Pharmacognostic Evaluation of Indigenous Medicinal Plant *Kedrostis foetidissima* (Jacq.) Cogn.

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ABSTRACT

Introduction: Ingeneral, members of Cucurbitaceae are well exploited for their medicinal, economic and culinary values,however few of them are less exploited.The present study deals with pharamcognostical evaluation ofone such plant namely Kedrostis foetidissima(Jacq.)Cogn.called as Appakovai in Tamil. **Methods:** Pharmacognostic evaluationswere carried out by organoleptic evaluation, anatomical studies and powder microscopy of leaves, roots and root tubers. **Results:** Organoleptic evaluation revealed that the characteristic white tubers, as storage organs,leaves exhibited a foetidodour when crushed.Anatomy of leaves showed lithocysts and anomocytic stomata,root showed the presence of fissured periderm and cleaved vascular bundlesand that of root tubers showed 3 or 4 exarch xylem. Powder microscopy of root tubers showed narrow and wide fibers; long, narrow and drum shaped vessels and scattered sclereids. **Conclusion:** The present Pharmacognostic and Powder microscopic studiesreveals that, the characteristic features of this plantparts resembles, the other members of cucurbitaceae .

Keywords: *Kedrostis foetidissima, Pharmacognosy, Powder microscopy.*

INTRODUCTION

Human beings depend on plant resources for food, shelter, clothing and medicine. Many members of Cucurbitaceae are exploited for their medicinal, economic and culinary values, However *Kedrostis foetidissima (*Jacq.*)* Cogn. is less exploited.[20] The plant is widely distributed in Africa and Asian countries. Most species of the genus Kedrostis are distributed chiefly in Africa. However, one species present in India is found in Gujarat, Konkan, Malabar, Deccan, and Carnatic regions of India.[5] In Tamil Nadu, this it is distributed in Cuddalore, Salem, Dharmapuri and Coimbatore districts.[12] The present study aims to evaluate the pharmacognosy of *Kedrostis foetidissima (*Jacq.*)* Cogn. (Figure 1), which has got wonderful medicinal values on cough,cold, asthma and piles.[14]

Figure 1: Kedrostis foetidissima–Habit

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MATERIALS AND METHODS

Chemicals and solvents

All chemicals and solvents used for the study were AR grade and was purchased from SRL- India.

Collection of Plant

The plant material used in this study was collected from wild area of Thittagudi (Tk) in Cuddalore district of Tamil Nadu, India (Latitude11.45; Longitude 79.75) Roots, tubers and leaves were washed thoroughly in tap water and then rinsed in distilled water for further use.

Phenology

Periodical phonological survey was conducted from September 2011 to March 2011. As the root tubers remain dormant under the soil during unfavorable season (April to September). The survey was limited to the above mentioned period.

Pharmacognostic Studies

The plant was identified on the basis of organoleptic, macroscopic and microscopic (anatomy) observations as summarized below.

(a)Organoleptic Characters

Study of Organoleptic characters of the plant was carried out using physical examination of the plant parts and light microscopic evaluations.[22]

(b)Anatomy

The anatomy of root tubers, leaves and stem were studied using the protocols of Subha et al (2011). Briefly, fresh plant parts were fixed in FAA (5% Formalin, 5% Acetic acid and 90% of 70% Ethanol) for 24 hours and subsequently dehydrated using series of t-Butyl alcohol. Fixed samples were embedded in paraffin wax blocks, sectioned using rotary microtome, stained with toluidine blue, safranin, fast-green, IKI as per protocols of O'Brien et al(1964), viewed under Nikon Labphoto2polarized microscope (Nikon , USA).

(c) Powder Microscopy

For powder microscopic observations, a coarse powder of root tuber was spread in a glass slide and viewed in bright field and polarized light microscope (Nikon Labphoto2 polarized microscope, USA. [3]

Deposition of voucher specimen

A voucher specimen of identified plant was authenticated and deposited in National Institute ofHerbal Science – Plant Anatomy Research center (PARC), Chennai- 45.

