



NATIONAL JOURNAL OF RESEARCH IN AYURVED SCIENCE

Pharmacognostical Investigation on *Lepidagathis keralensis*

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ABSTRACT

Objective: To study the Macroscopy and Microscopy of plant *Lepidagathis keralensis*. **Methods:** It was elucidated the Morphological specific characteristics for leaves, stem and root. Anatomical and Powder Microscopical characters of the plant were carried out. **Results:** Macroscopical characters showed that leaves was observed as Lanceolate, small in size, dark green in colour. Stem was observed as quadrangular, purple in colour. The root was observed as fibrous and brown in colour. Leaf Microscopy showed the presence of uniseriate upper and lower epidermis covered with cuticle. The lamina region is composed of mesophyll cells which is not distinguished to palisade and spongy parenchyma. Unicellular trichomes are present in the upper and lower epidermis. Stem microscopy showed the presence of multilayered parenchymatous cortex. A band of lignified fibers and stone cells can be found in the cortex region. Cortex is followed by phloem, which is composed of phloem elements.

Xylem region is wide and consists of lignified xylem vessels, xylem fibers and xylem parenchyma. Root microscopy showed the presence of outer cork region. Cork is followed by multilayered cortex. Lignified stone cells are present in the cortical region. Phloem is narrow made up of phloem elements. Xylem is wide region made up of lignified xylem elements like xylem vessels and xylem fibers. Powder Microscopy of plant *Lepidagathis keralensis* shows bordered pitted vessels, fragment of parenchyma cells and crystals of calcium oxalate and large number of elongated sclereids, a fragment of mesophyll cells and spiral vessels are seen. **Conclusion :** The present study provide the scientific data for the proper identification and authentication of *Lepidagathis keralensis*.

Key words: *Lepidagathis keralensis*, *Acanthaceae*, *Macroscopy*, *Microscopy*, *Unicellular trichomes*, *cork*, *parenchyma cells*.

INTRODUCTION

Most of the crude drugs used in medicine are obtained from plants, and only a small number comes from animal and mineral kingdoms. Drugs obtained from plants consists of either entire plants or plant parts. Herbal medicine is the oldest form of healthcare known to mankind. The greatest wealth in nature is the kingdom of plants. Nature has given a large source of medicinal agents from plants for the past thousand years an impressive number of modern drugs have been isolated from natural sources. Many of these isolation were based on the uses of the agents in traditional medicine. The plant based traditional medicine systems continue to play an essential role in health care. The ongoing recognition of medicinal plants is due to several reasons, including escalating faith in herbal medicine.[1,2]

Lepidagathis keralensis is a hard prostrate herb with woody root stalk. It is found in lateritic hills near sea coast mainly in exposed lateritic rocks. Commonly it is known as Paramullu. *Lepidagathis* (Acanthaceae) comprises about 150 species and is distributed across tropical countries. In India, it is represented by 37 taxa, of which 21 are endemic *Lepidagathis* was described by wildenow (1800) based on *Lepidagathis cristata* from the Indian subcontinent. Its distinctness from *Lophostachys* largely debated. *Lepidagathis* often shares Morphological similarities with some other genera in *Acanthaceae*, hence placed in family *Acanthaceae*. [2,3]

Lepidagathis keralensis (*Acanthaceae*) is less explored traditional plant for research studies. The family known to contain bioactive components like

cytotoxic, anti-fungal, anti-inflammatory, antioxidant and insecticidal properties. The plant has many medicinal properties. The spines of the plant used by Paniya tribes for digestive disorders. The plant is also used for kidney stones, asthma, chest pain, blood purifier etc. The major isolated chemical constituents of the genus include alkaloids, glycosides, saponins, flavonoids, phenol and inorganic minerals.[3]

The current literature survey revealed that Macroscopy, Microscopy and Powder Microscopy of *Lepidagathis keralensis*. The main objective of the study is to provide some valuable information with respect to its identification and authentication of *Lepidagathis keralensis*. [4]

MATERIALS AND METHODS

Plant collection

The fresh healthy specimen (whole plant) of *Lepidagathis keralensis* were collected from kannur district, kerala , India and authenticated by senior botanist Mr. A K Pradeep., professor, Department of Botany University of calicut and the voucher specimen was preserved as herbarium and the numbers were 173929.[4,5]

Chemicals and instruments

Different materials used for the study includes basic Microscopic instruments like compound microscope, trianacular microscope, glass slide, cover slip, watch glass and other common glassware. Micro photographs were taken using Lecia DMLS microscope attached with Letiz MPS 32 camera. Common solvents like ethanol (95%) and reagent like Phlouroglucinol,

