WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
Coden USA: WJPRAP Impact Factor 8.63
Volume 15, Issue 10, 1221-1232. Research Article ISSN 2277–7105

MACRO- MICROSCOPIC APPEARANCES OF FOUR POPULARLY USED HERBS IN *KRIMIDANTA*(DENTAL CARIES)

Sakshi A. R., *Mallya Suma V.

UG Scholar, Professor Department of Dravyaguna, SDM College of Ayurveda, Kuthpady, Udupi, 574-118.

Article Received on 15 April 2026,
Article Revised on 05 May 2026,
Article Published on 16 May 2026,

https://doi.org/10.5281/zenodo.20225241

***Corresponding Author**

Mallya Suma V.

UG Scholar, Professor Department of Dravyaguna, SDM College of Ayurveda, Kuthpady, Udupi, 574-118.

How to cite this Article: Sakshi A. R., *Mallya Suma V. (2026). Macro- Microscopic Appearances Of Four Popularly Used Herbs In Krimidanta(Dental Caries). World Journal of Pharmaceutical Research, 15(10), 1221–1232.

ABSTRACT

About: Plants exhibit strong antibacterial and healing potential, supported by both ethnomedicinal usage and modern research. Their phytochemical composition and pharmacological actions make them suitable candidates for developing a safe, effective and herbal mouthwash for the management and prevention of dental caries (*Krimidanta*). Authentication parameters are basic steps in any drug research. **Materials and Methods:** Pharmacognostic study involved the collection and authentication of plant materials including *Solanum torvum* fruits, *Solanum surattense* whole plant, *Ziziphus rugosa* bark, and *Zanthoxylum ovalifolium* fruits from their natural habitats, followed by voucher specimen deposition. **Results and Discussion**: Macroscopic evaluation documented external morphological features using digital imaging for proper identification. Microscopic analysis was carried out by preserving samples in FAA solution, preparing transverse sections, staining with safranin, and observing under a trinocular microscope, revealing characteristic features like cork, cortex, parenchyma, xylem vessels, phloem, sclereids and starch grains. **Conclusion:** The results collectively validate the identification parameters of the selected drugs. These standardization parameters support the safety and efficacy.

KEYWORDS: *Krimidanta*, Pharmacognosy, Macroscopy, Microscopy.

INTRODUCTION

Teeth are vital for chewing, speech, facial structure, and aesthetics. *Acharya Sushruta* described eight *Danta Rogas*, among which *Krimidanta* is characterized by discoloration, cavities, pain, swelling, and discharge.[1] *Krimidanta* can be correlated with dental caries caused by microbial destruction of tooth structures. Ayurveda recommends *Krimighna* and *Vatahara* drugs for its management.[2] Medicinal plants possess strong antimicrobial and healing properties, making them suitable for oral care. While classical texts mention many formulations for dental caries in the form of decoction, gargling etc. Brihati(*Solanum torvum)*, Kantakari(*Solanum surattense)*, Badara(*Ziziphus rugosa)* and Tumburu (*Zanthoxylum ovalifolium)* are frequently suggested drugs for *Krimidanta*.[3] These are often used in the form of decoction, tablet, application, mouth washes etc successfully since many years.

Brihati (*Solanum torvum)* a spiny shrub rich in alkaloids and flavonoids, exhibits analgesic, antipyretic, and antimicrobial activities and is used in conditions like *Shwasa*, *Jwara*, and *Krimi*. *Kantakari (Solanum surattense)* possesses anti-inflammatory, antibacterial, expectorant, and carminative properties and is commonly used in respiratory and gastrointestinal disorders.[4] Tumburu (*Zanthoxylum ovalifolium)* fruits containing volatile oils and flavonoids, demonstrates antimicrobial, analgesic, and anti-inflammatory effects and is traditionally used in toothache and microbial infections.[5] Badara(*Ziziphus rugosa)* is rich in triterpenoids and flavonoids, showing astringent, antimicrobial, and anti-inflammatory activities, and is beneficial in mouth ulcers, diarrhoea, and skin diseases.[6] Collectively, these plants exhibit strong antibacterial and healing potential, supported by both ethnomedicinal usage and modern research. Their phytochemical composition and pharmacological actions make them suitable candidates for developing a safe, effective and herbal mouthwash for the management and prevention of dental caries (*Krimidanta*).[7]

Authentication parameters of raw drugs used in herbal formulation forms a major step in any research. Hence with all this background a study has been planned to record Macro-microscopic profile of these four herbs.[8]

Brihati -Solanum torvum

Kantakari- Solanum surratense

Tumburu- Zanthoxylum ovalifolium

Badara- *Ziziphus rugosa* Lam.

