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Microscopical Studies on *Drynaria quercifolia* Leaves

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ABSTRACT

Drynaria quercifolia, commonly known as 'Oak Leaf Fern' of Polypodiaceae family is widely used in ethno and traditional medicines. It is widely distributed in evergreen forests of India and used in the treatment of fever, typhoid, dyspepsia, cough, cephalalgia and phthisis. The leaves of *Drynaria quercifolia* is subjected to macroscopic, microscopic and fluorescence analysis to set the standards for quality control of the drug. The pharmacognostic characters provide an exclusive identity profile to carry out further researches in *Drynaria quercifolia.*

Keywords: *Drynaria quercifolia*, Oak Leaf Fern, Polypodiaceae, pharmacognostic study, microscopy, fluorescence analysis

INTRODUCTION:

Drynaria quercifolia, commonly known as 'Oak Leaf Fern' or 'Basket Fern' is an epiphytic fern of Polypodiaceae family. It is commonly found in tropical countries such as India, Malasia, Indonesia, Philippines, New Guinea, Bangladesh and Africa [1]. In Ayurveda, it is known as 'Aswakatri' and widely used in the treatment of fever, typhoid, dyspepsia, cough, cephalalgia and phthisis. [2] The prepared soup from rhizome is used traditionally in the tribes of Tamil Nadu and Eastern Ghats to treat rheumatic complaints [3]. The paste of the rhizome is used in the treatment of typhoid, cholera, diarrhea, jaundice, head ache, skin disease and fever [4]. In traditional Chinese medicine, it is used topically to stimulate hair growth and to treat baldness [5]. The tribals in Tripura use the leaves and rhizomes for the treatment of abdominal pains and intestinal worms [6]. Plant rhizome is used by Indian tribals in Kalakad Mundanthurai Tiger Reserve and also in Vietnam to treat rheumatism, tuberculosis, dentalgia and osteodynia[7-9].

MATERIALS AND METHODS:

Collection and authentication of plant materials

The fresh samples of the leaves and rhizomes were collected from their natural habitat from Thiruvalla, Pathanamthitta District. The plant's identification and authentication were confirmed by the botanist Dr. Jacob Thomas, Herbarium Curator, PG and Research Department of Botany, Mar Thoma College, Tiruvalla. A voucher specimen was deposited in the Herbarium of PG and Research Department of Botany [Accession No:2099].

Pharmacognostic Study

Macroscopic Study

Fresh leaves were utilized for the morphological studies. The organoleptic characters such as colour, odour, taste, shape and features of the fresh leaves were analyzed [10].

Microscopic Study

Thin transverse section of the leaves were taken using sharp blades and stained as per the standard procedures. The powder sample was stained and observed under microscope to study the powder characters [11-16].

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Fluorescence analysis [11-16]

Fluorescence analysis of leaf powder was performed using standard methods. *Drynaria quercifolia* leaf powder was added with various neutral, acidic and basic reagent for 5 min and exposed to day light, short wavelength and long wavelength UV light[11-16].

Results

Morphological studies

Drynaria quercifolia is an epiphytic fern with horizontal stem having a length of 60 to 100 cm. Fronds are dimorphic and may be sterile or fertile. Sterile fronds are brown coloured and form shorter than the fertile one where as fertile fronds are green in colour consisting of sporangia.

Fig 1: *Drynaria quercifolia*

T.S of midrib

The T.S of the leaf is circular in shape. Epidermal cells are round, thick walled with prominent cuticle. Inner to the epidermis are several layers of collenchyma. Ground tissue is parenchymatous and contain two large dictyostele with a central xylem and outer phloem below which contain two or three small dictosteles. Each stele is covered with yellowish brown cells. Few covering and glandular trichomes are present in the upper epidermal region. Lamina begins with a dictyostele covered with lignified fibres. Mesophyll is differentiated into palisade cells and spongy parenchyma.

