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PHARMACOGNOSTICAL STUDIES ON THE LEAVES OF "*FICUS NATALENSIS*"

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ABSTRACT

In the present study, an attempt was made to investigate Pharmacognostical studies on the leaves of *Ficus natalensis* (Moraceae). The plant was identified and authenticated by Dr. V. Rama Rao, Research officer (Botany), Central Ayurveda Research Institute, Bengaluru. The macroscopical studies have been carried out on the leaves. The Characters of transverse section of leaves shows The mesophyll is dorsiventral and is differentiated into the upper palisade and lower spongy zone. The palisade mesophyll comprises 1-2 layers of densely packed, columnar parenchyma cells with abundant chloroplasts. Cluster crystals are present in the palisade tissue. The parenchyma cells of the spongy mesophyll have very few chloroplasts and are loosely arranged with large intracellular spaces, with a tendency to be braciform, giving a micellar pattern appearance. Single layer of upper and lower epidermal cells with cuticle; upper epidermis contains styloid and prismatic crystals. The upper epidermis is followed by 3 to 4 layers of collenchyma tissue, which also continues as a band above the lower epidermis. Vascular tissue comprises of closed collateral vascular bundle. The perivascular region is embedded with the ring of the sclerenchymatous ring, surrounding the vascular tissue. Physicochemical parameters such as moisture content, total ash value, sulphated ash value, Acid insoluble ash value, water-soluble ash value and extractive value were determined. These can serve in qualifying and differentiating the plant. This research provides valuable insights that will benefit future researchers in their endeavors.

KEYWORDS: *Ficus natalensis,* Macroscopy, Microscopy, Physicochemical parameter.

INTRODUCTION

The term "Pharmacognosy," which refers to studies on natural product drugs, has been used for almost 200 years as a constituent scientific discipline of pharmacy. During the last half of the 20th century, Pharmacognosy changed from being a descriptive botanical subject to one with a more chemical and biological focus. The use of herbal remedies, or "Phytomedicines,". Pharmacognosy study fields, on the other hand, are still growing and now encompass not only the more conventional analytical method development and Phytochemistry, but also aspects of cell and molecular biology in relation to natural products, ethnobotany, and phytotherapy. In order to clarify new plant-derived cancer chemotherapeutic agents and novel cancer chemopreventives, respectively, two multidisciplinary natural product drug discovery programs yielded promising bioactive molecules,. The systematic study of herbal remedies offers pharmacognosy groups an attractive new area of research, ranging from investigating the biologically active principles of phytomedicines and their mode of action and potential drug interactions, to quality control, and involvement in clinical trials.[1]

There are roughly 850 species in the genus *Ficus*, which belongs to the Moraceae family. There are roughly 200 different types of *ficus* found in tropical and subtropical woods as woody trees, shrubs, and vines. There are over 500 *ficus* species in Asia and Australia, and they are high in nutritious elements. In traditional medicine, *ficus* species are well-known for their abundance of flavonoids and phenolic acid, which help them protect against oxidative stress disorders. Plant extracts from these species have been shown to be useful in treating diabetes, stomachaches, piles, dysentery, inflammation, oxidative stress, and cancer. The anti-cancer, anti-inflammatory, and anti-diabetic properties of ficus plants have also been used to promote their ethno-medical usage.[2]

The evergreen or soon-deciduous tree or shrub *Ficus natalensis* can reach a height of 10 to 30 meters and has a crown that spreads widely. It frequently begins as an epiphyte in a tree branch before sending down aerial roots that, once they reach the ground, supply additional nutrients that support the plant's faster growth. When combined with the more vigorous top growth, these aerial roots have the ability to completely wrap the host tree's trunk.[3]

Fig. 1: Ficus Natalensis Leafs.

