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DRUG REVIEW

Pharmacognostical evaluation of *Vacha* (*Acorus calamus* Linn.) rhizome

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Abstract

Vacha (*Acorus calamus Linn.*) is a significant drug described in the Ayurvedic literature with multidimensional applications and immense therapeutic potential. The plant is botanically identified as *Acorus calamus* Linn. belonging to the family Acoraceae. The commonly used part of the drug is rhizome. Pharmacognosy is a useful tool for determining the genuineness of drugs by macroscopic and microscopic analysis. Macroscopic as well as microscopic characteristics of dried rhizomes of *Acorus calamus* Linn. were analysed in this work. The powder macroscopic and microscopic features of dried rhizomes were also examined.

Introduction

Vacha (*Acorus calamus* Linn.) is an important drug with various therapeutic applications. It is said to have positive influences on *medha* (grasping and retention of knowledge), *buddhi* (cognition), *smriti* (memory) and *sapnja* (consciousness).[1,2] It is a perennial, semi aquatic, strongly aromatic and gregarious tall herb which is seen throughout India in varying agro-climatic conditions.[3] It grows well in dump marshy places such as meadows, edges of lakes and banks of streams and rivers. For quality assurance and authentication purposes, pharmacognosy of dried rhizomes of *Vacha* was studied by macroscopic and microscopic analysis.

MATERIALS AND METHODS

Collection of sample: Dried rhizomes of *Vacha* were supplied by Ambuja Institute of Ayurvedic Research and Documentation, Udayamperoor. Ernakulam district, Kerala. The rhizomes that were devoid of any contamination and infestation were selected. (Fig 1, Fig 2)

Figure 1. Plant of *Acorus calamus* Linn

Figure 2. Dried rhizomes of *Acorus calamus* Linn.

Materials

Dried rhizomes of *Vacha* (*Acorus calamus* Linn.), magnifying lens, watch glass, blade, petri dishes, cover slips, glass slides, medium sized camel hair brushes, safranin, glycerine, distilled water, filter paper, compound microscope, digital camera

Method of Study:

A. Macroscopic evaluation of dried rhizomes

The macroscopic characteristics such as external characters of the rhizome, shape, size, its colour, cut surface, fracture, characteristic odour and also taste were examined with sensory perceptions.

B. Microscopic evaluation of dried rhizomes

Fine transverse sections of dried rhizomes were made. The cut sections were transferred to a petri dish with water. The staining solution was made by adding some drops of safranin to a watch glass filled with water. A thin section of rhizome was removed from petri dish and added to the staining solution. Using a hair brush, the section was placed on the middle of a clean slide once it had been sufficiently stained for thirty seconds. After that, a small drop of glycerine was poured on the section and mounted using a cover slip. The slide was examined using a compound microscope under 10X and 40X powers.

C. Powder macroscopic evaluation

Powder of dried rhizomes was taken on a white paper. A magnifying lens and the unaided eye were used to view it. The colour, taste and smell were assessed. Texture of powder was assessed using fingers. Fineness and degree of uniformity of the particles were noticed.

D. Powder microscopic evaluation

Over a glass slide, a pinch of fine rhizome powder was placed. Few drops of safranin were added to the powder. It was mixed using hair brush. Even spreading of this mixture was done on the glass slide followed by addition of glycerine. After placing a cover slip, it was examined under 10X power of a compound microscope.

A. Macroscopy of dried rhizomes

B. Microscopy of dried rhizomes

The transverse section is circular to oval with slightly wavy outline. It reveals a single row of epidermis or rarely very thin corky tissue followed by a broad cortex and a large stele or central cylinder. The arrangement of the ground or fundamental tissue is similar in both cortex and stele. It appears like a network composed of chains of neatly arranged spherical cells with vascular bundles arranged in a scattered manner at the junction of the network.

Cortex: This region is composed of spherical or oblong cells which are thin walled. Cells on outer side are smaller, mostly collenchyma cells with close arrangement. Towards the inner side, cells are rounded; they form chains of cells enclosing air spaces. Vascular bundles, starch grains and secretory cells with contents which are light yellowish-brown are present.

Endodermis: It is distinct with thin walled cells and casparian strips.

Stele: Composed of round parenchyma cells arranged in chains of single rows enclosing large air spaces. Some vascular bundles are arranged near endodermis forming a ring. In the ground tissue, some vascular bundles can be seen scattered. Spherical starch grains (diameter: 3-6 µ) are present. Secretory cells occur amidst the parenchyma cells.