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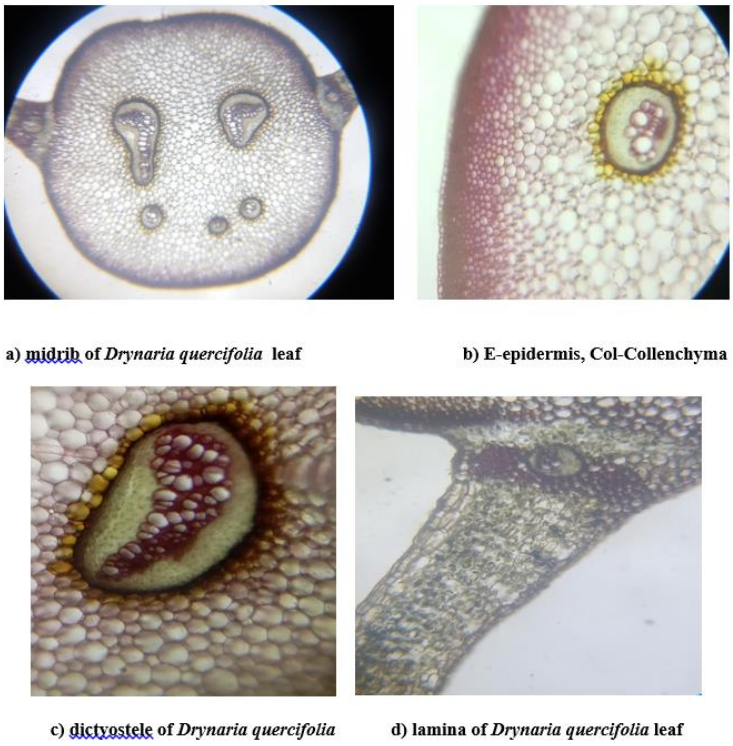

Fig 2: T.S of *Drynaria quercifolia*

T.S of Petiole

The T.S of the petiole is almost circular in shape, whereas the dorsal portion is slightly flat. More covering and glandular trichomes are present in the upper epidermal region compared to midrib. Two large dictyosteles and four small steles covered with yellowish brown cells are present in the centre. All other cellular arrangements are similar to that of midrib.

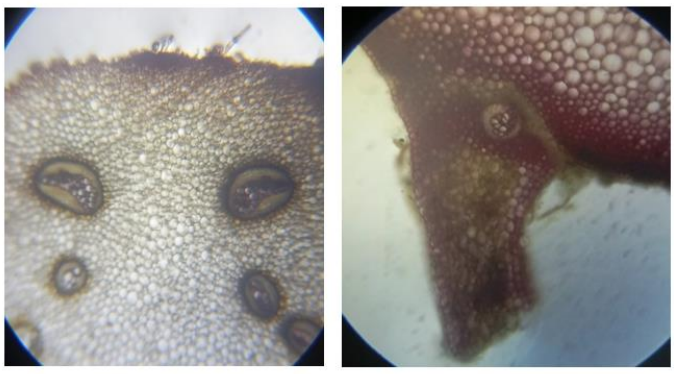

Fig 3: T.S of petiole of *Drynaria quercifolia*

Ct-Covering trichome

Powder microscopy

Powder microscopic characters contain important diagnostic characters such as wavy epidermal cells, brownish scale leaves, acicular calcium oxalate crystals, starch grains, covering trichomes, brownish matter and xylem vessels.

