



**BRIDELIA SCANDENS WILLD. – AN PHARMACOGNSTIC OVERVIEW**

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**ABSTRACT:**

Pharmacognosy is the study of naturally occurring biological substances, principally those derived from plants that find use in medicine. The word 'pharmacognosy' is derived from the Greek 'pharmakon', 'a drug', and gignosco, 'to acquire a knowledge of'. As late as the beginning of the 20th century, the subject had developed mainly on the botanical side, being particularly concerned with the description and identification of drugs, both in the whole state and in powder, and with their history, commerce, collection, preparation and storage. The plant selected for the present study - *Bridelia scandens* Willd. of the family Euphorbiaceae, is yet another folklore medicinal plant which is widely used in some parts of Karnataka in treating the disease Amavata by the local tribal people and villagers. Here an attempt is made to validate plant pharmacognostically *Bridelia scandens* Willd. is a large, woody, evergreen, scandent shrub with pendant branches large deflexed spines abundantly seen in western ghats. Bark grey, hard, deeply fissured; leaves elliptic, obtuse entire, thinly curvaceous; flowers greenish yellow, in dense axillary heads arranged in paniculate leafy spikes; drupes ovoid, bluish black, succulent, smooth. Upper epidermis shows no stomata and lower epidermis shows mostly ranunculaceous stomata. Transverse section of the petiole is almost circular with a narrow groove at the upper side and wavy margin with plenty of non-glandular trichomes. T.S. of the leaf shows a dorsiventral outline; vascular bundles are circular and similar to that of dicot stem. Microscopic study of the leaf powder showed, trichomes, fragments of lower epidermis with stomata, sclerenchyma fibers, crystals, chloroplast, vein fragments, spiral vessels and orange-reddish to brown pigments

**Key Words:** Pharmacognosy, *Bridelia Scandens* Willd. Leaf, Epidermis

## INTRODUCTION:

Pharmacognosy is the study of naturally occurring biological substances, principally those derived from plants that find use in medicine. The word 'pharmacognosy' is derived from the Greek 'pharmacon', 'a drug', and gignosco, 'to acquire a knowledge of'. As late as the beginning of the 20<sup>th</sup> century, the subject had developed mainly on the botanical side, being particularly concerned with the description and identification of drugs, both in the whole state and in powder, and with their history, commerce, collection, preparation and storage. Such branches of pharmacognosy are still of fundamental importance, but rapid development in other areas, particularly phytochemistry and pharmacology, have enormously expanded the subject. As a result it is now possible to approach the study of medicinal plants from the botanical, phytochemical and pharmacological view points [1][2]

Undoubtedly, the plant kingdom still holds many species of plants containing substances of medicinal value which are yet to be discovered; large number of plants are constantly being screened for their possible pharmacological value[3][4].

The plant selected for the present study - *Bridelia scandens* Willd. of the family Euphorbiaceae, is yet another folklore medicinal plant which is widely used in some parts of Karnataka in treating the disease Amavata by the local tribal people and villagers. Here an attempt is made to validate plant pharmacognostically.[9].

## MATERIALS AND METHODS:

Drug *Bridelia scandens* Willd. was collected from natural habitat (Sullia, Dakshina Kannada,

Karnataka). Leaf part of the drug was used for the present study as it was the part used in folk lore therapy.

## OBSERVATIONS AND RESULTS:

### I. Pharmacognostic study of the leaf of *Bridelia scandens* Willd.

#### (A) Macroscopic Characters of the Leaf :

Larger scandent shrubs; stem thorny, shoots brown pubescent. Leaves alternate, elliptic-oblong or obovate, 4.5 – 9 x 2.5 x 4.2 cm, rounded or subcordate at base, obtuse at apex, entire or undulate, fulvous-pubescent beneath; nerves 8-10 pairs. Flowers in inflorescence of interrupted pseudospikes with gradually reduced leaves, unisexual. Calyx lobes 5. Corolla lobes 5. Stamens 5. Disc without bristles, greenish yellow. Fruit a drupe, globose, ca 0.4 cm across, turning black when ripe [5][6][7] (Fig 1).



Fig 1. *Bridelia scandens* Willd. Macroscopic

Characters of the Leaf

**Flowering & Fruiting:** October - January.

**Distribution:** India: Western peninsular India and N. Circaras. Common in deciduous to semi-evergreen forests of Western Ghats.

