

**ROLE OF ANATOMICAL STUDIES IN THE IDENTIFICATION OF
ACTINODAPHNE HOOKERI MEISSN. OF FAMILY LAURACEAE****Siddhi Thakur and Dr. Meenakshi Vaidya***

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Author****Dr. Meenakshi Vaidya**Department of Botany,
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College, Vile Parle West,
Mumbai- 400056.**ABSTRACT**

Medicinal plants have been used throughout human history. *Actinodaphne hookeri* Meissn. (Family Lauraceae; local name: Pisa) is a medicinal plant commonly found in Mahabaleshwar and also in eastern part of India. Most urinary tract infections are caused by bacteria that enter the urethra and then the bladder. Certain conditions like diabetes, enlarged prostate, kidney stones, surgery, advanced age and conditions that affect personal care habits like Alzheimer's disease increase the chances of developing urinary tract infections. Leaves of *Actinodaphne hookeri* are known to be diaphoretic, antipyretic and great for the treatment against dysentery. The developing seeds of *A. hookeri* are investigated to delineate their ability to synthesize large

amounts of trilaurin. The present study shows that the leaves are hypostomatic and stomata are cyclocytic, anomocytic and tetracytic. The type of venation is Acrodromous, perfect, suprabasal. These characteristics could be useful in correct identification of the plant.

KEYWORDS: Lauraceae, *Actinodaphne hookeri* Meissn., cyclocytic, tetracytic, Acrodromous.

INTRODUCTION

Actinodaphne hookeri Meissn (Family Lauraceae; local name: Pisa). It is called Pisa in Hindi/ Marathi, Tali in Tamil, Tudgensu, and Galavaara in Kannada and Jharchampa in Oriya.



Pisa is an evergreen small tree mainly found in Karnataka and Maharashtra. Branchlets and young leaves are dense, soft rusty- velvety or hairy. Mature leaves may be hairless. Leaves are arranged in whorls of 5-8 on the stem. Leaves are ovate or elliptic- lanceolate, fine tipped, hairless or velvety beneath. Nerves 6-8 paired very slender. Male flowers are clustered on a short stout peduncle. Fruit is ellipsoid, seated on the much- thickened, nearly bell- shaped, perianth- tube as mentioned by Prajapati (2008) and Theodore (1958). Leaves of *Actinodaphne hookeri* Meissn (Family, Lauraceae) commonly known as Pisa are traditionally used in the treatment of diabetes and disorders of Urinary tract as mentioned by Prajapati (2009). They are also known to be Diaphoretic, antipyretic and great for the treatment against dysentery as reported by Jayprasad (2011). *Actinodaphne hookeri* is ideal for trilaurin synthesis and for exploiting it for genetic engineering as discovered by Sreenivas (1994). The present study was aimed to apply knowledge for further investigations and in assisting primarily health care.

The attempt has been made to recognize the taxonomic value of laminar architecture of the species growing in India. Meyerhoff (1952) and Klucking (1962) worked on venation features of angiosperm leaves. System of descriptive terminology and leaf architecture has been presented by Ettingshausen (1861), Krusmann (1960), Stace (1965) and Mouten (1960, 1967). Vaidya (2014 & 2015) has shown the role of anatomy in identification of some species of Genus *Litsaea* Lamk. of family Lauraceae. Thus anatomy is found to be useful for taxonomic purpose and may serve as a diagnostic feature in correct identification of the plant.

MATERIALS AND METHODS

The wood and the leaf samples of *Actinodaphne hookeri* Meissn. were collected from Alavane village, 15-20 km before Mahableshwar, close to Dhangar wadi, near Janni Mata Mandir. The samples were then authenticated for their botanical identity from the standard herbaria at Blatter Harbarium (Mumbai).

For the study of anatomical characteristics

The transverse section of fresh sample of leaves, bark and stem were taken. Out of the many sections, thin sections were selected which were then stained and mounted with glycerine to be examined for their anatomical characteristics.

