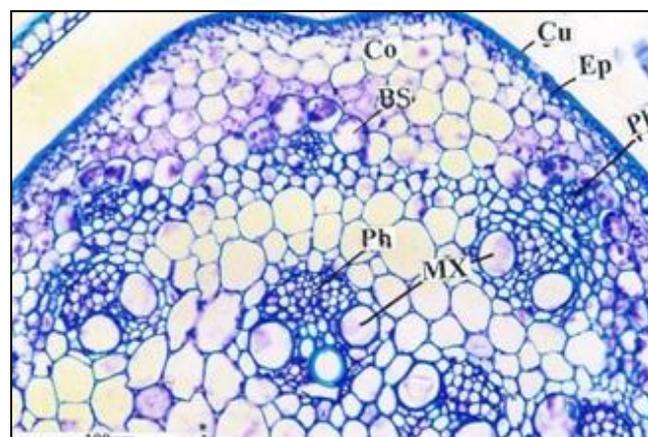


Fig 2 T.S of the Stem-portion enlarged

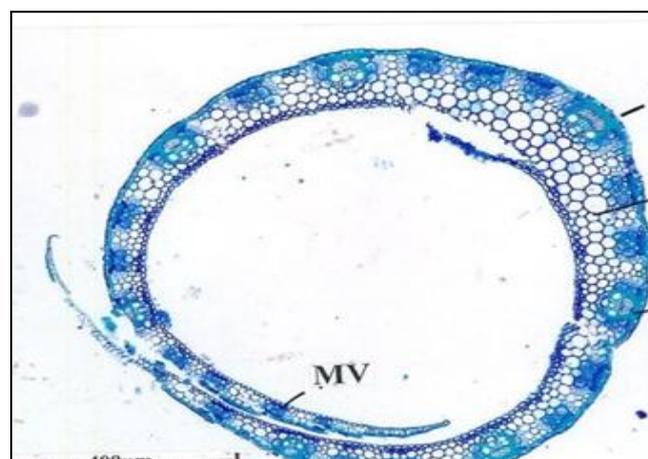


Fig 3. T.S of Leaf sheath

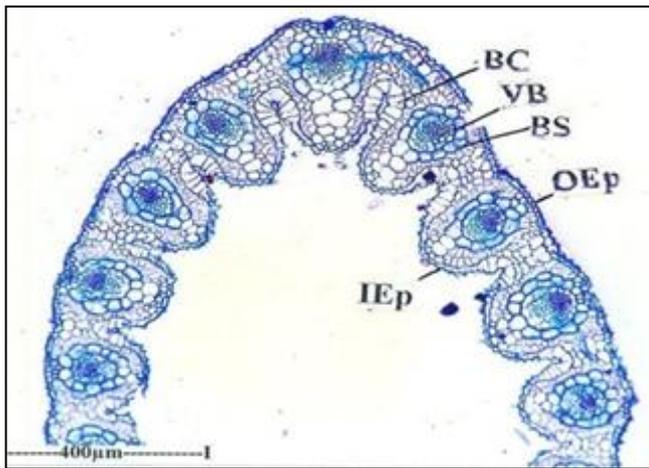


Fig 4: T.S of Leaf-middle part

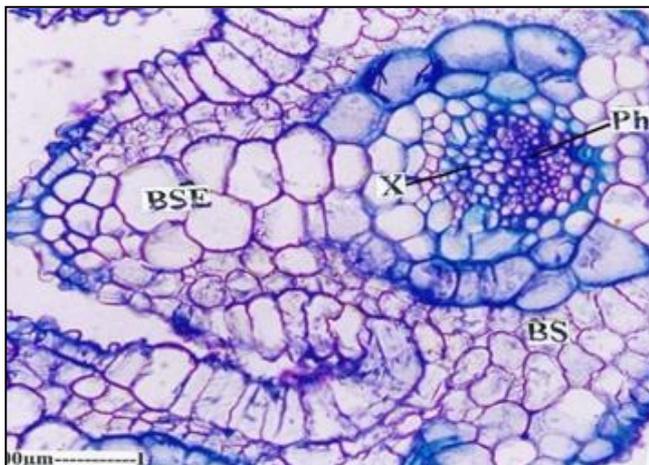


Fig 5: T.S of Leaf- Vascular bundle enlarged

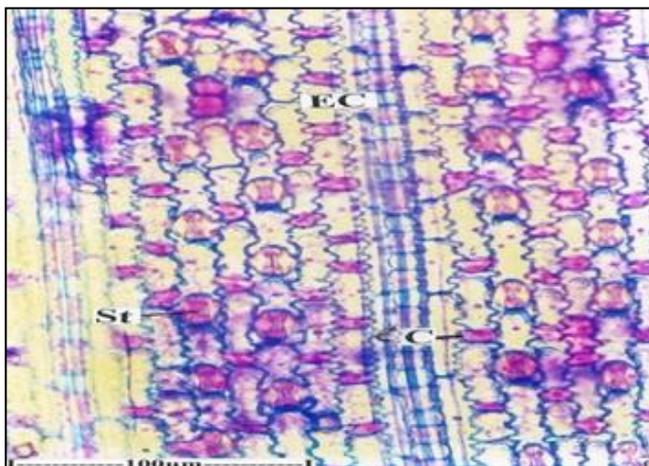


Fig 6: Epidermal cells and stomata enlarged

Cu- Cuticle, Ep-Epidermis, St- Stomata, IEp- Inner Epidermis, OEp- Outer epidermis, Co-cortex, VB- Vascular bundle, X-Xylem, Ph-Phloem, Pi, Ph-Pith, BS- Bundle sheath, MXI- Metaxylem, BC- Bulliform cell, MV- Marginal vessels.