The leaf of *Bridelia scandens*, Willd. moderately sized elliptical to oblong-orbicular leaves Laminae coriaceous, with acute or subacute or rounded apex, subacute or obtuse or subtruncated or subcordate base and entire or undulate margin, 2.5 - 12 cm. long, 1.5 - 9 cm.. broad, dark brown on upper, paler brown on lower surface and more or less so on lower; mid-rib and nerves indented on upper surface, both nerves and nervules prominent on the lower; nerves 8-12; petiole terite, fulvous tomentose, 5-6 mm. long 3-4 mm. broad[8][10] [11].

**(B) Microscopic characters of surface preparations :**

**(i)Upper epidermis :**

The leaves are highly stiff and reticulated and the vein-lets are mostly anastomised and fibrous in nature. Hence, it is not easy to take out or remove the peelings of the epidermis. However, the peelings of the upper epidermis do not show the presence of any stomatal openings. The epidermal cells are polygonal to hexagonal and are straight walled. The cells are comparatively larger in size. Plenty of prismatic crystals of calcium oxalate mostly associated with fibres are also can be observed throughout the epidermal preparations. Unicellular, multicellular and uniseriate trichomes are also present in the surface preparation.

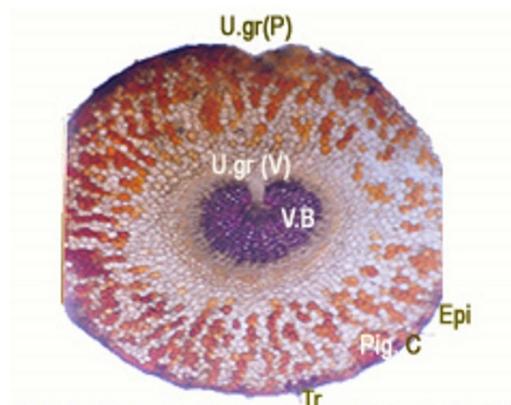
**(ii)Lower epidermis :**

Peelings of the lower epidermis show plenty of non-glandular trichomes especially on the veins. The lower epidermis is made up of epidermal cells; and stomata also can be seen on the lower epidermis. The epidermals cells are comparatively smaller in size and they are

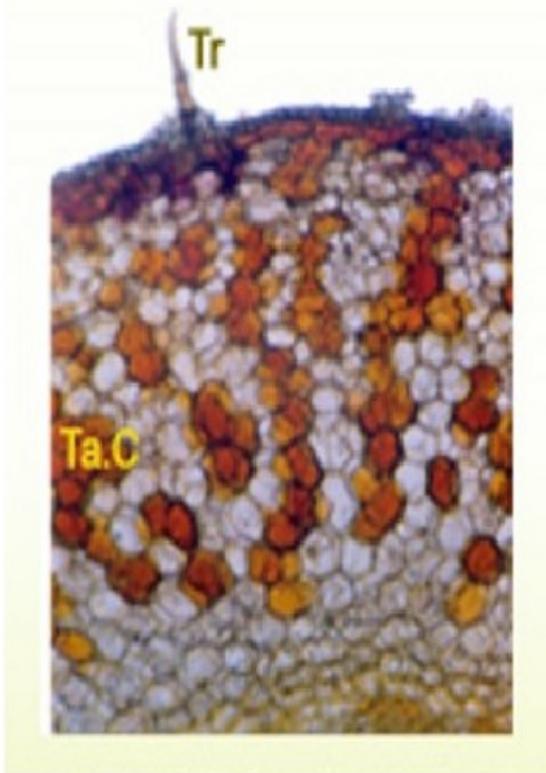
polygonal to hexagonal in shape with slightly wavy walls showing a papillose appearance. The stomata are mostly ranunculaceous or anomocytic and very rarely anisocytic also occur. The epidermal trichomes are mostly non-glandular and they are uni to multicellular and uniseriate with thick walls and narrow lumen. They are short, straight, very long, slender and coiled.

**(iii)Transverse section of petiole:**

The transverse section of petiole is almost circular in outline with a very narrow groove at the upper side. The margin is almost wavy with plenty of nonglandular trichomes. The trichomes are almost similar to those of the mid-rib of the leaf. The outer most tissue of the petiole is made up of a unilayered comparatively thick walled epidermis with a thick cuticle. Just below the epidermis, patches of collenchyma also can be observed. Majority of the paranchymatous ground tissue of the petiole - contain plenty of both aggregate and prismatic crystals of calcium oxalate; reddish-brown contents and also dark-brownish tannin containing cells (Fig 2&3).