For the study of leaf architecture, the method used to prepare slides of whole leaves is as follows: The mature leaves fresh, dried or preserved were first cleared by keeping them in 5% sodium hydroxide solution at room temperature for 1-2 days. The decoloured leaves were washed and transferred to 5% sodium hypochlorite till they were transparent. For more clarity the leaves were washed and put into the solution of trichloroacetic acid and phenol (2:1 by weight) for a few minutes at room temperature. They were then thoroughly washed to remove acid traces and were stained with aqueous Saffranine by keeping them in it for 10-15 minutes. The leaves were then transferred to 50% glycerine and mounted in glycerine jelly as per Payne (1969) and Mohan Ram (1978).

For epidermal studies: For the study of stomata the leaf pieces were boiled in concentrated nitric acid with little potassium chlorate added to it. The leaves turn brown and then yellowish white. They were then transferred to water to separate the epidermal peelings. These peelings were washed thoroughly, stained with aqueous Saffranine or Delafield Haematoxylin and mounted in glycerine as per Gupta (1961).

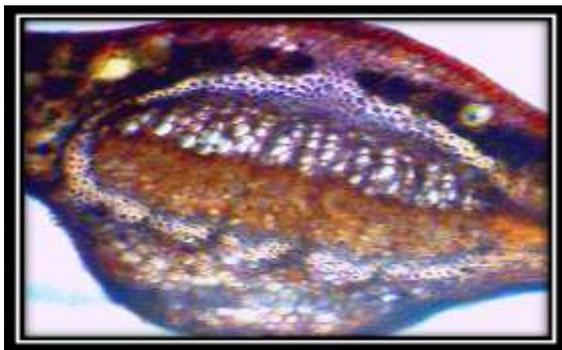
For maceration: The mature stem was cut into small pieces (2mm x 5mm) or into small slices (about 1 mm thick). 50% Nitric acid solution was prepared and the small pieces or slices were placed in it. The material was heated gently on a water bath until it showed effervescence. The heating was continued until the tissues were sufficiently softened and disintegrated. The heating was stopped as and when the separation of cell constituents took place. A piece of treated tissue was teased out with a mounted needle. The material was washed with water and made it free from acid. The material was stained with aqueous Saffranine and was mounted in glycerine in accordance to Khandelwal (2012).

The terminology used in anatomical studies is in accordance with Hickey and Wolfe (1975), Melville (1976), Hickey (1973, 1979) and Dilcher (1974).

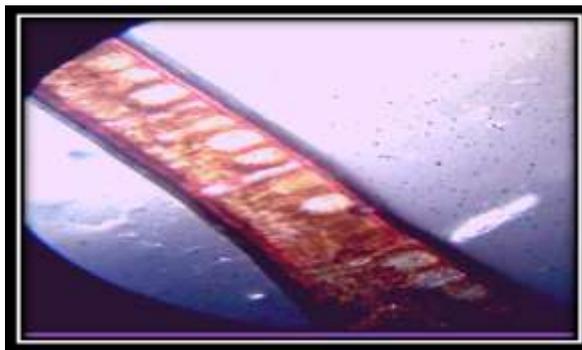
The microphotographs showing different anatomical features were taken by using Nikon Camera at various magnifications.

Permanent slides were prepared by staining as per standard procedures.

OBSERVATIONS AND RESULTS



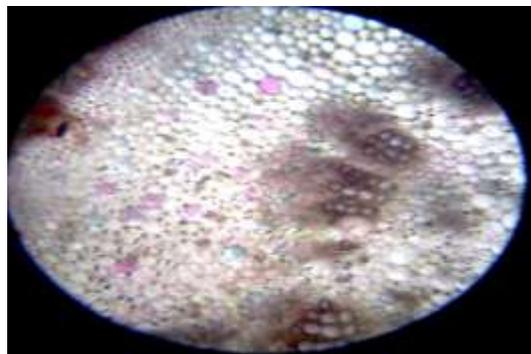
T.S of Leaf Passing Through The Midrib
(10 X 10x)



T.S of Leaf Passing Through The Lamina
(10 X 10x)



Trichomes (10 x 10X)



T.S of Petiole (10 x 10X)

T.S of leaf

Lamina region: Upper epidermis is single layered covered with cuticle. Just below it is a layer of palisade tissue followed by many layered spongy cells filled with chloroplast. The lower epidermis is also single layered. The leaf also shows presence of uniseriate and unicellular trichomes.