Figure 1: Herbs used in Dental caries.

MATERIALS AND METHODS

PHARMACOGNOSTIC STUDY

Collection of Plant Materials: Matured plant samples like fruits of *Solanum trovum* Sw, whole plant of *Solanum surratense* Burm f., bark of *Zizipus rugosa* Lam. and fruit of *Zanthoxyllum ovalifolium* Wight. from their natural habitat, authenticated, voucher specimen deposited and used for further study. (Voucher No. 260107140).

METHODOLOGY

Macroscopy

The external features of the test samples were documented using Canon IXUS digital camera. The macroscopic features were compared to local flora for authentication.[9]

Microscopy

Sample was preserved in fixative solution. The fixative used was FAA (Formalin-5ml + Acetic acid-5ml + 70% Ethyl alcohol-90ml). The materials were left in FAA for more than 48 hours. The preserved specimens were cut into thin transverse section using a sharp blade and the sections were stained with saffranine. Transverse sections were photographed using Zeiss AXIO trinocular microscope attached with Zeiss Axio Cam camera under bright field light. Magnifications of the figures are indicated by the scale-bars.[10]

RESULT

Macroscopy

Figure 1: a *Solanum trovum* Sw (Brihatiphala)

Figure 1: b *Zizipus rugosa* Lam (Badara Twak)

Figure 1: c *Zanthoxyllum ovalifolium* Wight. (Tumburu Phala)

Figure 1: d *Solanum surratense* Burm f. (Kantakari root)

MICROSCOPY

Figure 2: Microscopy of *Solanum surratense* root.

