

## PHARMACOGNOSTICAL INVESTIGATIONS ON DIFFERENT PARTS OF *CLERODENDRUM INERME*

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### ABSTRACT

*Clerodendrum inerme* is a hedge plant belongs to the Verbenaceae family, traditionally used for ornamental purpose in home gardens. *Clerodendrum inerme* is used in many places in landscaping, as a ground cover or a hedge plant, especially near the sea, as it tolerates the salt spray. The different parts of the plant are used as folk medicines against many diseases. The plant has many active components like alkaloids, flavonoids, terpenes etc. having a wide range of application in the field of medicine. Being a weed, with innumerable therapeutically useful components is a boon to the plant to be explored & established for its medicinal potential. The present study was undertaken with an aim to explore the pharmacognostic aspect of the plant which forms the very basic part of a drug evaluation. The microscopic and macroscopic observations made have been documented which might be an eye opener to future researches on this plant.

**KEYWORDS:** *Clerodendrum inerme*, leaf, stem, root, pharmacognosy

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## INTRODUCTION

*Clerodendrum inerme* is valued in landscaping as a groundcover or hedge plant. It has attractive evergreen foliage and fragrant white flowers that form in clusters and are accented by delicate red protruding stamens. Seaside *Clerodendrum*, as its name suggests, grows well along the beach tolerating the salt spray of the ocean and the harsh rays of the sun. It is a versatile plant and can be grown as topiary or as a bonsai (S.R. Harish and K. Murugan, 2011), (Forest Starr *et al.*, 2003).

*Clerodendrum inerme* belongs to the family Verbenaceae. The genus *Clerodendrum* includes over 450 species of tropical regions. The name *Clerodendrum* is derived from the Greek *kleros*, meaning chance or fate, and *dendron*, meaning tree, in reference to the uncertain medicinal qualities of some of the plants (Forest Starr *et al.*, 2003).

Evergreen sprawling shrub, 1–1.8 meter tall. Stems (Fig 1 & 2) woody, smooth. Leaves (Fig 1 & 2) ovate to elliptical (5–10 cm) long, acute to acuminate tip, green, smooth, slightly shiny upper surface, pinnate venation, margins entire, leaves opposite, simple. Cyme or umbel usually comprised of 3 flowers joined at a common base point; corolla white, fused, with 5 lobes; stamens 4, reddish to purple and upwardly curved. Fruit green turning black, 1–

1.5 cm long, obovoid (S.R. Harish and K. Murugan, 2011), (Forest Starr *et al.*, 2003).

The different parts of the plant have shown therapeutically significant activities like antinematocidal activity, antimicrobial activity, and anti-hepatotoxic activity. It has also been used for curing skin diseases, rheumatism etc. The methanolic extract of root contains verbanoside, which possess analgesic and anti microbial activities which is prescribed conforming the traditional use of this plant as medicine. The crude extract of the leaf also have shown the anti microbial activity. (Chethana G.S *et al.*, 2013). This plant *Clerodendrum inerme* is known to have many active principles like alkaloids, flavanoids, terpenes etc (Chethana G.S *et al.*, 2013)

It is an important medicinal plant reported to be used in the treatment of skin diseases, venereal infections, elephantiasis, asthma, topical burns and for rheumatism. It is also used as a substitute of quinine. In Siddha medicine, it is used under the names of ‘*Chankan kuppi*’ and ‘*Pechagnan*’. A glycoside ester namely Verbascoside has been isolated from the root of this plant, which has analgesic and antimicrobial properties. The antioxidant activity of the plant extract may be due to the presence of polyphenols which are reported as strong antioxidants (Forest Starr *et al.*, 2003).

**Fig. 1 *Clerodendrum inerme* in its habitat**



**Fig. 2 *Clerodendrum inerme* in its habitat**



The leaves and stems contain a number of triterpenes, diterpenoids, sterols and flavones. The leaves yielded the flavanolid, friedelin, salvigenin (5-hydroxy-6, 7, 4'- methoxy flavones), acacetin, cirisimaritin, pectolinarigenin, apigenin (5, 7-dihydroxy-4' methoxy flavaone) and amethyl flavones, cleroflavone (7-hydroxy 5, 4' dimethoxy-6-methyl flavanone). The leaves also yielded diterpenes clerodendrin B. the leaves exhibited growth inhibition and anti-feedant activities in house flies and mosquitoes. (KS Krishnan Marg, 2010). *Clerodendron inerme* as a febrifugal and uterine stimulant, a pest control agent and antiseptic, to arrest bleeding, treatment of asthma, hepatitis, ringworm, stomach pains (Chellaiah Muthu *et al.*, 2006).