Midrib region: The upper and lower epidermis is similar to lamina. Just below the upper epidermis there are collenchymas cells continued with compactly arranged parenchyma cells. There is presence of 1 vascular bundle in the midrib region. This vascular bundle is conjoint, collateral and closed. The entire vascular bundle is surrounded by 3-4 layers of sclerenchymatous cells. Next to the sclerenchymatous cells and just above the lower epidermis, 5-6 layers of collenchymatous cells are seen.

T.S of Petiole

Epidermis- Single, thin layered, consisting of barrel shaped cells. Unicellular, uniseriate trichomes are seen.

Hypodermis- Below the epidermis, 2 layers of sclerenchymatous cells are seen. Below the sclerenchymatous cells, 2-3 layers of collenchyma with chloroplast are visible.

Ground tissue- The ground tissue is parenchymatous with vascular bundles arranged in an arc-shaped or C-shaped manner. There is the presence of oil glands in the ground tissue.

Vascular Bundles- The vascular bundles are conjoint, collateral and open. 8-10 in number. Cambium is seen. Sclerenchymatous patches (caps) are seen above the phloem (8-10) and below the xylem. Xylem is endarch.



T.S of Stem (10 x10X)



Stem Trichomes (10 x 10X)

T.S of Stem

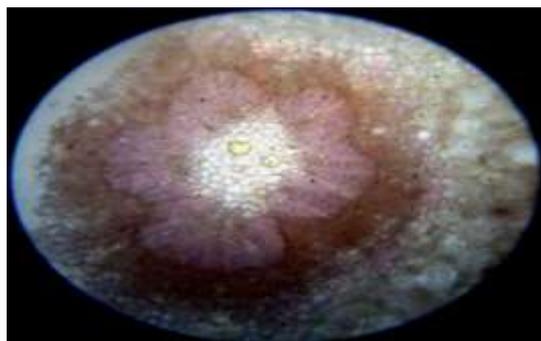
The transverse section of the stem is differentiated into 3 regions-

Epidermis: Single layer made up of closely packed barrel shaped cells. The epidermis shows grooves in some regions. Numerous unicellular trichomes are seen.

Cortex: 2-3 layers of collenchyma with chloroplast. Inner to collenchyma with chloroplast, a few layers (9-10) of parenchyma are seen. The innermost layer of cortex which is endodermis is seen which is single layered.

Stele: Stele is centrally located. Large vascular bundles are arranged in 2 rings. The outer ring consists of smaller vascular bundles while the inner ring consists of larger vascular bundles. The phloem of the inner ring of the vascular bundles, shows cap like sclerenchymatous patches at the top. Vascular bundles are conjoint, collateral and open. Cambium is seen in between xylem and phloem. Xylem is endarch.

Pith: Parenchymatous, large.

T.S of Pedicel**T.S OF Pedicel 10 x 10X**

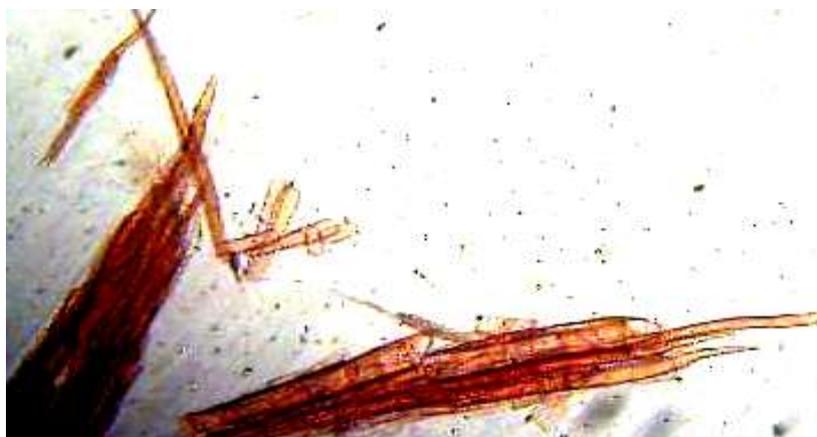
The section is divided into: Epidermis, Cortex and Stele