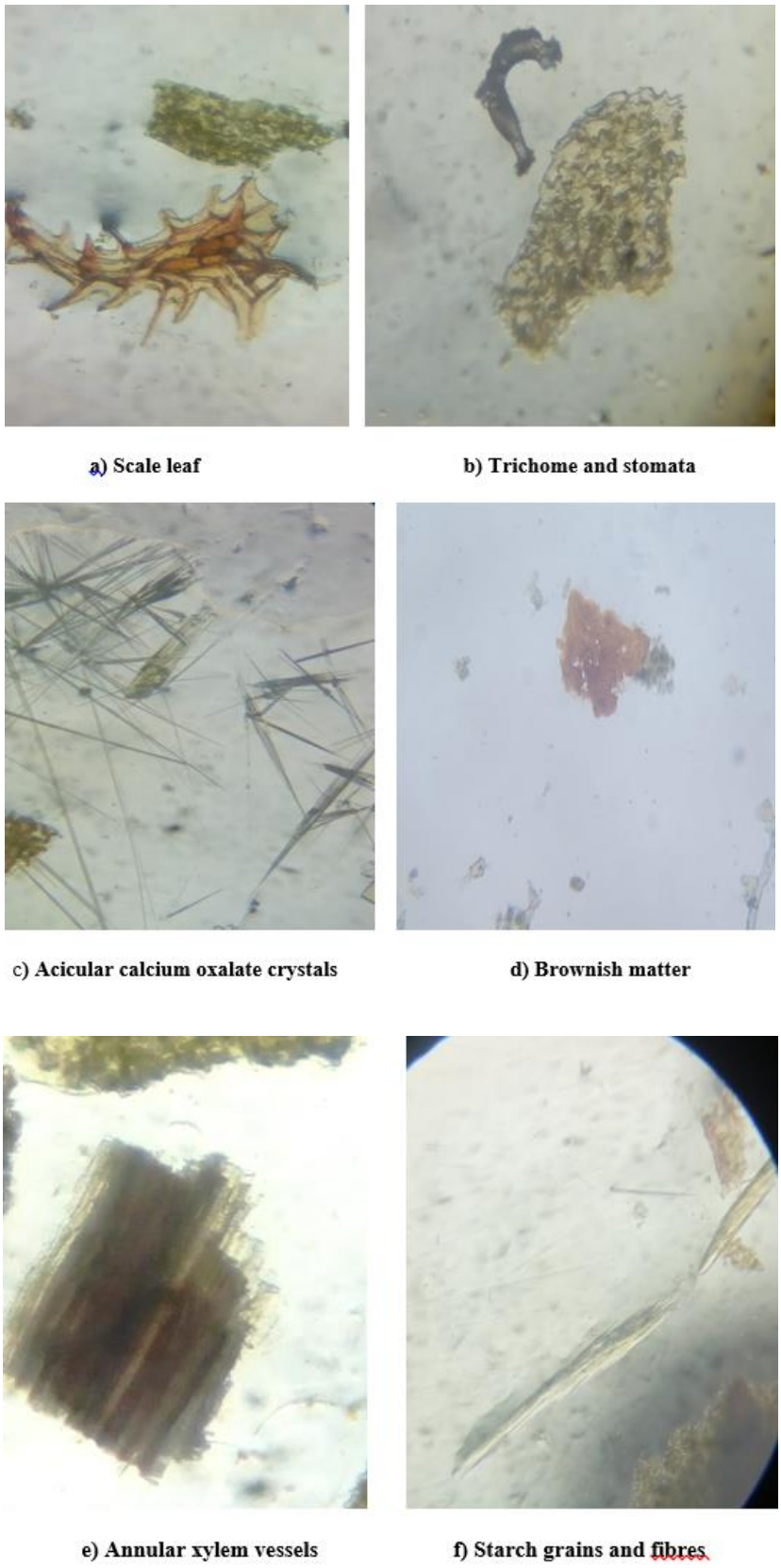

Fig 4: Powder microscopy of *Drynaria quercifolia*

Fluorescence analysis of *Drynaria quercifolia* leaf powder

Drynaria quercifolia leaf powder was added with acidic, neutral and basic solvents. There after they were exposed to day light, short wavelength and long wavelength UV light. The results are depicted in table 1.

Table 1: Fluorescence analysis of *Drynaria quercifolia* leaf powder

Sl. No	Reagents	Visible light	UV 254nm	UV 366 nm
1.	Powder drug	Brown	Greenish brown	Black
2.	Powder drug+ methanol	Light brown	Dark green	Black
3.	Powder drug+ glacial acetic acid	Dark brown	Fluorescent green	Black
4.	Powder drug+ petroleum ether	Brown	Dark brown	Black
5.	Powder drug + 15% NaOH	Orange brown	Fluorescent green	Black
6.	Powder drug + 5% KOH	Orange Brown	dark green	Black
7.	Powder drug+ HNO_3	Light orange	Brownish green	Black
8.	Powder drug+ $FeCl_3$	Dark green	Fluorescent green	Black
9.	Powder drug+ $CHCl_3$	Light yellow	Yellowish green	Black
10.	Powder drug+ ethyl acetate	Greenish brown	Brown	Fluorescent orange
11.	Powder drug+ picric acid	Brown	Green	Black
12.	Powder drug+ iodine(N/20)	Brown	Green	Black

Conclusion

Pteridophytes are endowed with wide range of medicinal properties due to the presence of various promising phytochemicals. *Drynaria quercifolia* is used in the treatment of typhoid, cholera, diarrhea, jaundice, head ache, skin disease, fever rheumatism, tuberculosis, dentalgia and osteodynia. The present pharmacognostic study revealed the morphological, microscopical and phytochemical aspects to provide distinct pharmacognostical profile of *Drynaria quercifolia.*

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