The aim of the present study was to explore the plant pharmacognostically by the study of the macroscopic and microscopic observation of internal and external parts of the plant.

## MATERIALS AND METHODS

The whole plant, *Clerodendrum inerme* was collected from Harihar TQ, Davangere dist, Karnataka, India during the month of April 2013. The botanical identity was confirmed by the Taxonomical experts in the R&D wing, Sri Sri Ayurveda Trust, Udayapura, Bangalore-82, Karnataka, India. The voucher no. of the specimen is 129 maintained in Acharya College of Technology, Bangalore, Karnataka, India.

### Macroscopical evaluation

The sample was cleaned and macroscopic evaluation of root, leaf, and stem was carried out. The leaf, stem and root were then separated and individual macroscopic characters like size, shape, texture were noted in detail.

### Microscopical evaluation

Free hand sections of leaf, stem and root were taken and washed with chloral hydrate solution. Sections were first observed in distilled water then stained with Saffranin red. Photomicrographs were taken by Carl zeiss trinocular microscope.

## RESULTS AND DISCUSSION

### Macroscopic characters of root:

Roots are cylindrical in shape, woody; cut pieces 10 cm in length, 2–3 cm breadth. Externally dark brown and internally brownish cream in colour. Surface is rough and at places longitudinal striations and wrinkles seen, at some place it is exfoliated. Fracture short and splintery. Odour is slight aromatic, bland in taste. Fibrous in Texture.

### Microscopic characters of root:

The transverse section of root shows, 10–12 rows of tangentially elongated and radially arranged cork cells [Fig 4.1] followed by cortex formed with 8-10 layers of oval to round shaped parenchyma cells which are compactly arranged with prisms of calcium oxalate [Fig 4.2]. The xylem vessels are of varying size, lignified, found isolated or in the group of 2–3 [Fig 4.3]. Medullary rays are 2–3 seriate and the cells are pitted and lignified [Fig 4.4]. Starch is found in wood only.

### Macroscopic characters of stem:

Stem is cylindrical in shape, woody; cut pieces 15 cm in length, 0.2–0.3 mm in breadth. Externally light brown in colour & internally whitish to light green in colour. Surface is nearly smooth, pubescent with white oval shaped lenticels present on it. Fracture short and splintery. Odour is disagreeable with bland taste. Fibrous in Texture.

### Microscopic characters of stem:

The transverse section of stem shows, single layer of epidermis with 2–3 celled covering trichomes followed by 8–10 layers of cortex consisting of oval shaped parenchymatous cells which are compactly arranged with prisms of calcium oxalate. Patches of lignified fibers are scattered at places in the outer few layers of cortex. Within the cortex, there is an interrupted layer of lignified fibers followed by phloem and xylem vessels. Pith is very large consisting of oval shaped parenchymatous cells.