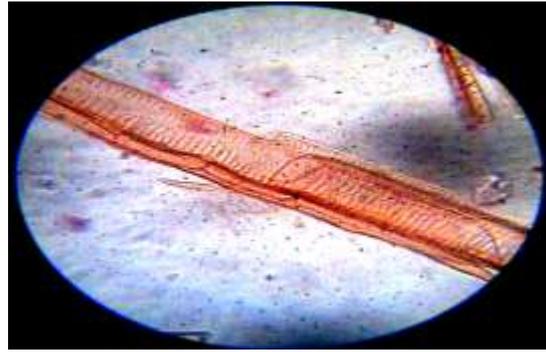
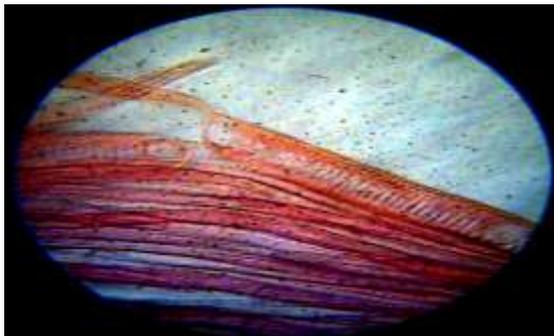
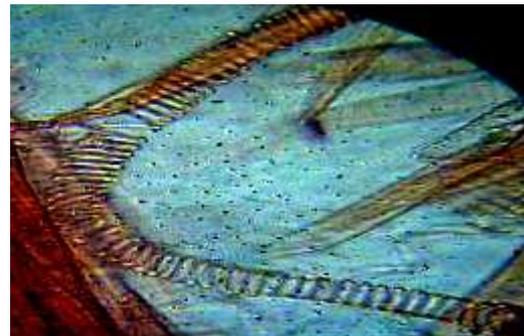
Epidermis: Single layered. Few trichomes are seen. Inner to the epidermis, 1-2 layers of collenchyma are also seen.

Cortex: Parenchymatous. Consisting of 8-10 layers. The innermost layer of cortex which is endodermis is seen which is single layered.

Stele: Pericycle which is the outermost layer of stele is single layered. Stele is centrally located. Many vascular bundles are seen arranged in a ring. Each vascular bundle is conjoint, collateral and open. Xylem is endarch. Above Phloem, cap like schlerenchymatous patches are seen.

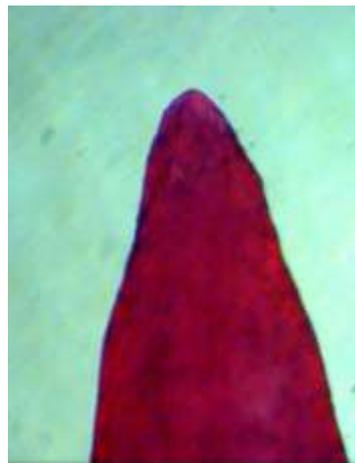
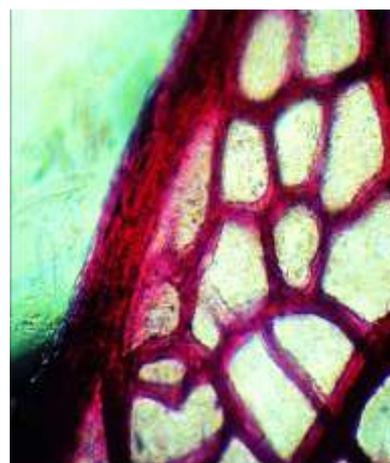
Pith: Parenchymatous, small.

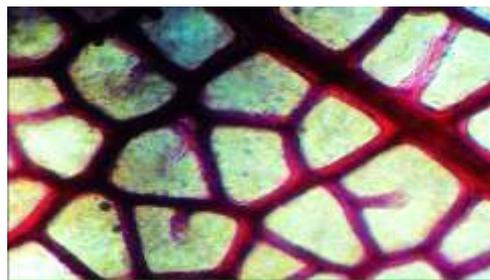
Maceration**Tracheids**

**Annular Thickening****Scalariform Thickening****Reticulate Thickening****Spiral Thickening**

Maceration: shows presence of tracheids and trachea with annular, spiral, scalariform and reticulate thickenings.