PLANT PROFILE

FICUS NATALENSIS

Scientific name: *ficus natalensis.*

TAXONOMY

Kingdom	=	Plantae
Division	=	Angiosperms
Class	=	Eudicots
Order	=	Rosales
Family	=	Moraceae
Genus	=	*Ficus*
Species	=	*F. natalensis*
Synonyms	=	*Natal fig*
Common name	=	*Ficus natalensis*[11]

CHEMICAL CONSTITUENTS

Ficus natalensis leaves contain flavonoids, tannins, glycosides, sterols, saponins, and triterpenes, and have strong antioxidant properties. Three triterpenoid saponins were isolated and identified, with the leaves showing significant free radical scavenging activity, suggesting potential health benefits.[4]

ETHNOPHARMACOLOGICAL USES

Ethno pharmacological, therapeutic and commercial importance and have been used in traditional medicines as a cure against malaria, diabetes, cancer, diarrhea, pyretic, ulcer, as well as gastrointestinal and urinary tract infections.[5]

MATERIALS AND METHODS

Collection of Plant Material: The plant material was collected from K. M. doddi, Mandya district, Karnataka, India in the month of January 2024. The plant was identified and authenticated by Dr. V. Rama Rao, Research officer (Botany), Central Ayurveda Research Institute, Bengaluru. An herbarium voucher specimen was preserved in the department of Pharmacognosy, Bharathi College of Pharmacy, Bharathinagar for further reference.

Drying and size Reduction of leaves: The leaves of *Ficus natalensis* were subjected to shade drying and further crushed to powder, and then the powder is passed through the sieve no. 80, and stored in air tight container for further use.[6]

EXPERIMENTAL PROCEDURE

Macroscopical Studies: Leaves of *Ficus natalensis* was studied macroscopically for examining its colour, odour, taste, size, shape, fracture and texture. Macroscopic examination of crude drug was carried out by naked eye by placing the individual raw materials on a white paper surface.[7]

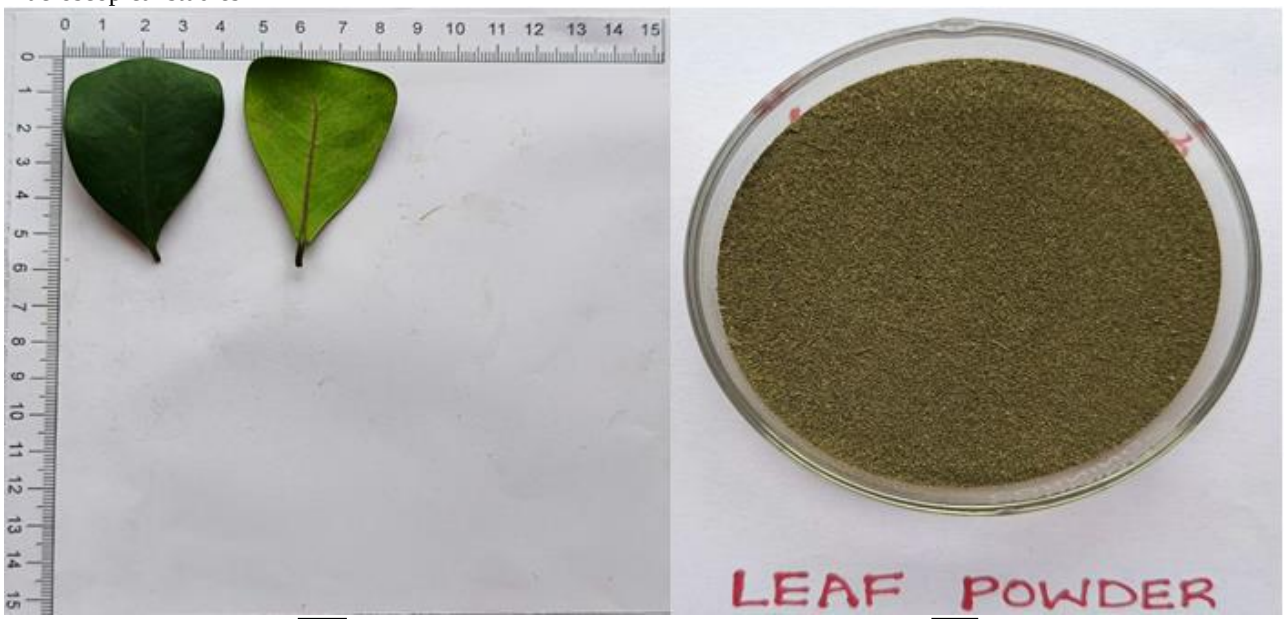
Microscopical Studies: Microscopical study has been carried out by taking free-hand sections of fresh stem bark. Thin sections were cleared with chloral hydrate solution followed by water and stained with safranin and observed under the microscope. As well as the dried bark powder was evaluated by treated with chloral hydrate solution followed by water and stained with safranin and observed under the microscope. Microphotographs have taken by using CatCam microscope camera fixed with the microscope (Model: OLYMPUS CX31).[8]