RESULTS AND DISCUSSION

According to World Health Organization (WHO), more than 80% of the world's population relies on traditional medicine for basic health care.[23] Medicinal plants are source of raw material for modern and traditional systems of medicine. In India, Siddha and Ayurvedic medicines are widely used to treat many common ailments. The treatments, in most cases, are administered by traditional healers and generally consist of crude plant extracts. Recently, biologically active compounds are isolated from such plants and used as herbal medicine.[21]

Botanical description

It is a scandent, monoecious climber with perennial root system. Stem -slender, angled, branched and sparsely hairy. Tendrils - axillary, simple, filiform and glabrous.Leaves-simple, bright green, hairy and more or less scabrid on both sides, margins distantly toothed or 5-angled.Petioles short and hairy.[14] **Male flowers**: yellow,2 to 4 at the apex, pedicels capillary, long with hairy calyx and campanulate (Figure 2a). **Female flowers**: pale yellow and pubescent, peduncles longer than male flowers, calyx 5, united, hairy and campanulate (Figure 2b). Ovary inferior, oblong, beaked and pubescent. Fruits sub-sessile, deep red and tapering into a long narrow beak. Seeds ***brown with a narrow sharp wing.***[10,19]

Figure 2a: Female Flower

Figure 2b: Male Flower

Pharmacognostic Studies

Organoleptic observations

Kedrostis foetidissima (Jacq.) Cogn. is a climber with root tubers. The root tuber is thick, fleshy and a white storage organ which is 4 mm in thickness. Surface appearance, size, odour and texture of the leaves were done by physical examinations. The leaves were slightly bitter; they look fleshy and hairy in appearance. It gives a foetidodour when crushed, the surface of the leaves are rough due to the presence of hairy out growths.

Anatomy of Plant Parts

Microscopic Features of Leaves

Lamina

The leaf is fairly thick, soft and has thin, less prominent midrib. The midrib is slightly projecting on abbatial side and more or less flat on the adaxial side. The midrib portion is about 300 µm thick. The vascular system of the midrib consists of two juxtaposed collateral bundles which include wide, angular thick walled xylem elements. The lamina is 220 µm thick. It consists of thick adaxial epidermis comprising thin walled cylindrical cells. At frequent intervals, a group of epidermal cells dilate extensively and possess calcium carbonatecystoliths. The cystolith bearing cells are called lithocysts.[3]

The epidermal cells as seen in surface view of the paradermal sections, are wide, thick walled and highly wavy rendering the cells amoeboid in outline. The cell surface is smooth. The stomata occur only on the abaxial epidermis. They are anomocytictype having no specific subsidiary cells. The guard cells are wide and elliptic, measuring 25 X 20 µm in size (Figure 3).

Root tuber

The tap root becomes modified into thick, fleshy, white storage organ. It is about 4mm thick. In sectional view, the tuberous rootconsists of outer thin periderm, wide

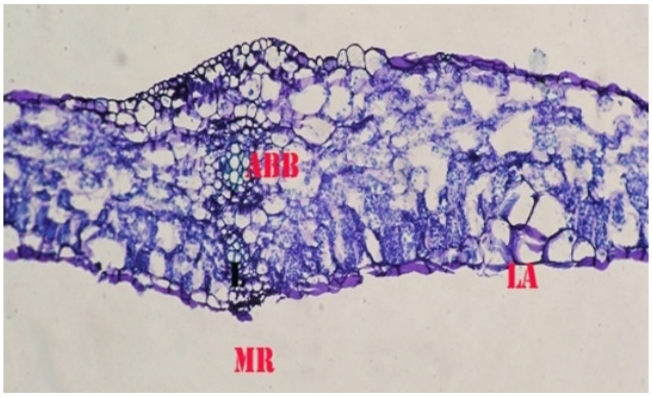

Figure 2: Lamina T.S MR-Mid rib, LA-Lamina, ABB-Abaxial bundle

Table 1: Phenology of the plant

MONTHS	SEPTEMBER				OCTOBER				NOVEMBER				DECEMBER				JANUARY				FEBRUARY				MARCH			
WEEKS	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
GERMINATION	------																											
VEG. PHASE	----------				-------																							
FLOWER BUDS							---------																					
FLOWERS									----------				-----															
YOUNG FRUITS															------		--											
MATURE FRUITS																	----------				----------							
LEAF / FRUIT FALL																									----------			

