



**PHARMACOGNOSTICAL AND PHYTOCHEMICAL STUDIES OF THE BARK OF  
KYDIA CALYCINA ROXB**

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**ABSTRACT**

The plant *Kydia calycina* Roxb. is a flowering tree belongs to the family Malvaceae. It possess antitumor, anthelmintic, anti-inflammatory, analgesic and antioxidant properties. The aim of the study was to determine the pharmacognostical and phytochemical properties of the plant. In the present study, chief phytoconstituents of *Kydia calycina* Roxb. were identified in order to relate their presence with bioactivities of the plant. Petroleum ether, Benzene, Chloroform, Acetone, Ethanol and Water extracts of *Kydia calycina* Roxb. were assessed to determine phytochemical analysis. Maximum phytoconstituents were present in ethanol and water extract.

**KEYWORDS:** *Kydia calycina* Roxb., Malvaceae, Pharmacognostical study, Phytochemical study, Successive solvent extraction.

**1. INTRODUCTION**

Medicinal plants are one of the sources of natural products for the treatment and management of many diseases. The use of plant extracts and isolated pure compounds has provided the basis for the production of herbal medicines and phytopharmaceutical compounds. Herbal medicine aims to return the body to a state of natural balance so that it can heal itself.

The plant *Kydia calycina* Roxb. belonging to the family Malvaceae is a flowering tree, found in the regions of Indian subcontinent, Southern China and Southeast Asia. It is commonly known as Roxburgh's *Kydia* or Pula. This plant possess antitumor, anthelmintic, anti-inflammatory, analgesic and antioxidant properties. It is also used for skin diseases and burns. *Kydia calycina* Roxb. also have several synonyms like *Kydia roxburghiana* Wight, *Kydia fraterna* Roxb., *Kydia paterna* Roxb., *Kydia pulverulenta* Buch.-Ham.<sup>[1]</sup>



**Fig 1: *Kydia calycina* Roxb. Plant**



**Fig 2: Leaves of *Kydia calycina* Roxb.**

**2. MATERIALS AND METHODS**

**2.1 Plant collection and authentication**

The plant *Kydia calycina* Roxb. was collected from Chooral mala, Wayanad district, Kerala, India. The plant

was dried under shade and powdered. Stored in polythene containers at room temperature. And this powder was used for further pharmacognostic and phytochemical studies.



**Fig3: Dried bark of *Kydia calycina* Roxb.**

Dried specimen of *Kydia calycina* Roxb. was well pressed and mounted on herbarium sheet with the help of fevicol and it is labelled.<sup>[2]</sup> The plant was authenticated by Dr. Sreeja P, M.Sc., Ph.D., PG Dept. of Botany & Research Centre, Sir Syed College, Taliparamba. Kannur district, Kerala, India. Also a voucher specimen numbered 9940 was also kept in the respective college.



**Fig 5: Herbarium of *Kydia calycina* Roxb.**

## 2.2 Pharmacognostical studies

### 2.2.1 Macroscopic evaluation

Macroscopical studies of the bark of *Kydia calycina* Roxb. Were examined and determined by the evaluation of external characters like colour, taste, odour, size and shape of the bark.

### 2.2.2 Microscopical studies

For transverse microscopy, free hand sections and microtome sections of the bark were taken. Thin sections were selected, stained with Saffranin, mounted in glycerin & observed through Trinocular 'Leica' microscope attached with 'Leica DFC 295' digital



**Fig 4: Dried powder of *Kydia calycina* Roxb.**

camera connected to the computer and Leica Application Software LAS Version 3.6.1.

For powder microscopy, sufficient amount of powder was taken on a microscopic slide, add 1-2 drops of saffranin. Spread the sample evenly over the slide & mount with glycerin. Observe through Trinocular 'Leica' microscope attached with 'Leica DFC 295' digital camera connected to the computer and Leica Application Software LAS Version 3.6.1. And the procedure was repeated in 2-3 slides to get maximum characters.