Physicochemical Constants: Physicochemical constants such as the percentage of moisture content, total ash, acid insoluble ash, water soluble ash, sulphated ash, water and alcohol soluble extractives, loss of weight on drying, were calculated based upon standard procedures prescribed in Indian Pharmacopoeia.[9]

Preliminary Phytochemical Studies: Preliminary phytochemical test for stem bark of *Ficus natalensis* were performed and chemical constutients were determined by using standard procedures described by Kokate C.K., Purohit A.P., and Gokhale S.B.[10]

RESULT AND DISCUSSION

Macroscopical studies



A B

Fig. 2: A – Ficus natalensis leafs, B – Leaf Powder.

Table 1: Macroscopical Character Of Leafs Of *Ficus Natalensis* Includes.

Colour	**Light – dark green**
Odour	Characteristic
Size	6-9cm long,4-6cm broad
Shape	Triangular
Texture	Smooth at lower and upper surface

Microscopical Character

Transverse Section of leaf: The transverse section preparation of the leaves was studied under the microscope and the following inclusions were recorded. - The upper and lower epidermis is uniseriate, consisting of smaller, compactly arranged and less heavily cutinized cells. There is a single-layer hypodermis present beneath the upper epidermis.

The mesophyll is dorsiventral and is differentiated into the upper palisade and lower spongy zone. The palisade mesophyll comprises 1-2 layers of densely packed, columnar parenchyma cells with abundant chloroplasts. Cluster crystals are present in the palisade tissue. The parenchyma cells of the spongy mesophyll have very few chloroplasts and are loosely arranged with large intracellular spaces, with a tendency to be braciform, giving a micellar pattern appearance.

Midrib- Single layer of upper and lower epidermal cells with cuticle; upper epidermis contains styloid and prismatic crystals. The upper epidermis is followed by 3 to 4 layers of collenchyma tissue, which also continues as a band above the lower epidermis. Vascular tissue comprises of closed collateral vascular bundle. The perivascular region is embedded with the ring of the sclerenchymatous ring, surrounding the vascular tissue.