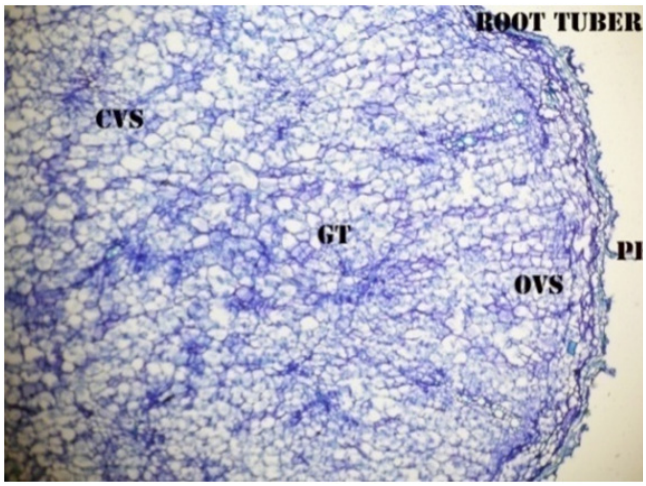

Figure 3: Root tuber - T.S (CVS-Central vascular system, GT-Ground tissue, OVS-Outer vascular system PE-Periderm)

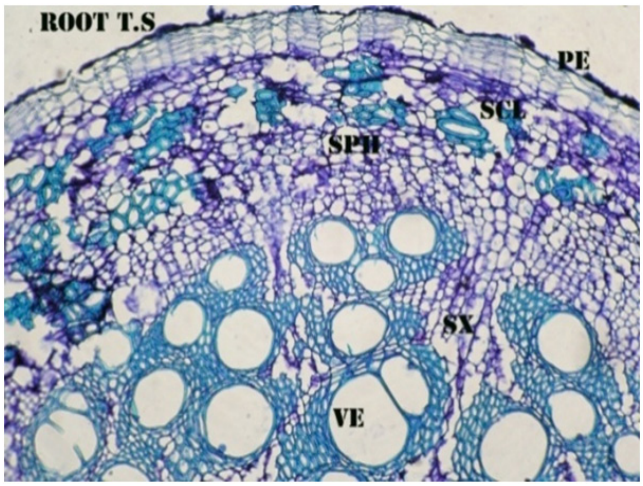

Figure 4: Root T.S(PE-Periderm, SPH-Secondary phloem, SX-Secondary xylem, VE-Vessel element)

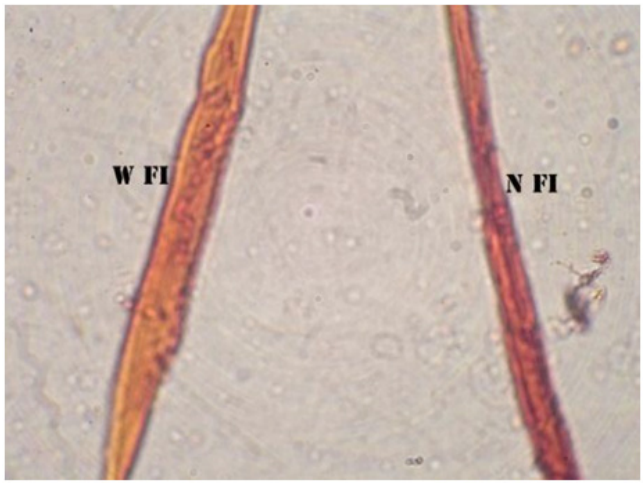

Figure 5: Powder microscopy of Root tuber (WFI-wide fibre, NFI- Narrowfibre)