### 2.2.3 Physicochemical evaluation

Physicochemical constants like ash value, extractive value, moisture content, swelling index and mucilage content were carried out according to the standard procedure.<sup>[3]</sup>

### 2.2.4 Phytochemical studies

Preliminary phytochemical screening was carried out by Successive solvent extraction. Extraction was carried out by using various solvents like Petroleum ether, Benzene, Chloroform, Acetone, Ethanol and Water according to their increasing polarity.<sup>[4]</sup>

Then Phytochemical screening of different extracts of *Kydia calycina* Roxb. was performed. The extracts obtained was subjected to various chemical tests for the detection of secondary metabolites.<sup>[5,6]</sup>

## 3. RESULTS AND DISCUSSION

### 3.1 Macroscopic evaluation

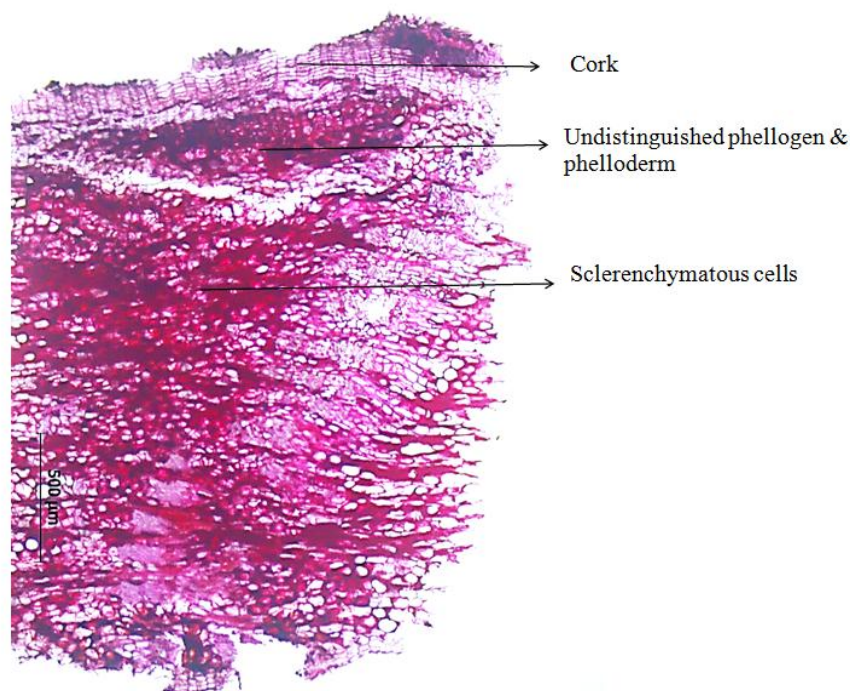
From macroscopic evaluation; colour, taste, odour, size and shape of the bark were determined.

**Table 1: Organoleptic analysis of bark of *Kydia calycina* Roxb.**

CHARACTERS	BARK
Size	5-6 mm thick
Shape	Irregular flakes
Colour	Greyish Brown
Taste	Bitter
Odour	Aromatic

### 3.2 Microscopic evaluation

Transverse section of the bark of *Kydia calycina* Roxb. were performed and it shows the following microscopic characters.



**Fig. 6:** Transverse section of bark of *Kydia calycina* Roxb.

#### 3.2.1 Cork

Also known as phellem. They form the outer tissue of the bark. Consists of series of cell layers, that are suberised. And they become dead cells when mature.

#### 3.2.2 Phellogen

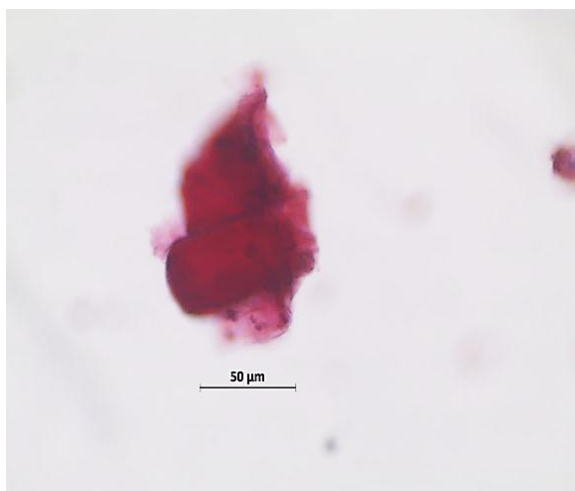
Also known as cork cambium. It is made up of single layer of meristematic cells. These are dividing zone of cells that forms phellem to the outside and phelloderm to the inside.