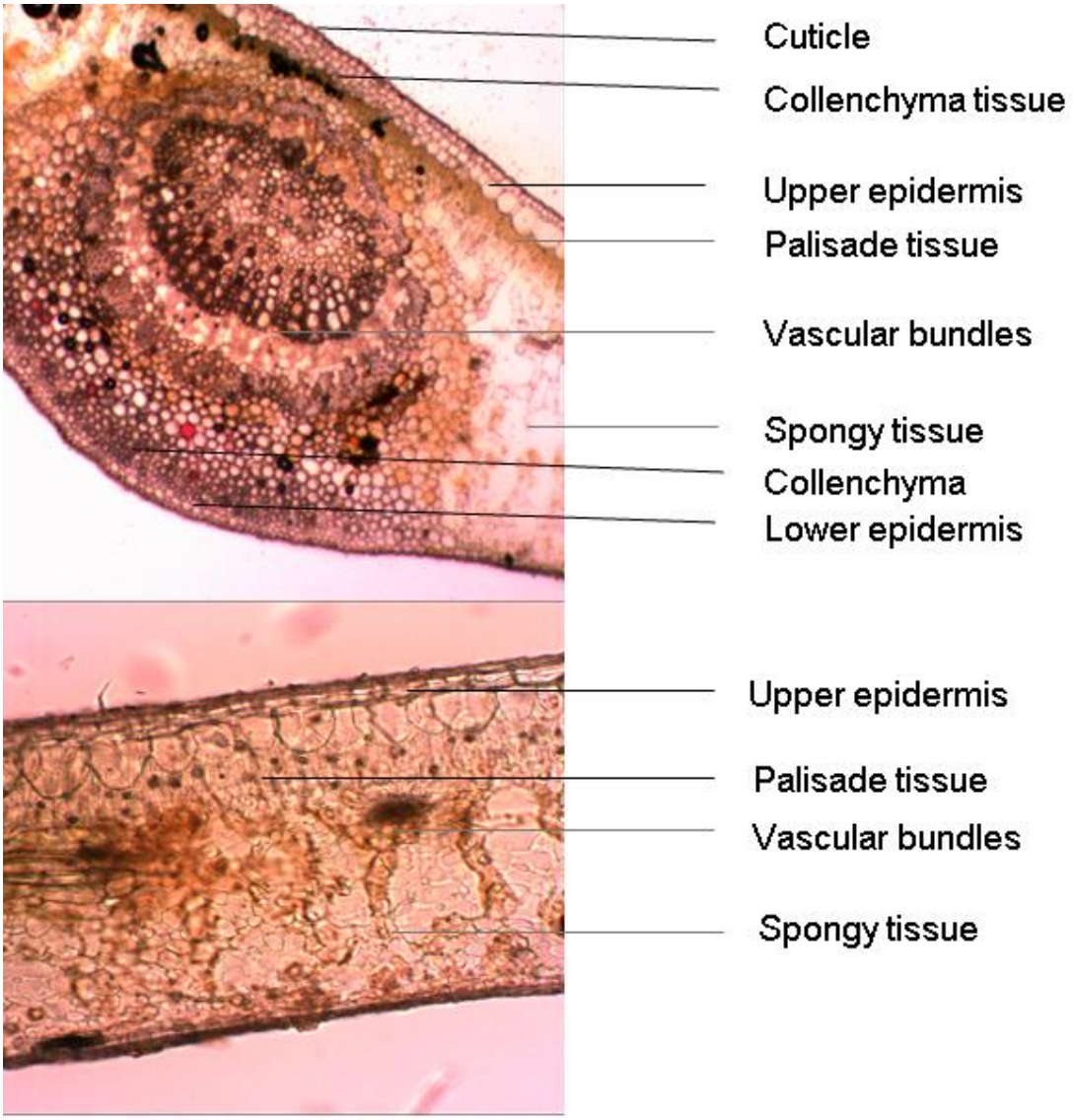


Fig. 3: T.S. of Leaf.

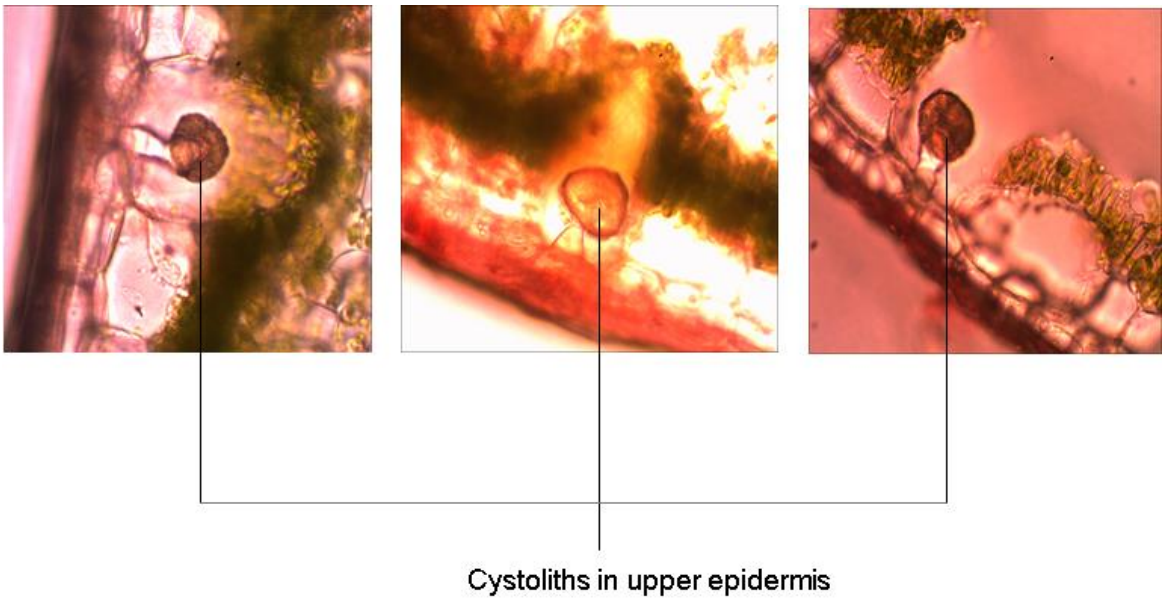


Fig. 4: Upper Epidermis.