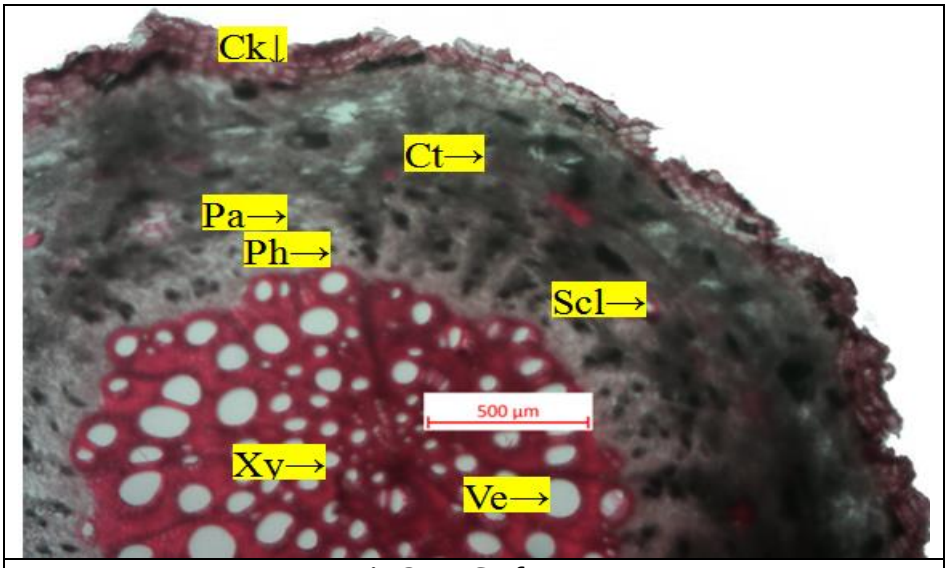

Fig 2a. TS of Root

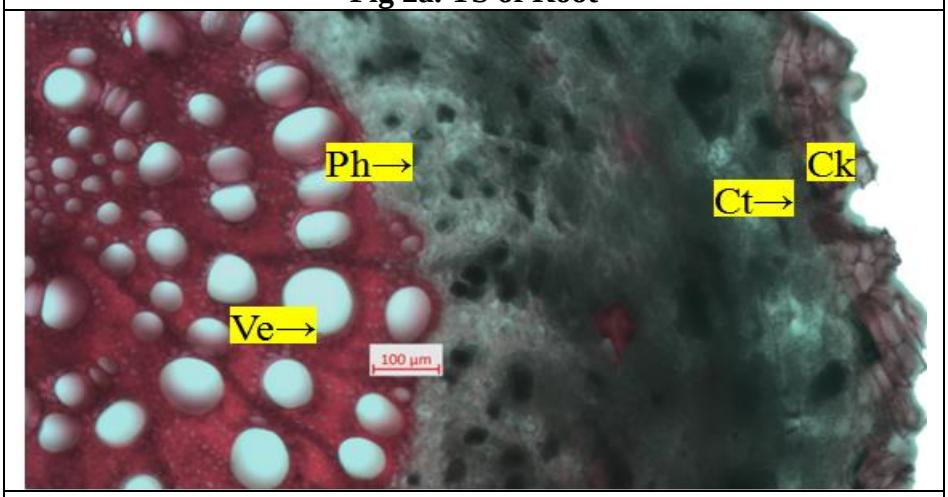

Fig 2b. A portion enlarged

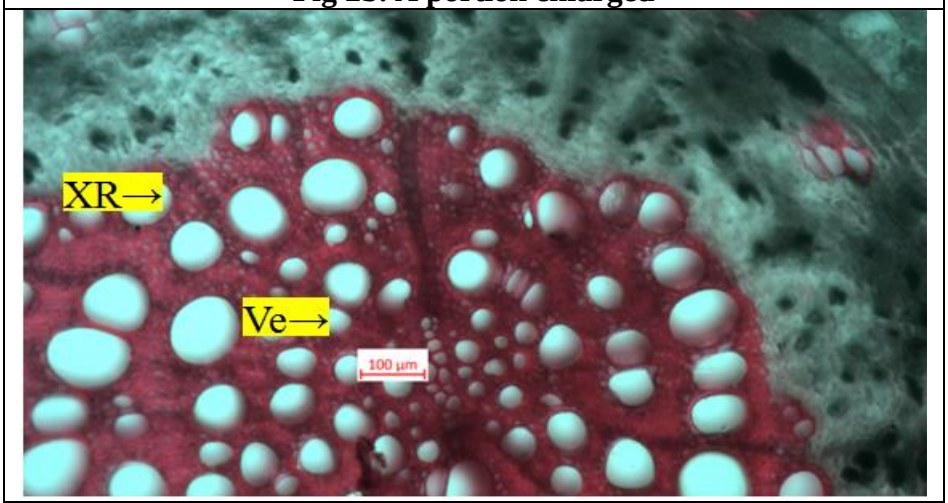

Fig 2c. Xylem

Ck – cork; Ct – cortex; Pa – parenchyma; C – Calcium oxalate crystals; Ph – phloemVe – vessel; Xy – xylem; XR – xy;em rays