(Fig 3 to Fig 6)

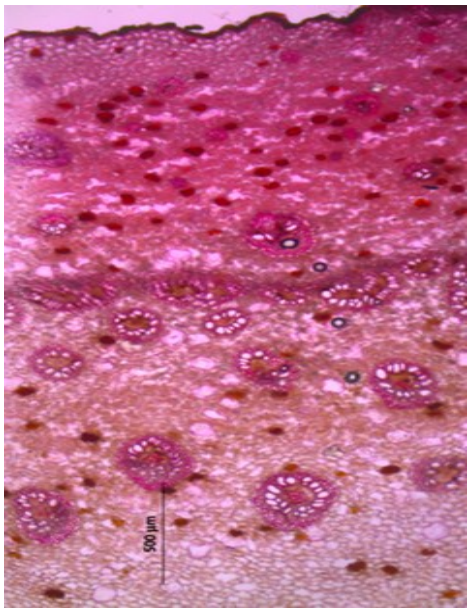


Figure 3. TS of dried rhizome showing cork, cortex, endodermis and stele

Table 1: Macroscopic features of *Vacha* (*Acorus calamus* Linn.) rhizomes

Parameters	Dried rhizomes of *Acorus calamus* Linn.
Size	8-12 cm in length, 0.5-1.5 cm thick
Shape	Sub cylindrical to slightly flattened, tortuous
Colour	Light brown
External characters	Covered with thin brownish corky skin. Upper side of rhizome had transverse leaf scars which are alternately arranged and triangular. The rhizomes are nearly surrounded by these scars. Lower side shows irregular zigzag line of slightly elevated tubercular spots of root scars.
Cut surface	Minutely porous and light buff in colour
Fracture	Rhizome break with short fracture
Odour	Characteristic aroma
Taste	Rhizomes have pungent and bitter taste

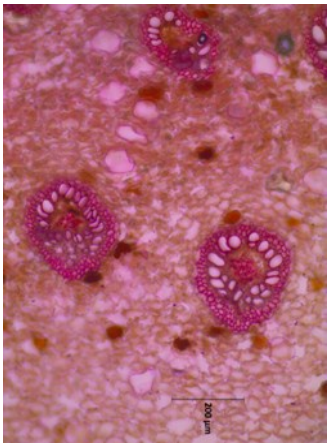


Figure 4. TS of cortex showing secretory cells, starch grains, Vascular bundles

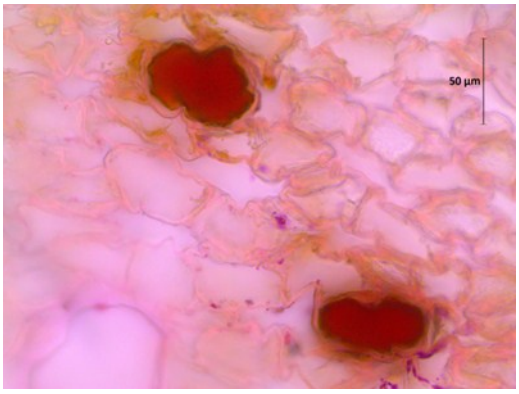


Figure 5. Secretory cells

Figure 6. Vascular bundle (Xylem and phloem), sclerenchyma cells

C. Powder macroscopy

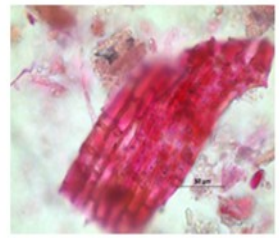
Table 2. Powder macroscopic features of rhizome of *Acorus calamus* Linn.

Parameters	Organoleptic evaluation of powder
Colour	Buff coloured
Odour	Aromatic
Texture	Almost fine, fibres present
Taste	Pungent

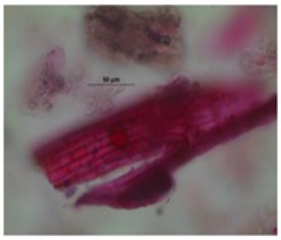
Figure 7. Powder of *Acorus calamus* Linn. rhizomes

D. Powder microscopy

Cork cells, epidermal cells, pitted vessels, fibres, reticulate vessels, trichomes, stellate trichomes, parenchyma cells with starch grains, pigment cells, pitted parenchyma cells and pitted vessel fragments were identified in powder microscopy of the dried rhizome.