Transfer section of petiole: The transverse section of the petiole it shows nearly irregularly circular in outline. It shows an outer epidermis, surrounding a wide cortex formed of an outer collenchyma and inner parenchyma cells. The vascular tissue is formed of a ring of dissected vascular bundles, each crowned by a band of pericyclic fibres and enclosing a pith containing many dark staining lacifers.

T. S. OF PETIOLE

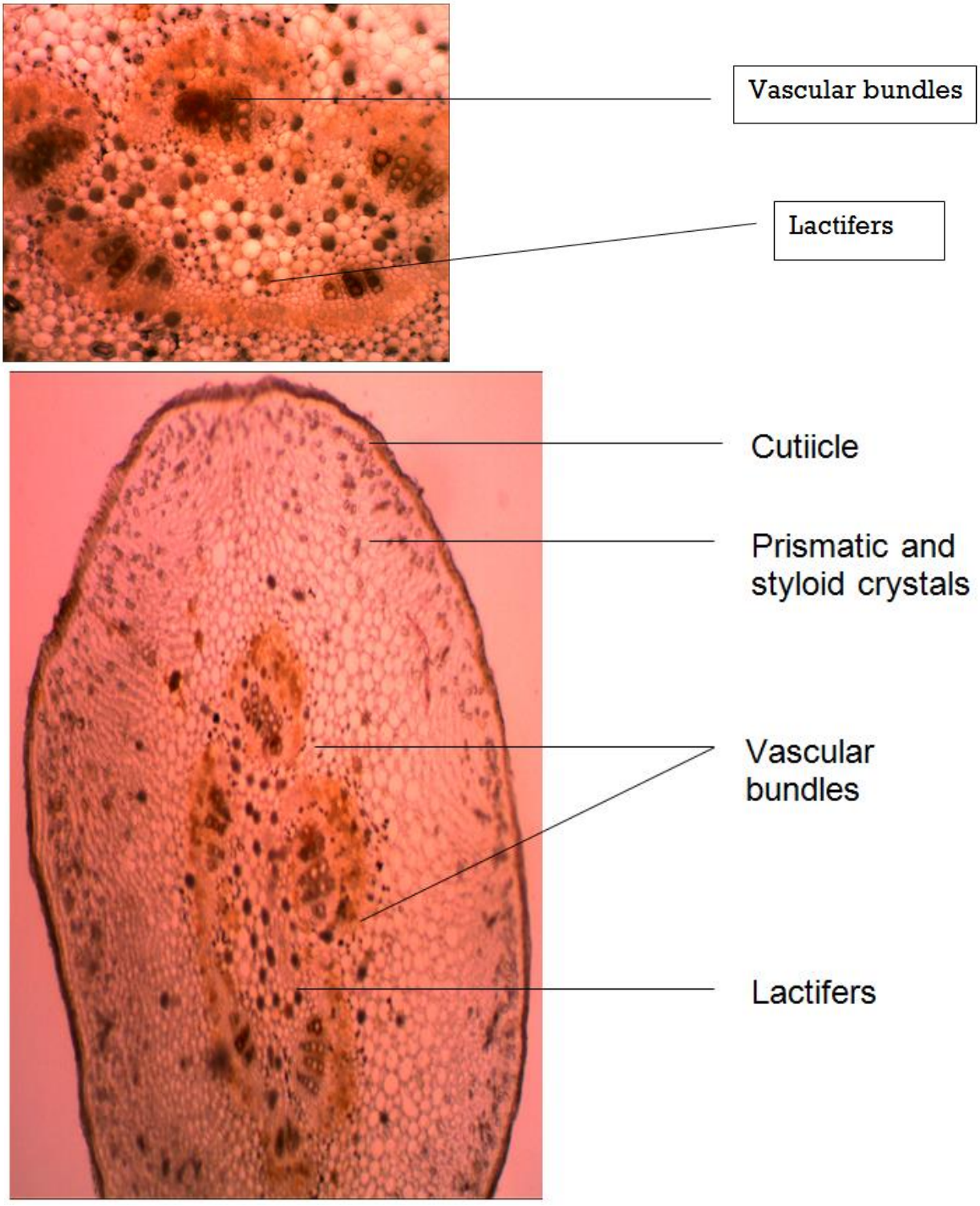


Fig. 5: T. S. Of Petiole.

Diagnostic Characteristics: Uniseriate epidermis, anomocytic stomata, much of the leaf interior is occupied with spongy mesophyll with