Figure 3: Microscopy of *Ziziphus rugosa* stem bark

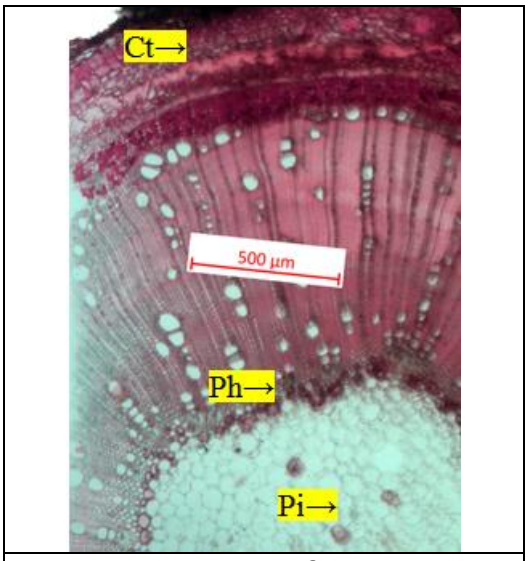

Fig 3a. TS of stem

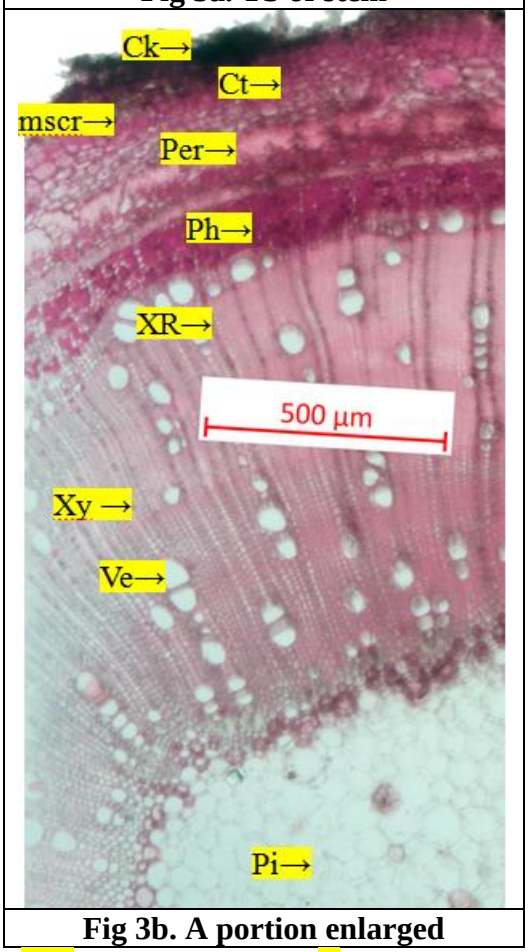

Fig 3b. A portion enlarged

Ck – cork; Ct – cortex; Pa – parenchyma; C – Calcium oxalate crystals; mscr – microsphenoidal crystals of calcium oxalate; Per - Pericyclic fibres; Ph – phloem; Pi – pith; Ve – vessel; Xy – xylem; XR – xy;em rays;