STUDY OF VENATION

**Entire Leaf****The Tip (10 X 10x)****Margin (10 X 10x)**

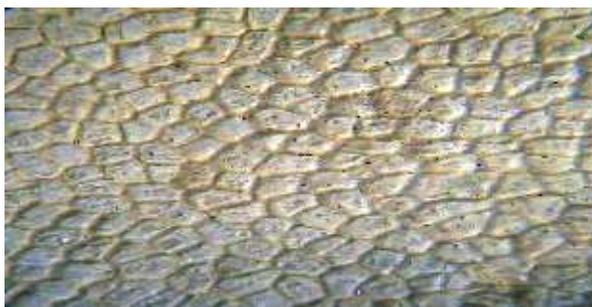
**Midrib (10 X 10x)****Areoles (10 X 10x)**

Leaf organization is simple. With respect to leaf shape and size, the length of the whole leaf is 120 mm and the width is 37 mm. The lamina is symmetrical; base is symmetrical; form is elliptic; apex is attenuate and base is cuneate. The margin is entire. The leaf texture is coriaceous. There are no glands and the petiole is normal.

The type of venation is acrodromous, perfect suprabasal. Primary vein (1^0) is stout; its course is straight and unbranched. Secondary veins (2^0) are present; angle of divergence is acute narrow. The variation in the angle of divergence is only lowest pair of secondary veins more acute than the pairs above it. The relative thickness of secondary veins is moderate; its course is upper secondary veins more obtuse than lower. Intersecondary veins are composite. Intramarginal vein is absent. Tertiary veins (3^0) are present; angle of origin exmedial to admedial side is RR/RO/RA; the pattern is percurrent and course is simple and forked; relationship to midvein is approximately at right angles; arrangement is predominantly alternate. The higher order venation forming a reticulum in which vein orders are distinct. Quarternary veins (4^0) are thin; its course is orthogonal. Quinternary veins (5^0) are thin; its course is orthogonal. The highest vein order of leaf is 5^0 . The marginal ultimate venation is looped. Areoles are well developed; arrangement is random and shapes are triangular, quadrangular and pentagonal. Veinlets are simple and linear.

STUDY OF STOMATA

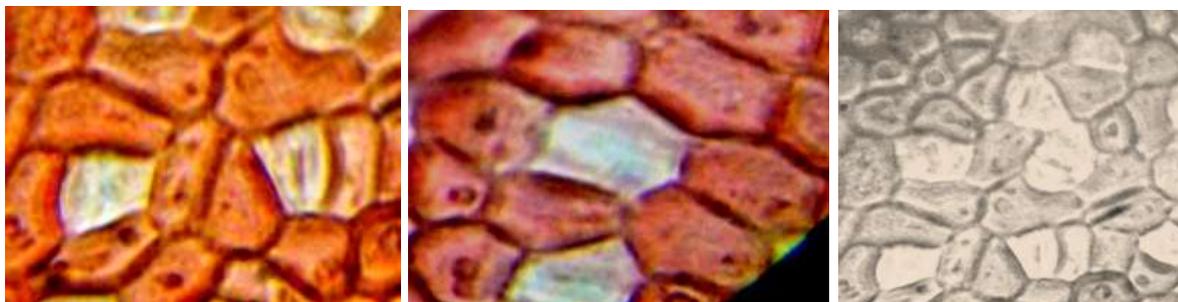
UPPER EPIDERMIS

**(10 x 40X)**

The leaves are hypostomatic. Stomata are found on the lower surface only.

Upper epidermis: Stomata are absent. The epidermal cells are polygonal in outline.

LOWER EPIDERMIS



Brachyparatetracytic (10 x 40X) Cyclocytic (10 X 40x) Anomocytic (10 x 40X)

Lower epidermis: Stomata are cyclocytic, anomocytic and Brachyparatetracytic. The guard cells are elongated and kidney shaped. Epidermal cells are irregular and polygonal in shape.

CONCLUSION

The leaves are hypostomatic. Stomata are cyclocytic, anomocytic and brachyparatetracytic. The type of venation is acrodromous, perfect suprabasal. Areoles are well developed; veinlets are simple and linear. Oil globules are present in the ground tissue of petiole. Schlerenchymatous patches are observed above the phloem of petiole, stem and pedicel. Reticulate, annular, spiral, scalariform, types of thickenings are seen.

The present study may be a small effort towards the standardization of the plant material which can be used as medicine. It may even be useful to supplement information in carrying out further research and revalidation of its use in the Ayurvedic System of Medicine.

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