Fig 3: T.S. of Root of *Clerodendrum inerme*

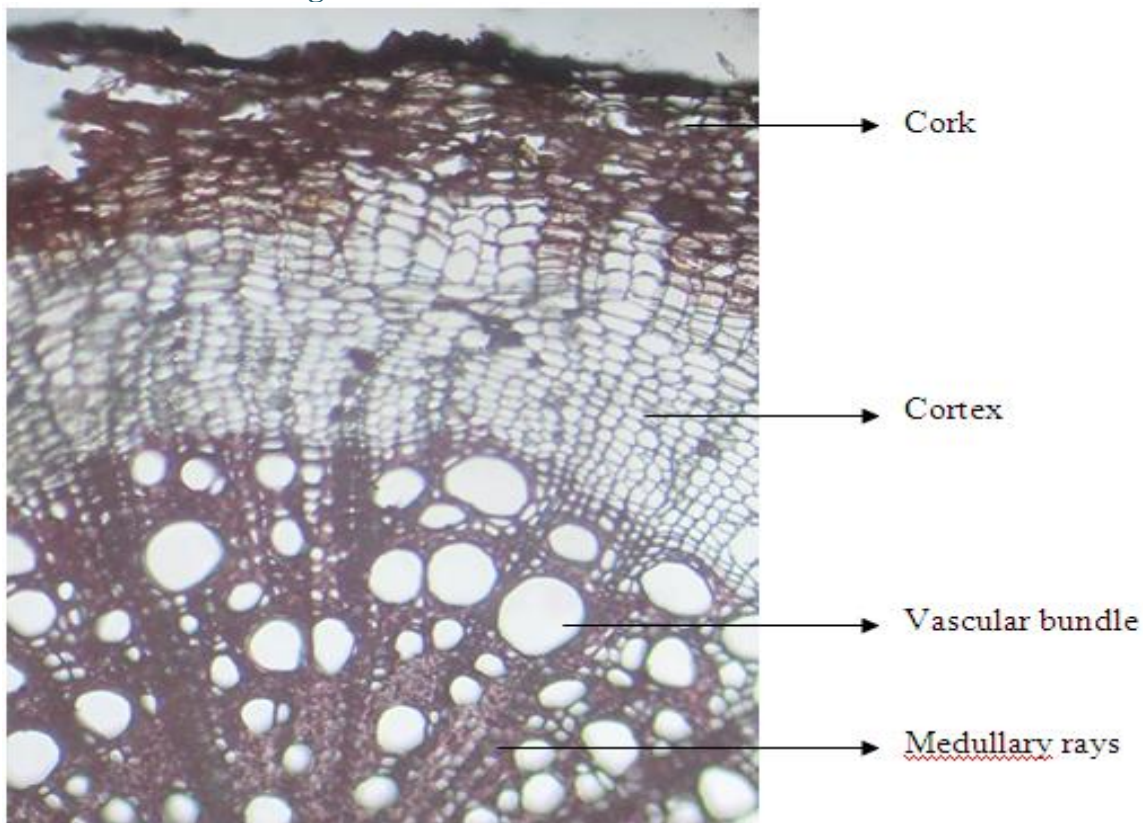