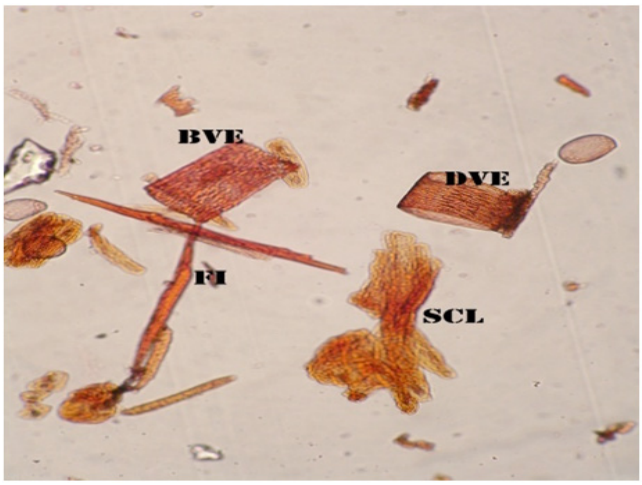

Figure 6: Powder microscopy of Root tuber (BVE-Broad vessel element,SCL-Sclereids, DVE-Drum shaped vessel elements, FI-Fibres)

parenchymatous ground tissue and isolated small vascular strands (Figure 4).

Periderm is a thin outermost zone of cells comprising two or three layers of cells. The periderm surface is irregularly fissured.The ground tissue occupies the major portion of the tuber and consists of large thin walled irregular and compact parenchyma cells. The ground parenchyma contains dense accumulation of starch grains. The starch grains are mostly compound type, simple parenchyma being less frequent. Many prismatic crystals are grouped into spherical ball compound type. The compound star grains are about 100µm thick.

Vascular strands are found in discrete units; some strands are seen along the periphery of the ground tissue. These outer vascular strands are in narrow radial files, the xylem elements are narrow and thin walled. In the central core also seen small nests of vascular elements. These strands have three or four xylem strands.[3]

Root

The root is 1.6 mm thick. It consists of outermost rough, fissured and narrow periderm. It is superficial in position and includes 5 to 7 layers of suberised phellem cells. Inner to it is the presence of cortical zone where brachysclereids and fiber elements are scattered. The vascular cylinder is cleaved into many fan shaped segments which are wider at the periphery and narrow at the centre. On the outer ends

of the xylem wings phloem mass occur which includes sieve elements which are random in alignment (Figure 4).[3]

Powder Microscopy

The powder/ macerated preparation of the root-tuber exhibit the following inclusions as seen under the microscope. Fibres: Xylem fibres are abundant and are thin walled. There are two types of fibres, one is narrow type and another is wide type. Narrow fibres are thick walled with reduced lumen;up to 500µm long. The wide fibres have thick wall and wider lumen;up to 400µ long (Figure 5).

The vessel elements of different shape and size are common in the powder. Some of the vessel elements arelong, narrow and cylindrical, measuring 450µm long.Another type of vessels includes wider, shorter vessel elements measuring 160-180µm long. A third category of cells are much wider and drumshaped,they are 100µm long and 150µm wide. There are scattered sclereids which are short, wide and lumened cells. They have thick walls and abundant pits. The sclereids are 150µm long (Figure 6).[22]

Phenology

As for as phenology is concerned , the germination of root tubers started in the first and second week of September, vegetative phase remained from first week of September to second week of October, Flower buds were given off during the third week of October and transformed into flowers in first week of November and continued till the second week of December, the flowers were converted into young fruits during third week of December and continued till first week of January, matured fruits were formed in the second week of January and continued till the fourth week of February, lastly the leaves were turned yellow and withering of leaves and ripened fruits took place during the month of march (Table -I).

CONCLUSION

The earlier ethno botanical study revealed the usage of this plant as medicine. In spite of its medicinal values it is not very commonly used as other members of Cucurbitaceae. The pharmacognostic investigations of leaves, roots and root tubers revealed the characteristic anatomical features of Cucurbitaceae. Powder microscopic results of root tubers showed the presence of narrow and wide fibers, narrow, wide and drum shaped vessels. Though there is a scarce reference about the medicinal values of roots of this plant in the text, the leaves have got wonderful curative effects against cough, cold, asthma and piles. The phonological study revealed the availability of this plant only for a period of six months in a year. Thus pharmacognostical studies were carried out to ensure the identity of the plant and a little effort is taken to explore the uses of this plant.

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