Hydrochloric acid, glycerin, iodine solution.[6,7]

Macroscopical evaluation

The fresh leaves , stem and root of *Lepidagathis keralensis* were subjected to morphological studies and parameters like colour, odour , shape, taste and size are evaluated as per standard WHO guidelines.[8,9]

Microscopical evaluation

A histochemical and Microscopical study of the fresh plant *Lepidagathis keralensis* and powdered plant *Lepidagathis keralensis* was performed according to the method described by Kokate and Khandelwal.[10,11]

RESULTS

Macroscopic evaluation



Figure 1; whole plant of *Lepidagathis keralensis*



Parameter	Leaves	Stem	Root
Colour	Dark green	Purple	Brown
Odour	Pleasant odour	Pleasant odour	No odour
Taste	Tasteless	Tasteless	Tasteless
Shape	Lanceolate	Quadrangular	Fibrous
Size	Length 0.5 -1.5 cm Width 3- 10 mm	Length 10 -15 cm Width 5- 10 mm	Length 10 -20 cm Width 0.5 - 5 mm

Table 1. Macroscopic evaluation of *Lepidagathis keralensis*

Microscopical evaluation

Transverse section of Lepidagathis keralensis (leaf)

Transverse section of the *Lepidagathis keralensis* (Leaf) midrib shows an outer single layer of upper and lower dome-

shaped epidermis covered with cuticle. Under the epidermis, a parenchymatous region is present in which the vascular bundle is embedded. The vascular bundle is made up of xylem and phloem elements. Spiral vascular strand is also present. Unicellular trichomes are present in both

lower and upper epidermis region. The transverse section of the leaf lamina shows uniseriate upper and lower epidermis covered with cuticle. The lamina region is composed of mesophyll cells which is not distinguished to palisade and spongy parenchyma. Unicellular trichomes are present in the upper and lower epidermis.

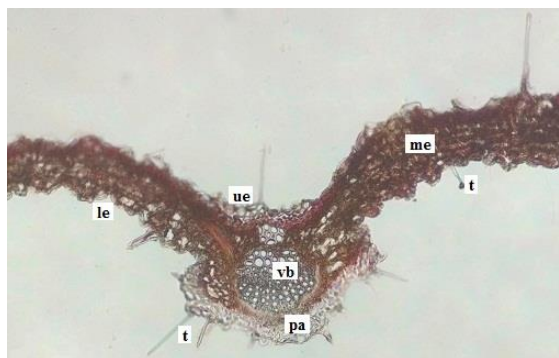


Figure.2: Transverse section of the *Lepidagathis keralensis* (Leaf)

Stain: Phlouroglucinol + HCl & Magnification: 45 x

le.: lower epidermis; **me.:** mesophyll cells; **pa.:** parenchyma cells; **t.:** trichomes; **ue.:** upper epidermis.

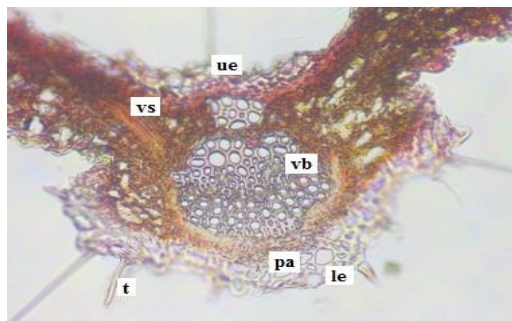


Figure.3: Transverse section of the *Lepidagathis keralensis* (Leaf) through midrib

le.: lower epidermis; **pa.:** parenchyma cells; **t.:** trichome; **ue.:** upper epidermis;

vb.: vascular bundle; **vs.:** vascular strand.

Transverse section of Lepidagathis keralensis (Stem)

Transverse section of *Lepidagathis keralensis* (Stem) shows 2-3 layers of cork cells. It is followed by multilayered parenchymatous cortex. A band of lignified fibers and stone cells can be found in the cortex region. Cortex is followed by phloem, which is composed of phloem elements. Xylem region is wide and consists of lignified xylem vessels, xylem fibers and xylem parenchyma. Pitted parenchyma and pitted vessels are also present. Medullary rays are uni to bi seriated. Pith is parenchymatous. Large number of raphides of calcium oxalate can be found in pith region.