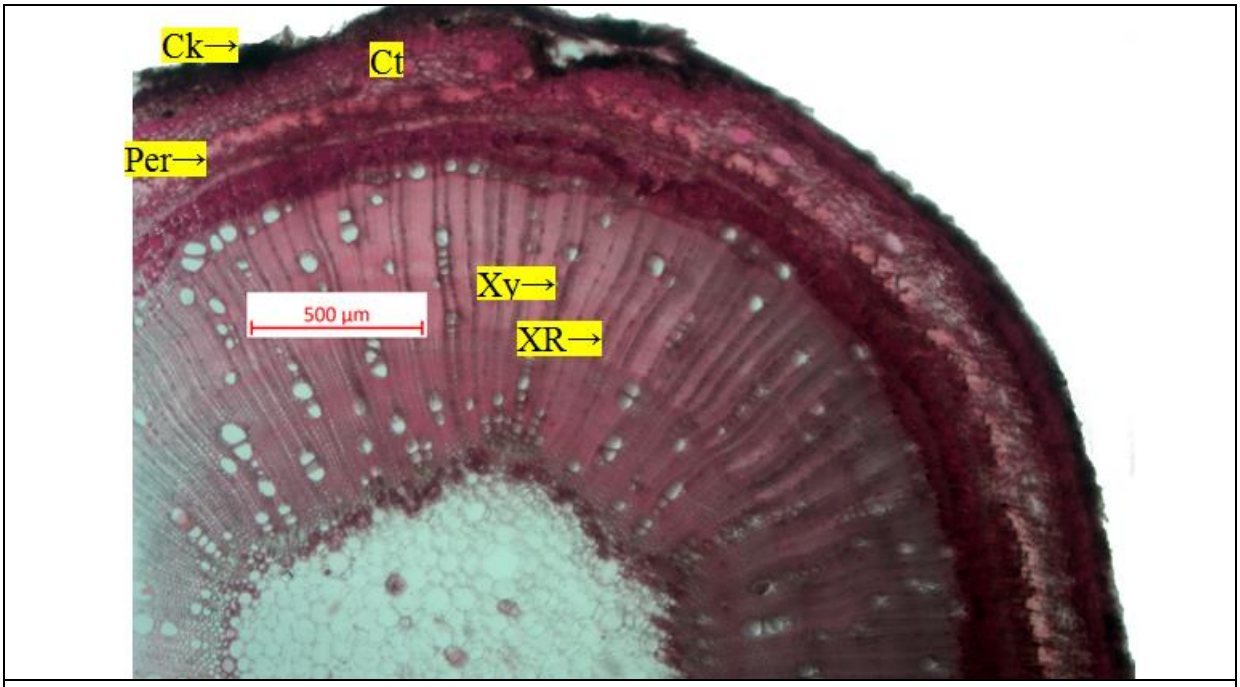

Fig 3c. Cork, cortex, pericycle, xylem and pith

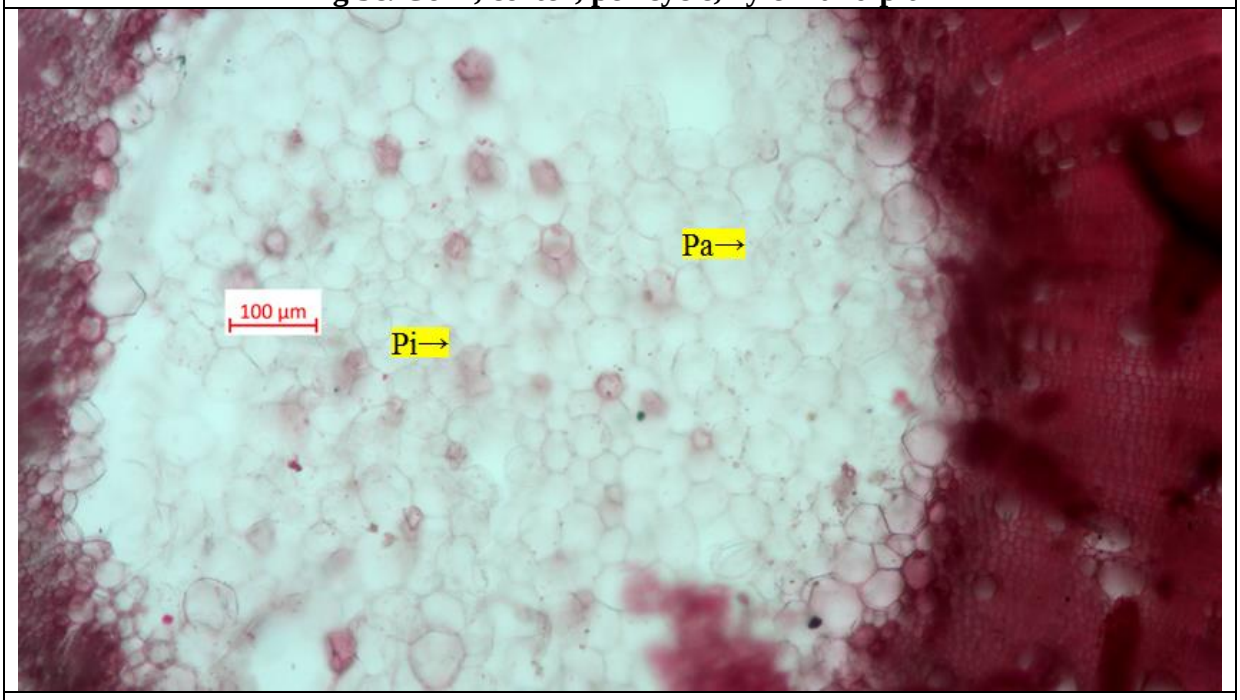

Fig 3d. Pith

Ck-cork; Ct-cortex; Pa - cortical parenchyma; Per - pericyclic fibres; Xy - xylem; XR-xylem rays; Pi - pith