**Fig 2. T.S of Leaf petiole with circular outline & Central circular vascular bundle showing a groove at upper side.**



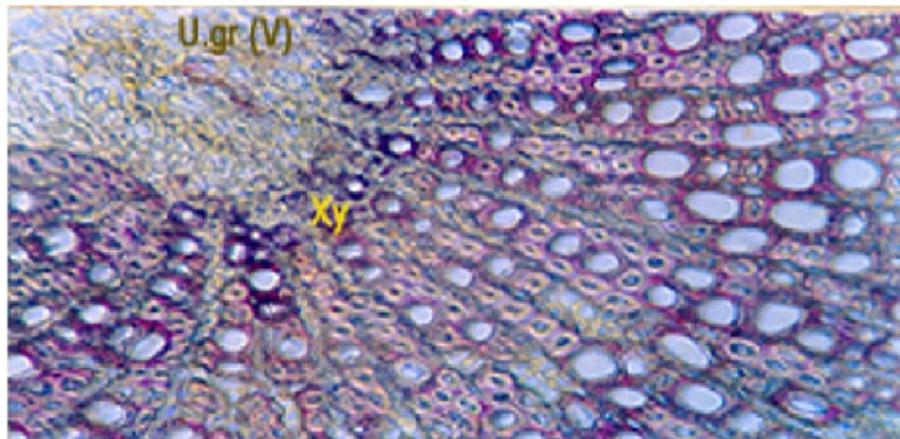
**Fig 3. A Portion of T.S of Petiole showing epidermis with hair and cortex with plenty of orange brown colored contents and a portion of vascular bundle**

The centre of the petiole is occupied by a semicircular vascular bundle with a deep groove on the upper side which is made up of non-lignified tissues. The major portion of the vascular bundle is made up of xylem. The xylem is arranged with radiating vessels, tracheids and fibres. Lower side of the xylem is made up of phloem and is surrounded by lignified sclerenchyma fibres. The surrounding ground tissue is made up of wide paranchymatous, cortex.

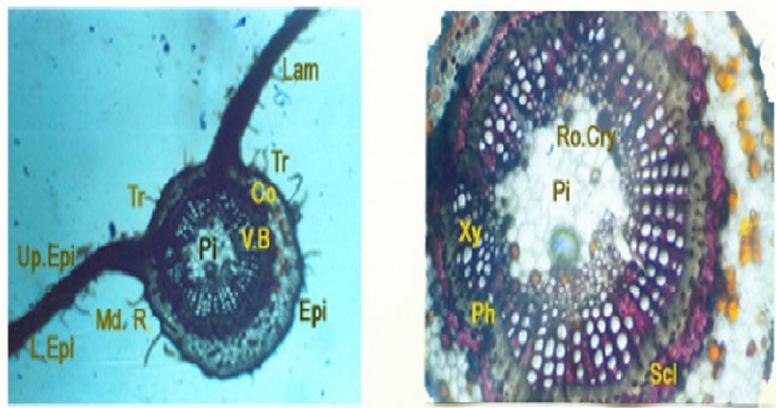
**(iv) Transverse section of the leaf:**

The transverse section of the leaf through the mid-rib shows a dorsiventral outline

in which the palisade tissues remain only underneath of the epidermis of the lamina. The upper epidermis of the lamina is unilayered and made up of comparatively larger and rectangular shaped cells with slightly thick cuticle on its outside. The epidermal hairs mostly multicellular uniseriate with comparatively thick walls are also can be seen especially on the veins. The stomata are totally absent on the upper epidermis. The palisade tissues are comparatively very narrow and cylindrical to oblong in shape and unilayered. Just below it there is the loosely arranged spongy parenchyma of the mesophyll. Plenty of light yellowish or orange-brown contents as well as rosette crystals of calcium oxalate also can be seen in some of the mesophyll cells. The lower epidermis is also made up of rectangular shaped cells and is unilayered and comparatively smaller than those of the upper side. There are a number of stomatal openings also present on the lower epidermis. Plenty of non-glandular hairs, mostly multicellular and uniseriate with thick wall are seen. Glandular hairs also can be seen on the lower side especially just below the mid-rib region. Fibro-vascular bundles with crystal sheath are also traversed throughout the mesophyll of the lamina. Majority of the crystals are prisms of calcium oxalates (Fig 4&5).