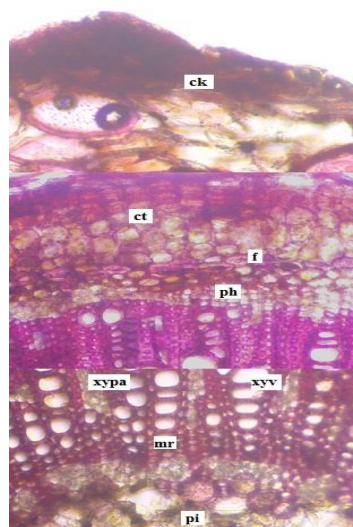


Figure.4: Transverse section of the *Lepidagathis keralensis* (stem)

Stain: Phlouroglucinol + HCl & Magnification: 45 x

Portion enlarged *Lepidagathis keralensis* (Stem): **ck.**: cork; **ct.**: cortex; **f.**: fiber; **mr.**: medullary rays; **ph.**: phloem; **pi.**: pith; **xypa.**: xylem parenchyma; **xyv.**: xylem vessels.

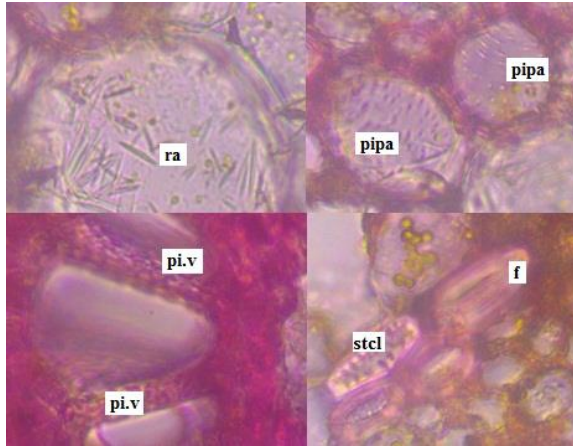


Figure 5: cell inclusions of *Lepidagathis keralensis* (Stem)

f.: fiber; **pi.v**: pitted vessels; **pipa.**: pitted parenchyma; **ra.**: raphides; **stcl.**: stone cell.

Transverse section of *Lepidagathis keralensis* (Root)

Transverse section of *Lepidagathis keralensis* (Root) shows outer cork region. Cork is followed by multilayered cortex. Lignified stone cells are present in the cortical region. Phloem is narrow made up of phloem elements. Xylem is wide region made up of lignified xylem elements like xylem vessels and xylem fibers. Medullary rays are uniseriated. Pith is absent.

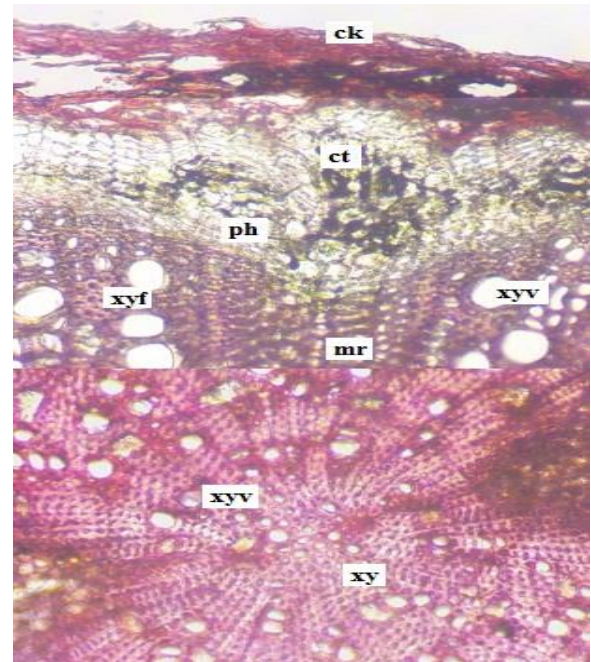


Figure 6: Transverse section of *Lepidagathis keralensis* (Root)

Stain: Phlouroglucinol + HCl & Magnification: 45 x

Transverse section of *Lepidagathis keralensis* (Root) a portion enlarged shows **ck.**: cork; **ct.**: cortex; **mr.**: medullary ray; **ph.**: phloem; **xy** : xylem; **xyv** : xylem vessel; **xyf** : xylem fiber.

Powder Microscopy

Powder microscopy of *Lepidagathis keralensis* whole plant shows bordered pitted vessels, fragment of parenchyma cells and crystals of calcium oxalate. A large number of elongated sclereids, a fragment of mesophyll cells, pitted vessels and spiral vessels are seen. Fragment of non-lignified fiber with annular vessel, unicellular trichomes, multicellular hair and stomata are also present.