#### Powder Microscopy

The organoleptic evaluations of the aerial part of the powder shows that it was light green with astringent odour having characteristic taste. Epidermis with thin elongated cells and parenchyma were observed when stained with toulidine and dumbbell shaped stomata were observed when stained with aniline blue and vascular bundles and fibres were observed,

when stained with ploroglucinol and concentrated hydrochloric acid.

#### Physico chemical features

The powdered drug was evaluated for its physico-chemical parameters like total ash values, acid insoluble ash, water soluble ash and loss on drying, and the results were tabulated (Table 1).

Table 1: Physico chemical evaluation of the crude drug of aerial parts of *Cynodon dactylon*

Standardization parameters	% W/W
Total Ash	28.08
Acid Insoluble Ash	7.10
Water Soluble Ash	8.25
Loss on Drying	0.59

#### Fluorescence analysis of the extracts

The extracts were prepared as per their polarity in hot successive extraction technique, and they were treated with reagents and the colour changes were observed under Ultra Violet light and the results were tabulated (Table 2).

Table 2: Fluorescence analysis of the aerial parts of *Cynodon dactylon*

S. No Sample	Colour in Day light	Colour in UV light
1. Petroleum ether Extract	Brown	Dark green
2. Benzene extract	Green	Green
3. Chloroform extract	Dark green	Dark green
4. Ethanol extract	Dark green	Dark green
5. Aqueous extract	Brown	Green

#### Extractive values

The extracts were prepared according to the polarity and they were concentrated and their values were calculated with reference to air dried drug and the results were tabulated (Table 3).

Table 3: Extractive values of aerial parts of extracts of *Cynodon dactylon* with different solvents

S. No.	Extracts	Extractability (%)
1	Petroleum Ether Extract	10
2	Benzene Extract	7.2
3	Chloroform Extract	5.2
4	Ethanol Extract	9.0
5	Aqueous Extract	17

#### Preliminary phytochemical analysis

The stem powder and various extracts such as petroleum ether extract, benzene extract, chloroform extract, ethanol extract and aqueous extract were subjected to preliminary phytochemical screening for their presence or absence of the constituents and the results were tabulated (Table 4).

**Table 4:** Preliminary phytochemical tests for drug powder and various extracts of aerial parts of *Cynodon dactylon*

Test	Drug powder	Petroleum ether	Benzene	Chloroform	Ethanol	Aquous
Sterols	+	+	-	-	-	-
Terpenoids	-	-	-	-	-	-
Carbohydrates	+	+	+	+	+	+
Flavanoids	+	-	-	-	+	+
Proteins	+	+	+	+	+	+
Alkaloids	+	-	-	-	+	+
Glycosides	-	-	-	-	-	-
Saponins	+	-	-	-	+	+
Tannins	+	-	-	-	+	+
Mucilages	-	-	-	-	-	-
Volatile oil	-	-	-	-	-	-

## Discussion

Microscopic method is one of the simplest and cheapest methods to start with for establishing the correct identity of the source materials. Various exogenous and endogenous factors have been taken in to account for determining the quality and purity of plant. Anatomically it shows 2 different layers of vascular bundle in the culm, surrounded by 6-7 layers of sclerenchymatous cells, distinct abaxial and adaxial epidermal layer in the leaf sheath with a parallelly placed vascular bundles and evident bulliform cell and kranz anatomy of the leaf gives a minute details of the aerial part of the plant and its anatomical adaptation to with stand in any drastic condition. Increased metaxylem area and phloem area in sheath area plays an important role in the conduction of water and photosynthesis, particularly under adverse saline conditions. This has been supported by previous reports in different plant species, *Oriza sativa* [16], *Kandelia candel* [17], *Zizuphus* cultivars [18], and *Arabidopsis thaliana* [19]. Powder analysis of the crude drug revealed the presence of parenchyma, phloem fibre, stomata. Fluorescence analysis and microchemical colour indicative tests were also carried out with a view to establish the authenticity of the drug. Besides these tests, ash values, extractive values and preliminary phytochemical screening were also carried out. The total ash, acid soluble ash and water insoluble ash were 280.8%, 7.10% and 8.25% respectively. The maximum extractive value was found in distilled water (17%) followed by Petroleum ether (10%) Ethanol (9%) Benzene (7.2%) Chloroform (5.2%). All the extracts of the drug was subjected to different tests for detecting the presence of various phytoconstituents present in the drug, which revealed the presence of alkaloids, glycosides, flavanoids, saponins, terpenoids and tannins. Though *Cynodon dactylon* is a weed, it is a highly reputed drug used in Ayurveda and Unani. Barring the anatomical details and preliminary phytochemical screening, rest of the pharmacognostical parameters, gives us the clue that it can be cashed economically as well to improve the standard of health in the developing countries.

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