Figure 4: Microscopy of *Solanum torvum* fruit

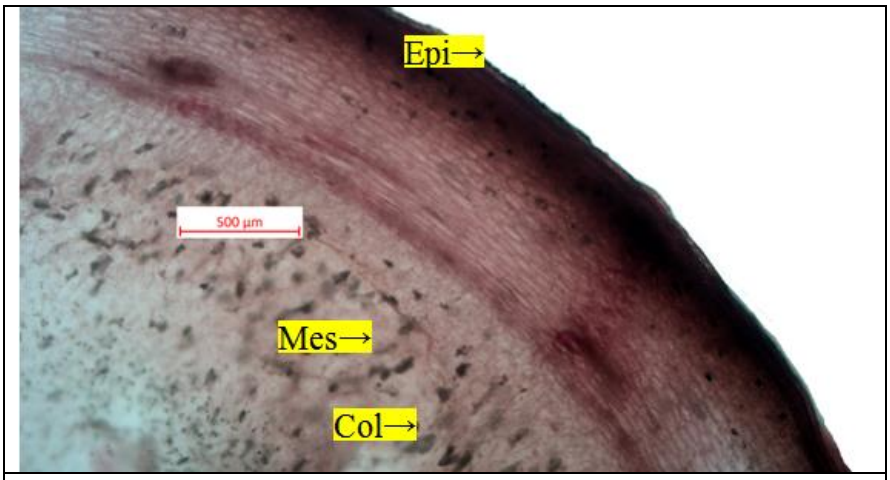

Fig 4a. Epicarp and Mesocarp

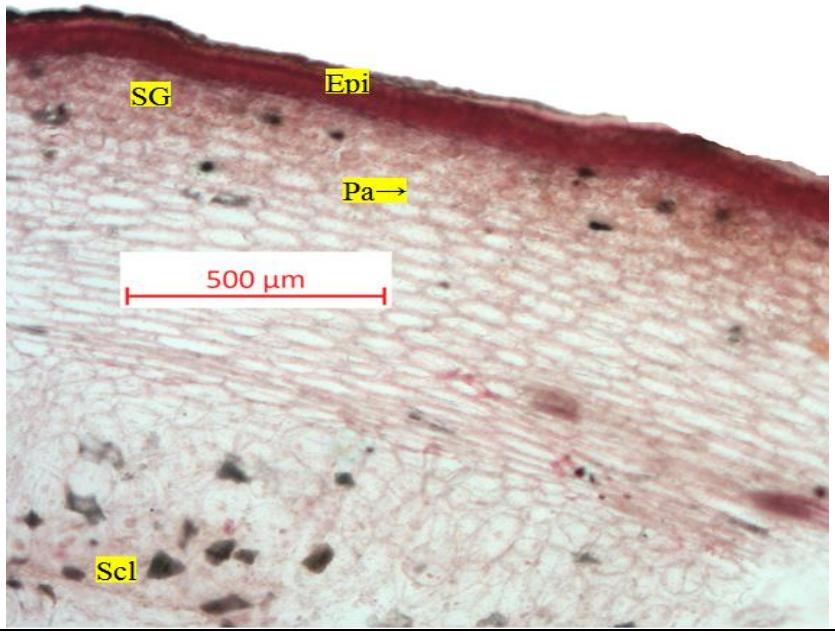

Fig 4b. Epicarp and mesocarp containing sclerenchyma

Epi - epicarp; Col - collenchyma; Mes - mesocarp; Pa - parenchyma; SG - starch grains;