large air spaces. The lithocyst carrying the cystolith is larger than the normal epidermal cell.

STOMATA OF LEAFS

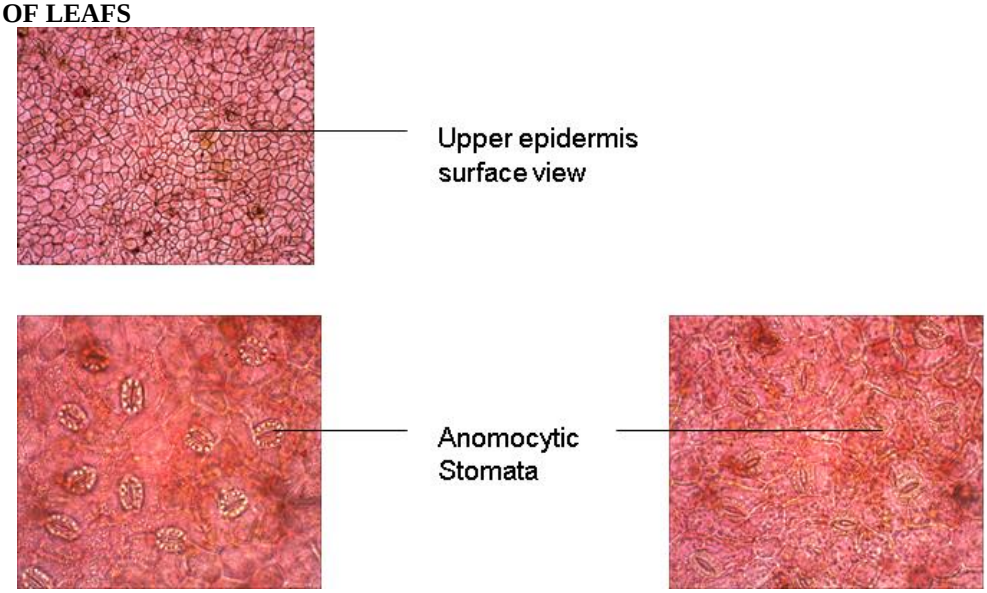


Fig. 6: Stomata.

POWDER MICROSCOPY OF LEAFS

Leaf powder is in green colour powder microscopy of the leaf showed the presence of lignified fibres, fibre with crystals and tannin content a group of helical/spiral vessels prismatic and styloid crystals anomocytic stomata in the lower epidermis cystolith in a lithocyst palisade tissue with few cluster crystals isolate crystals.

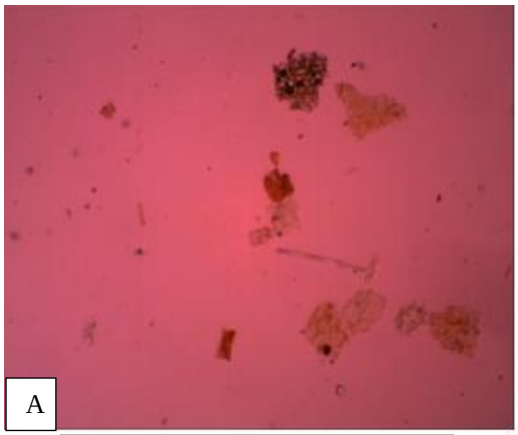


Fig. 7: Fragments of Tissues.

Fig. 8: Fibres.