**Fig 4..A portion of T.S. of petiole with Vascular bundles showing xylem and upper groove**



**Fig 5. TS of the leaf showing midrib and lamina along with pith and vascular bundle**

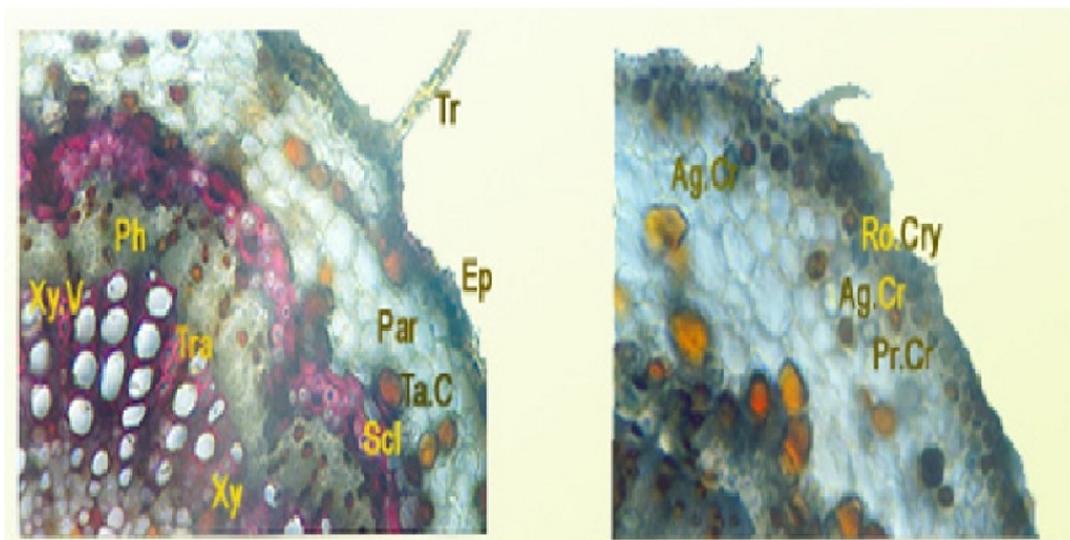
The mid-rib region is almost circular in outline and possesses a large outward bulging on the lower side and conical or convex bulge on the upper side. The vascular bundle is circular in outline and almost similar to that of a dicot stem with circular pith at the centre. Surrounding the pith there is a wide xylem tissue in which the vessels are comparatively larger in size and arranged radially along with small tracheids and tracheidal fibres. Orange - reddish colouring material containing cells are also abundant in the pith region as well as in the xylem parenchyma. Just outside the xylem there are

few narrow patches of phloem mostly arranged on both the upper and lower sides of the xylem. Surrounding the phloem there is a circular ring of sclerenchyma fibres. The fibres are mostly with narrow lumen and are in 2-3 in circular layers. Just surrounding the sclerenchymatous fibres there is the circular parenchymatous ground tissue. Majority of the parenchyma cells also contain orange or brownish cell contents. Abundant rosette crystals and few prisms of calcium oxalate are also seen in most of the parenchyma cells. Just below the upper epidermis of the mid-rib region there is a large

conical patch of collenchyma tissues. Just below there are few parenchyma also can be seen. Plenty of tannin or light orange coloured materials are also seen in most of the cells.

The epidermal hairs of both upper and lower side of the mid-rib region are comparatively very large and thick walled, several of them are almost straight and few are

bent or coiled in appearance. The hairs are comparatively more on the lower side of the lamina. The basal cells of the hairs are also very broad and surrounded by 3-5 small circular cells. Crystals of calcium oxalate are mostly aggregate including rosettes, stellate and also prisms of various sizes (Fig 6).