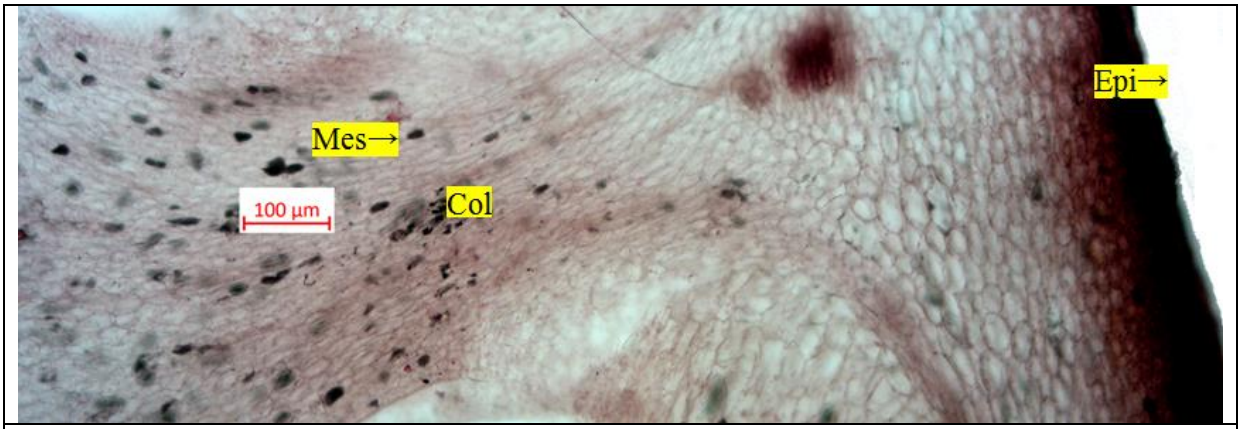

Fig 4c. Pericarp constituting of Epicarp and Mesocarp

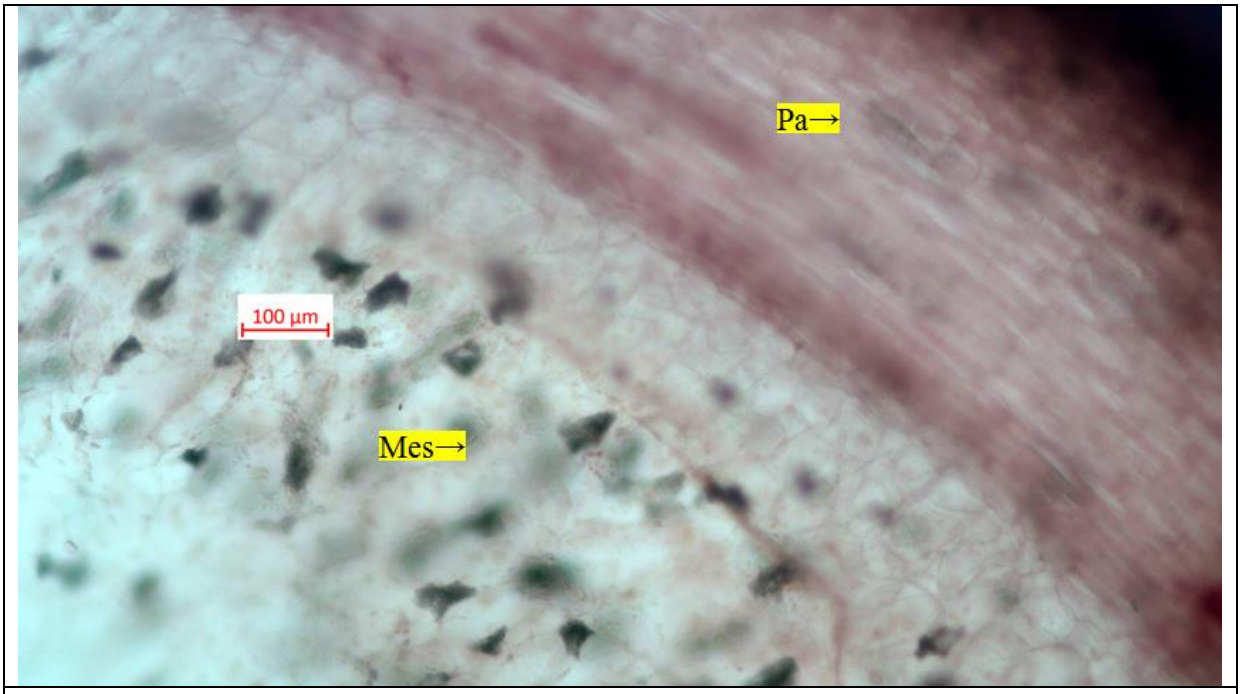

Fig 4d. Mesocarp

Epi - epicarp; Col - collenchyma; Mes - mesocarp; Pa – parenchyma.

Figure 5: Microscopy of *Zathoxylum ovalifolium* fruit

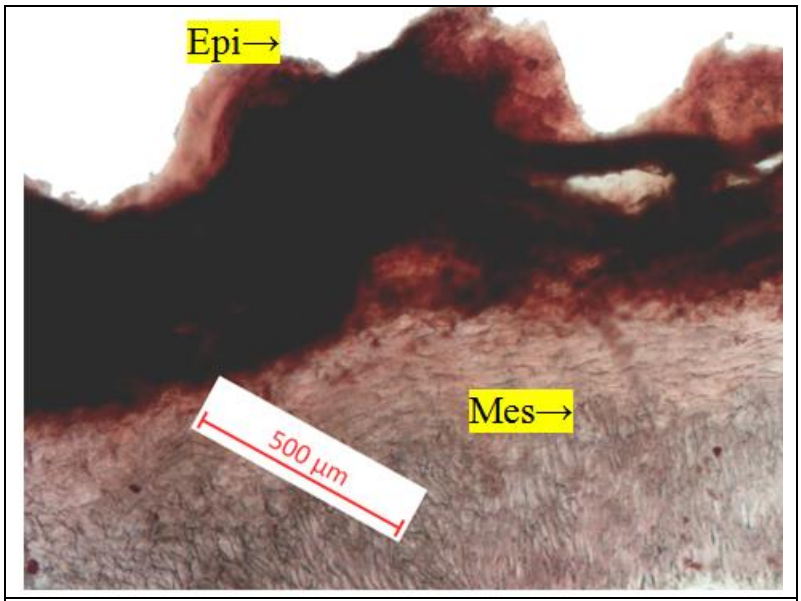

Fig 5a. Epicarp and Mesocarp

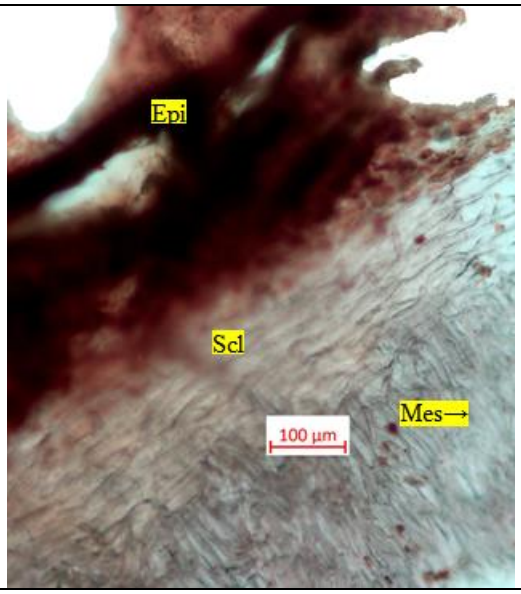

Fig 5b. Sclereids and Mesocarp

Epi - epicarp; Mes – mesocarp; Scl sclereids.

RESULTS OF MICROSCOPY

The root *Solanum surratense* has distinct features like striated cork which is 3-4 rows beneath which a narrow cortex containing stone cells and sclereids, Ground tissue is parenchymatous. Phloem is narrow, Xylem consists of xylem vessels, fibers, xylem rays.