Fig. 9: Fibre with crystals and tannin content.

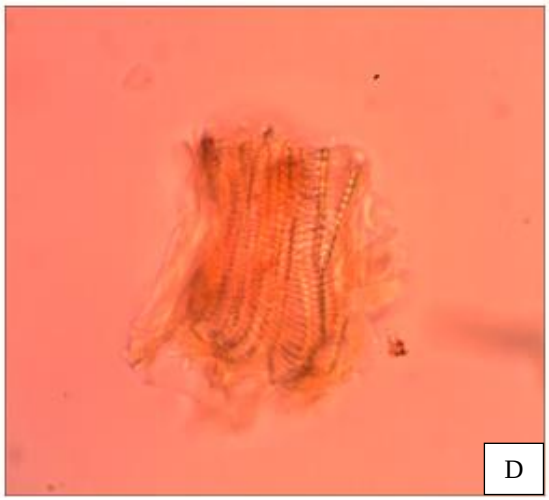


Fig. 10: Group of helical/spiral vessels.

Fig. 11: Cluster Crystal.

Table 2: Showing Results For Quantitative Evaluation Of The Leaves Of Ficus Natalensis.

Evaluation parameters (% W/W)	Leaves (% W/W)
Moisture content	**80. 82**
Total ash value	**11.77**
Acid insoluble ash value	**0.55**
Water soluble ash value	**6.75**
Sulphated ash value	**19.66**

Table 3: Extractive Values Of Leaves Of Ficus Natalensis.

Evaluation parameters (% W/V)	Leaves (% W/V)
Alcohol soluble extractive value	17.4
Water soluble extractive value	11.2

CONCLUSION

The study of *Ficus natalensis* leaves has provided valuable insights into their morphological, and anatomical characteristics.

The transverse section (T.S.) of the leaf showed a well-organized structure with a clear differentiation of tissues including the epidermis, palisade and spongy mesophyll, and vascular bundles. These features support the leaf's physiological functions such as photosynthesis, transpiration, and nutrient transport.

In summary, *Ficus natalensis* leaves possess significant structural and chemical features that support their traditional medicinal use. These findings contribute to the scientific understanding of the species and suggest potential for further pharmacological and botanical research.

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CONFLICTS OF INTEREST: No conflicts of interest.

REFERENCE

1. Douglas Kinghorn A. Pharmacognosy in the 21st century. J Pharm Pharmacol., 2001; 53(2): 135-48. doi: 10.1211/0022357011775334. PMID: 11273009.
2. Nawaz H, Waheed R, Nawaz M. Phytochemical composition, antioxidant potential, and medicinal significance of Ficus. InModern Fruit Industry 2019. IntechOpen
3. https://tropical.theferns.info/viewtropical.php?id=Ficus+natalensis
4. Adamu FU, Abubakar BY, Musa AO. Morphological characteristics of different Ficus species found in Samaru-Zaria, Nigeria. Dutse Journal of Pure and Applied Sciences, 2021; 7(3a): 176-83.
5. https://aijpms.journals.ekb.eg/article_302956.html
6. O Olaoluwa, O Taiwo, L Nahar, S Sarker Trends in Phytochemical Research – 2022 oiccpress.com
7. Srivastava AK, Srivastava P, Behera BR and Shrivastava AK: Pharmacognostical & phytochemical investigation of Cissus quadrangularis Linn. stem. Int J Pharm Res Dev., 2011; 11(1): 207-15.
8. Arathi TS, Sunbee Prakash and Vinod B: Pharmacognostic and physico chemical study of

stem bark of Azadirachta indica. J Pharmacogn Phytochem., 2023; 12(5): 05-08.
9. Gopalakrishnan S, Rajameena R and Vadivel E: Phytochemical and pharmacognostical studies of the leaves of Myxopyrum serratulum AW Hill. J Chem Pharm Res., 2012; 4(1): 788-94.
10. Rahar S, Nagpal N, Swami G, Nagpal MA and Kapoor R: Pharmacognostical studies of Saccharum munja roxb, Root. Int J Pharm Tech Res., 2011; 3(2): 792-800.
11. https://en.wikipedia.org/wiki/Ficus_natalensis