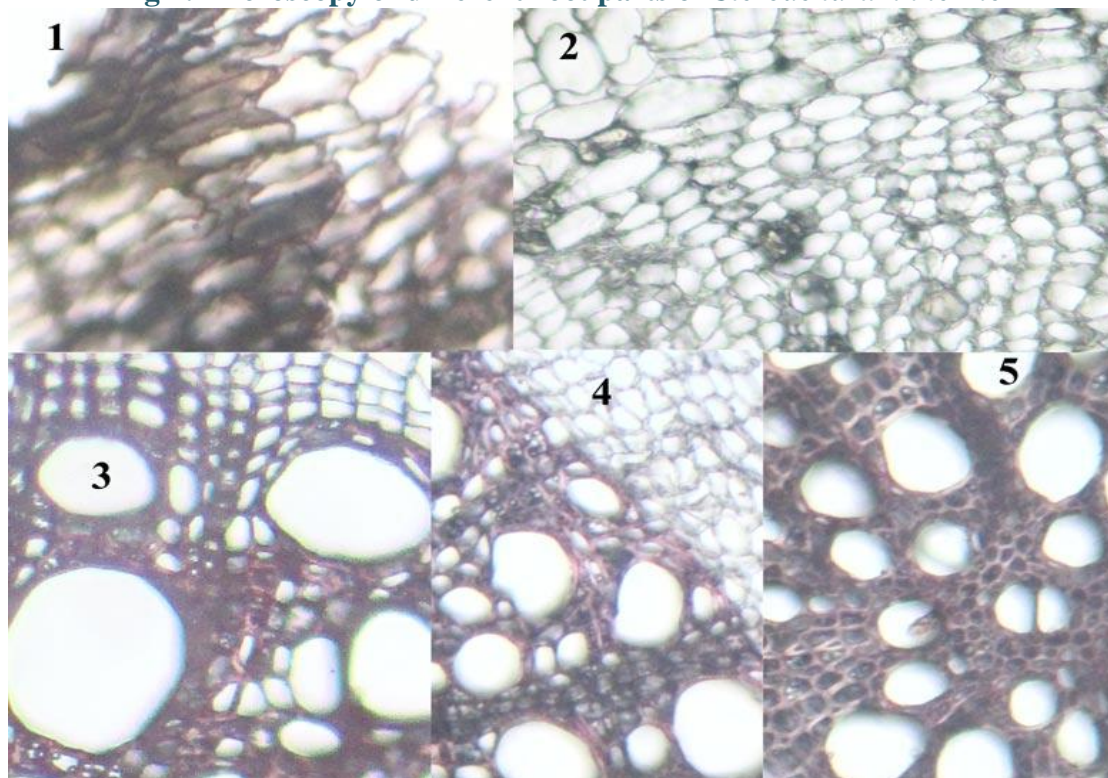
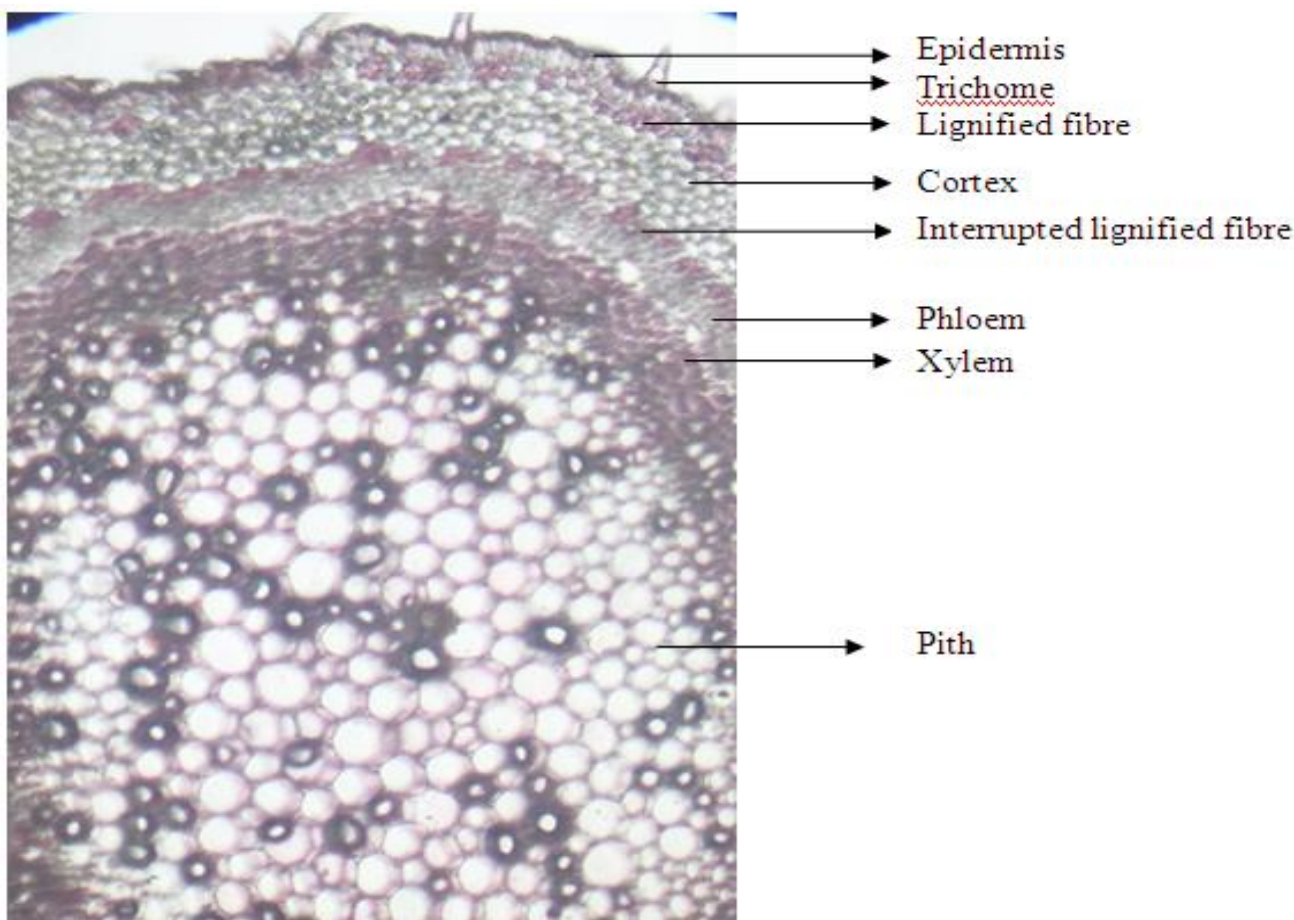