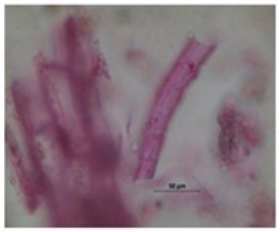


Cork cells

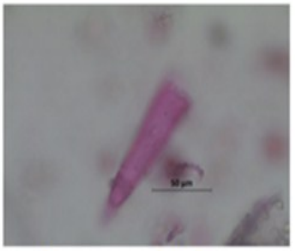


Epidermal cells

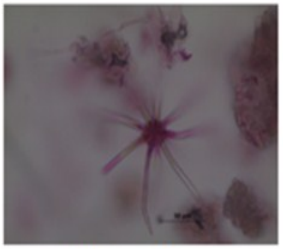
Pitted vessels and fibres



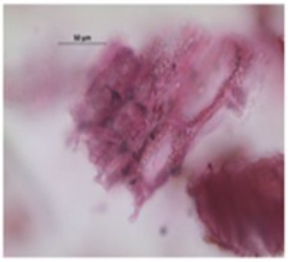
Fragments of reticulate vessel



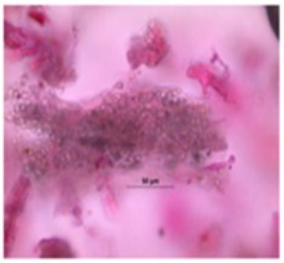
Fragments of trichomes



Stellate trichomes



Cells with starch grains



Starch grains

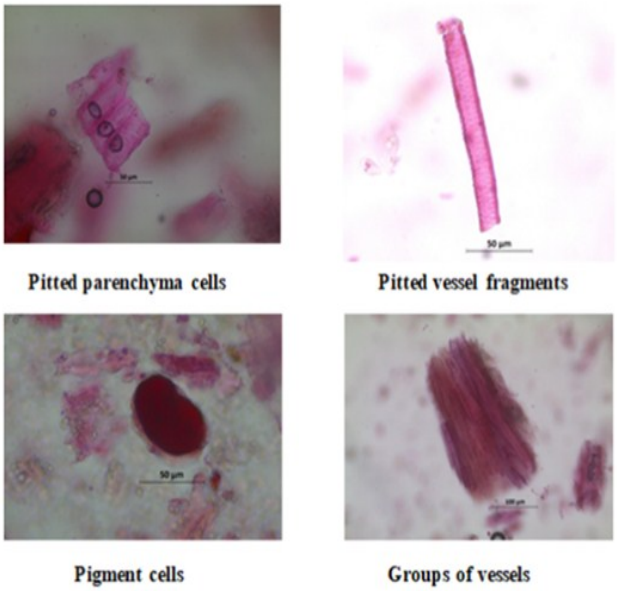


Figure 8. Powder microscopy of *Acorus calamus* Linn. rhizomes

Conclusion

Sub cylindrical to slightly flattened rhizomes of *Vacha* are light brown with transverse leaf scars on the upper side and tubercular spots of root scars on lower side. Transverse section of it is characterised by thin corky tissue followed by a broad cortex and large stele. The arrangement of tissues in cortex and stele appears like a network composed of chains of spherical cells with vascular bundles and secretory cells. Pitted vessels, fibres, reticulate vessels, trichomes, stellate trichomes, and parenchyma cells with starch grains, pigment cells, pitted parenchyma cells and pitted vessel fragments are identified in powder microscopy.

References

1. Madhava. Madhava Dravyaguna. Priya Vrat Sharma, editor. Varanasi: Chaukambha Vidyabhavan; 1973. 7 p.
2. Agnivesa. Caraka Samhita. R K Sharma, Bhagwan Dash, translators. Reprint ed. Volume I. Varanasi: Chaukambha Sanskrit series office; 2014. Sutra Sthana, Chapter 4, Shadvirechanashatasriteeyam, sloka 18; 100 p.
3. Kolammal M, Aiyer Narayanan K. Pharmacognosy of Ayurvedic drugs of Travancore-cochin. Series 1, Number 3. Thiruvananthapuram: Department of Pharmacognosy, University of Travancore; 1992.43-49 p.

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