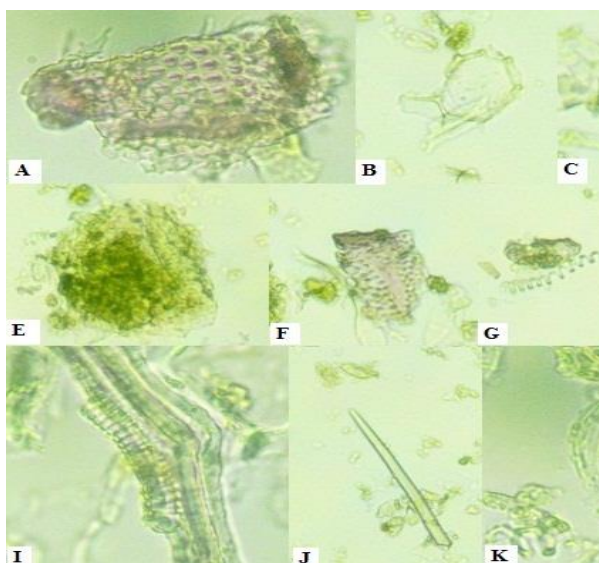


Figure 7: Powder microscopy of *Lepidagathis keralensis*

A. bordered pitted vessel; B.: parenchyma cells; C.: crystal of calcium oxalate; D.: sclereids; E.: fragment of mesophyll cells; F.: pitted vessel; G.: spiral vessel; H.: sclereids; I.: non-lignified fiber with annular vessel; J.: trichomes; K.: stomata; L.: multicellular hair.

DISCUSSION

These studies were aimed at ensuring Macroscopy, Microscopy and Powder Microscopy of *Lepidagathis keralensis* under investigation. Morphological evaluation is helpful in the authentication of *Lepidagathis keralensis* by evaluating the external appearance ie., colour, shape, size, odour and taste [11]. All these parameters were recorded for Leaves, Stem, and Root of the plant *Lepidagathis keralensis*. Unicellular trichomes are present in both lower and upper epidermis region, Xylem region is wide and

consists of lignified xylem vessels, Large number of raphides of calcium oxalate can be found in pith region are the differential characters. [12] These were helpful in primary identification of *Lepidagathis keralensis*. Microscopical techniques provides detailed information about the plant. Even identifying the powder characteristics of *Lepidagathis keralensis* is useful in authentication and identification of the adulterants in the plant. [13,14]

CONCLUSION

1. The specific Macroscopic features (colour, shape, odour, size and taste) were determined for *Lepidagathis keralensis*.
2. The following anatomical special structures for plant organs were established and can be used for identifying *Lepidagathis keralensis*.
 - a) *Leaves* - The transverse section of the leaf lamina shows uniseriate upper and lower epidermis covered with cuticle. The lamina region is composed of mesophyll cells which is not distinguished to palisade and spongy parenchyma. Unicellular trichomes are present in the upper and lower epidermis.
 - b) *Stem* - The transverse section of stem shows 2-3 layers of cork cells. It is followed by multilayered parenchymatous cortex. A band of lignified fibers and stone cells can be found in the cortex region. Cortex is followed by phloem, which is composed of phloem elements. Xylem region is wide and consists of lignified xylem

vessels, xylem fibers and xylem parenchyma.

c) *Root* - Transverse section of *Lepidagathis keralensis* (Root) shows outer cork region. Cork is followed by multilayered cortex. Lignified stone cells are present in the cortical region. Phloem is narrow made up of phloem elements. Xylem is wide region made up of lignified xylem elements like xylem vessels and xylem fibers.

3. Powder microscopy of plant *Lepidagathis keralensis* shows bordered pitted vessels, fragment of parenchyma cells and crystals of calcium oxalate. A large number of elongated sclereids, a fragment of mesophyll cells, pitted vessels and spiral vessels are seen.

In conclusion the present work was undertaken to lay down the Macroscopical, Microscopical and Powder microscopical parameters and it reveals the Pharmacognostical characters of *Lepidagathis keralensis*.

ACKNOWLEDGEMENT

The author is thankful to Mr. Surjith Mohan, Partner, Psychotherapist, Kanhagad, Kerala, for financial and mental support. And also thankful to the Principal, Sirajudheen M K, Professor and Head, Celestin baboo R.V, Department of Pharmacognosy, Jamia Salafiya Pharmacy College, Pulikkal, Malappuram, Kerala.

CONFLICT OF INTEREST

Nil

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Conflict of Interest: None

Source of funding: Nil

Cite this article:

Pharmacognostical Investigation on Lepidagathis keralensis

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Ayurlog: National Journal of Research in Ayurved Science- 2024; (12) (04): 01- 08