Fig 4: Microscopy of different root parts of *Clerodendrum inerme*



4.1 Cork, 4.2 Cortex, 4.3 Vascular bundle, 4.4 Medullary rays, 4.5 Absence of Pith

**Fig 5: T.S of Stem of of *Clerodendrum inerme***



**Macroscopic characters of leaf:**

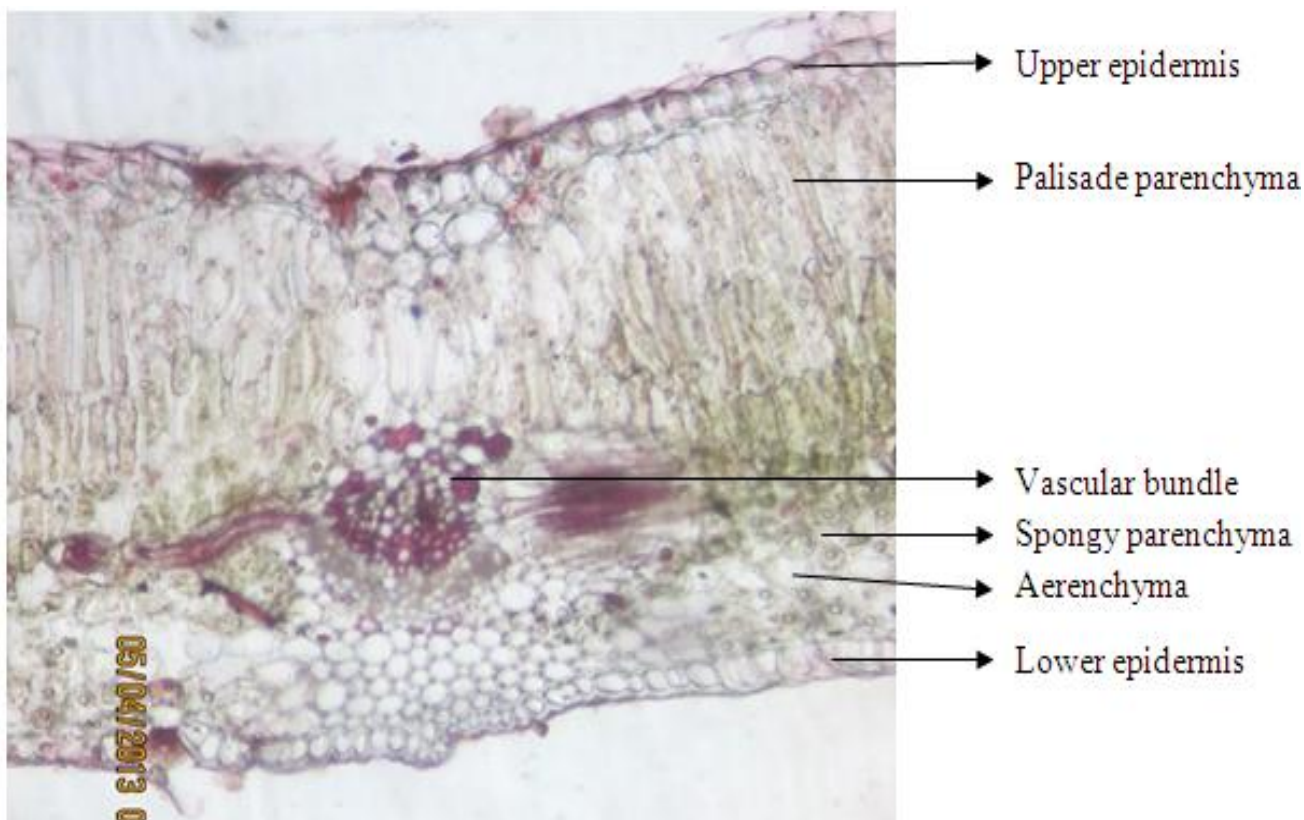
Leaves are simple, opposite or ternate, elliptic or obovate in shape, size is 5–6 cm long and 3–3.8 cm broad, apex is obtuse or mucronate, slightly attenuate at base, margin entire, reticulate venation, glabrous. Odour disagreeable, coriaceous in texture.