**Fig 6. Portion of T.S. of Midrib showing cells of epidermis, parenchyma, sclerenchyma with phloem and xylem along with prismatic, rosette and aggregate crystals**

**Study of the powder:**

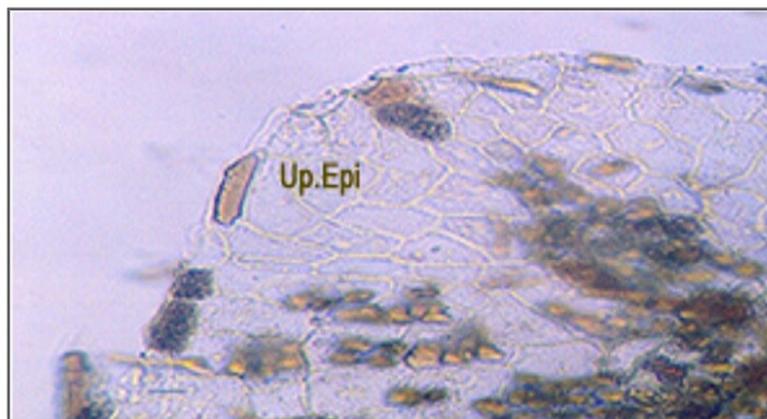
**(1) Macroscopic characters :**

Powder is slightly light greenish in colour with a characteristic odour similar to that of tea leaves and astringent in taste.

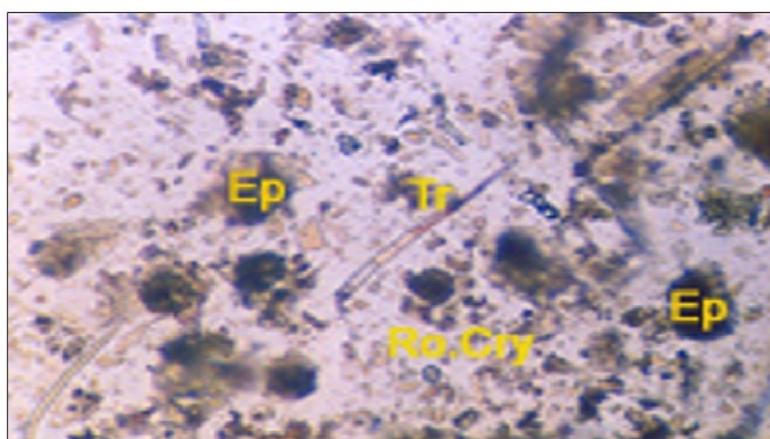
**(2) Microscopic characters :**

Powder of the leaf showing plenty of non-glandular multicellular, uniseriate trichomes with highly thick walls. Fragments of epidermis showing polygonal to hexagonal cell wall without stomata indicating upper epidermis. Sclerenchyma fibres associated with plenty of prismatic crystals of calcium oxalate;

narrow, tubular cells with plenty of chloroplast mainly palisade tissues, small fragments of epidermis with ranunculaceous type of stomata, especially derived from lower epidermis, occasional aggregate crystals of calcium oxalate; very thin walled unicellular, non-glandular, non-lignified trichomes and lignified trichomes are specific diagnostic features of the powder. Majority of the fragments from the veins contain idioblast with prismatic crystals. Spiral vessels, orange-reddish to brown coloured pigment cells are also plenty throughout the powder(Fig 7&8).



**Fig 7. Microscopic characters observed in leaf powder(Upper epidermis) cells contain plenty of prismatic crystals of calcium oxalate.**



**Fig 8. Microscopic characters observed in leaf powder(Lower epidermis) shows Shows plenty of non-glandular trichomes.**

#### **DISCUSSION:**

*Bridelia scandens* Willd. is a large, woody, evergreen, scandent shrub with pendant branches large deflexed spines abundantly seen in western ghats. Bark grey, hard, deeply fissured; leaves elliptic, obtuse entire, thinly curvaceous; flowers are greenish yellow, in dense axillary heads arranged in paniculate leafy spikes; drupes ovoid, bluish black, succulent, smooth.

Upper epidermis shows no stomata and lower epidermis shows mostly ranunculaceous stomata. Transverse section of the petiole is

almost circular with a narrow groove at the upper side and wavy margin with plenty of non-glandular trichomes are seen. T.S. of the leaf shows a dorsivertral outline; vascular bundles are circular and similar to that of dicot stem.

Microscopic study of the leaf powder showed, trichomes, fragments of lower epidermis with stomata, sclerenchyma fibers, crystals, chloroplast, vein fragments, spiral vessels and orange-reddish to brown pigments. Leaf being the main part used in traditional therapeutic usage leaf is taken up for the study. Above were characteristic features which helps

in identifying the drug pharmacognostically from other closely associated drugs.

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