The stem bark of *Ziziphus rugosa* consists of thick cork, cortex, following which ring of pericyclic fibers, narrow phloem, centrally xylem and pith. Microscopy of *Solanum torvum* fruit consists of pericarp comprising of Epicarp and Mesocarp which consists of collenchyma. Pericarp is parenchymatous consists of starch grains. *Xanthoxylum rhetsa* fruit pericarp consists of epicarp and mesocarp. Mesocarp consists of collenchyma cells.

DISCUSSION

Brihati (*Solanum torvum*), *Kantakari* (*Solanum surattense*), Tumburu(*Zanthoxylum ovalifolium)*, and Badara(*Ziziphus rugosa)* widely used in Ayurveda and folklore medicine for their therapeutic properties. Collectively, these plants exhibit strong antibacterial and healing potential, supported by both ethnomedicinal usage and modern research. Their phytochemical composition and pharmacological actions make them suitable candidates for developing a safe, effective and herbal mouthwash for the management and prevention of dental caries (*Krimidanta*). Authentication parameters are basic steps in any drug research.

The pharmacognostic study involved the collection and authentication of plant materials including *Solanum torvum* fruits, *Solanum surattense* whole plant, *Ziziphus rugosa* bark, and

Zanthoxylum ovalifolium fruits from their natural habitats, followed by voucher specimen deposition (Voucher No. 260107140).

Macroscopic evaluation documented external morphological features using digital imaging for proper identification. Microscopic analysis was carried out by preserving samples in FAA solution, preparing transverse sections, staining with safranin, and observing under a trinocular microscope, revealing characteristic features like cork, cortex, parenchyma, xylem vessels, phloem, sclereids and starch grains. The results collectively validate the identification parametrs of the selected drugs. These standardization parameters support the safety and efficacy.

CONCLUSION

The present study successfully generated Maco-microscopic features of *Brihati* (*Solanum torvum*), *Kantakari* (*Solanum surattense*), Tumburu(*Zanthoxylum ovalifolium)*, and Badara(*Ziziphus rugosa)* which are popularly used in the management of *Krimidanta*. Pharmacognostic evaluation confirmed the authenticity and purity of the selected plant materials.

ACKNOWLEDGEMENT

Financial support and sponsorship: Part of the observation is made from findings of a major research project entitled; Pharmaceutical preparation and scientific validation of herbal mouth wash using unexplored indigenous herbs in Krimidanta(Dental caries) RGUHS/ADV.RES/ UG GRANTS RESEARCH/234/2025-26 Dated 22-01-2025 and 6-03-2025;UG25AYU0238; sanctioned by Rajiv Gandhi University of Health Sciences, Bangalore.

BIBLIOGRAPHY

1. Sushruta. Jadavaji Trikamji. Sushruta Samhita with Nibandhasagraha commentary of Dalhanacharya. Nidana Stana, Mukharoga Nidana Adhyaya, 16/29, 9th edition, Chaukhambha Sanskrit Sansthan, Varanasi, 2010; 846.
2. Anonymous. Wealth of India- A dictionary of Indian raw material, CSIR products, New Delhi, 1976. Reprinted 2005, NISCAIR; Vol-VI, 224.
3. Sharma Rakesh K, Arora Rajesh (2006). Herbal Drugs–A twenty first century perspective. New Delhi: Jaypee Brothers Medical Publishers, pp 34-40.
4. Bhat Gopalakrishna K. Flora of Udupi. Udupi: Published by Indian Naturalist Edition, 2003; P. 580.

5. Kritikar KR, Basu BD. Indian medicinal plants. Dehradun Publisher Ltd, India, 1991; 2(3): 2219-220.
6. Khare C.P. Indian Medicinal Plants. 1st Indian reprint. New Delhi: Chaukhambha publications, 2007; P.3547. Herbs in Krimi.
7. Mallya Suma V, Suchitra Prabhu, Vishwanatha U, KN Sunilkumar. Anatomical atlas of Panchavalkala. Effective healing of five bark drugs used in gynecological disorder. Journal of Ayurvedic and herbal medicine, 2018; 4(1): 6.
8. Chaithra, Mallya Suma V, Prabhu Suchitra, Comparative Biological Activity Profile of Nava (Freshly Collected) and Purana (Old) Dhanyaka (Coriandrum sativum Linn.) through Gas Chromatography and In-Vitro Anti-Microbial Study, Journal of Drug Delivery & Therapeutics, 2020; 10(3): 12-16.
9. Mukharjee Pulok K. Quality Control of Herbal Drugs; New Delhi: Business Horizons, 2002; p68.