**Microscopic characters of leaf:**

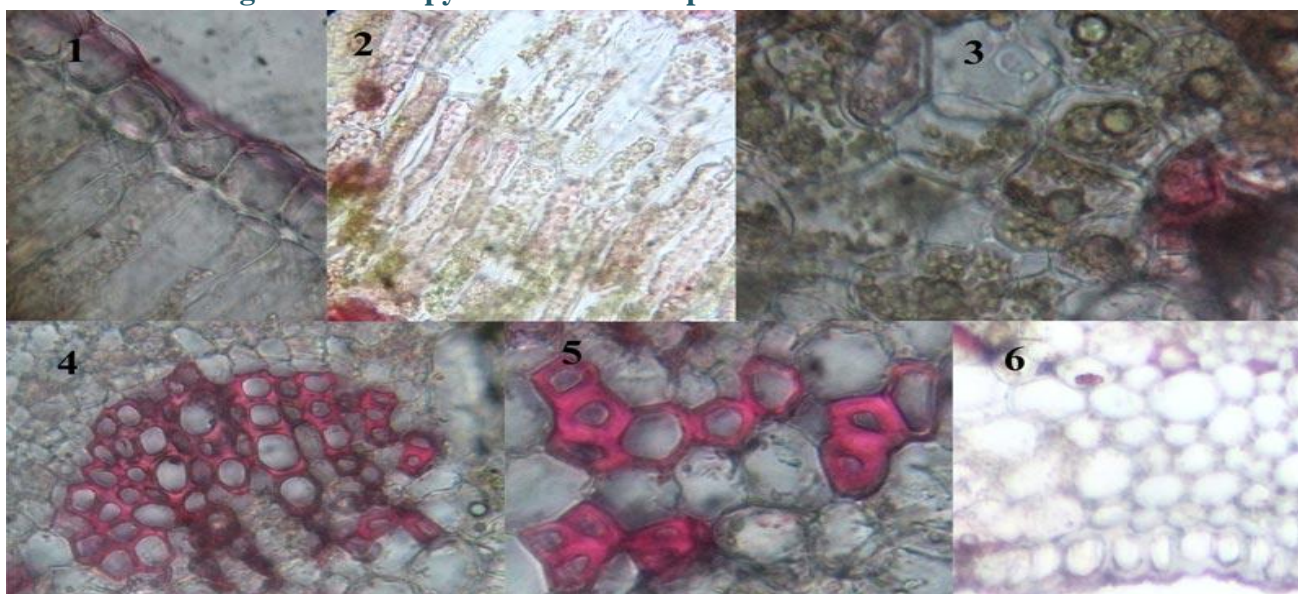
Cross section of midrib shows thick walled circular cells of upper and lower epidermis with cuticle [Fig 7.1 & Fig 7.6]. Just below the upper epidermis we can see two types of parenchyma cells i.e., 2–3 layer oval shape parenchyma cells followed by elongated cells. Above the lower epidermis 4–6 layer of oval shaped parenchyma cells can be seen. The

vascular bundle present in middle of midrib is semicircular [Fig 7.4]. Just below the vascular bundle, lignified fibers can be seen [Fig 7.5]. Cross section showed both the epidermis (Upper and Lower) in the lamina consisting of fairly thick walled circular cells with thick cuticle layer. In both epidermises we can observe glandular trichomes which are sub sessile and situated in a shallow cavity. The mesophyll consists of two to three layered palisade cells [Fig 7.2] just below the upper epidermis and four or five layers of spongy parenchyma cells with aerenchymatous cells [Fig 7.3] at places seen below the palisade cells which extend up to lower epidermis. The lateral veins occur in the median position and has small collateral vascular bundle.

**Fig 6: T.S of Leaf of *Clerodendrum inerme***



**Fig 7: Microscopy of different leaf parts of *Clerodendrum inerme***



7.1 Upper epidermis with cuticle, 7.2 Palisade parenchyma, 7.3 Spongy parenchyma with aerenchyma, 7.4 Vascular bundle, 7.5 Lignified fibres, 7.6 Lower epidermis with cuticle

## CONCLUSION

From this work on *Clerodendrum inerme*, it is helpful in the study of physiology of each cell structure of different parts of the plant. It is very important to understand the physiology of a plant cell like the presence of lignified cell which supports the plant and many more. The reason for undertaking this study is, it reported that this plant has a significance usage in

treatment of fever, wounds, skin disease etc. It is experimentally proven to show the activity of some of the properties of the *Clerodendrum inerme* like antimicrobial activity which correlates the usage as folk medicines like applying for wounds etc. Much more work has to be carried out regarding the medicinal value of this plant available in the treatment of the diseases.

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