#### 3.2.3 Phelloderm

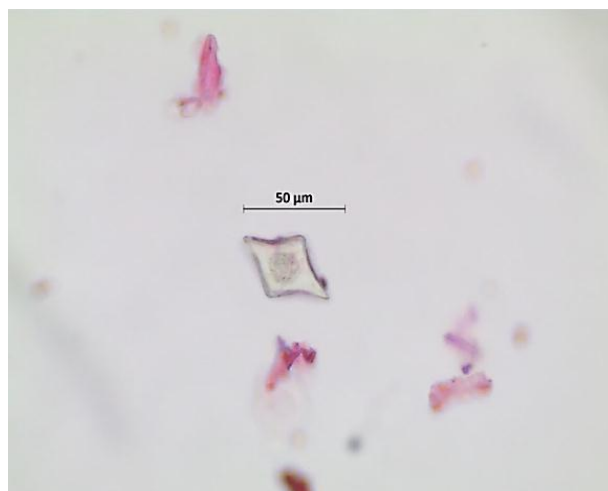
Phelloderm or secondary cortex is produced on the inner side of phellogen and they are made up of living cells.

### 3.3 Powder microscopy

The powder microscopy of *Kydia calycina* Roxb. shows the following parts.

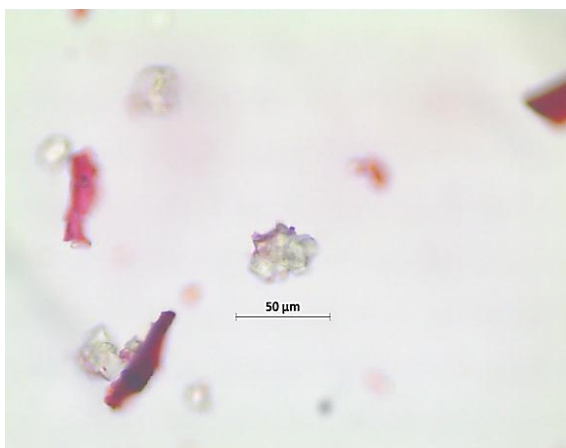


**Fig 7:** Red pigment

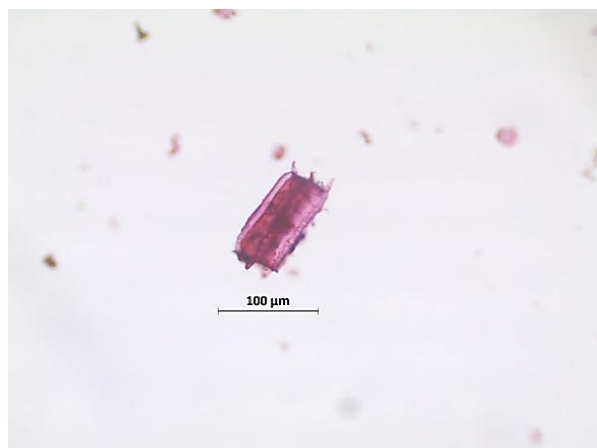


**Fig 8 :** Prismatic crystal of Calcium oxalate





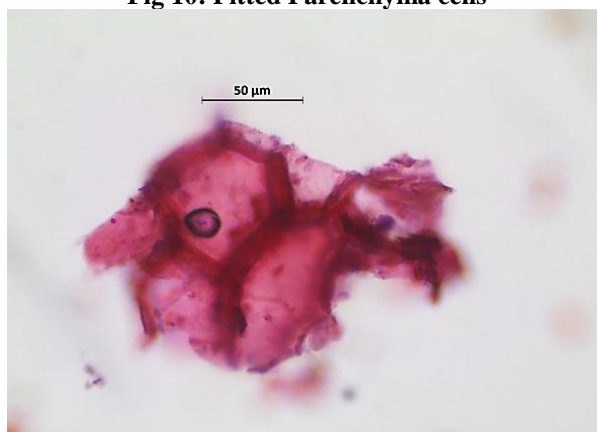
**Fig 9: Crystals of Calcium oxalate**



**Fig 10: Pitted Parenchyma cells**



**Fig 11: Cork cells surface view**



**Fig 12: Fragments of Cork cells surface view**



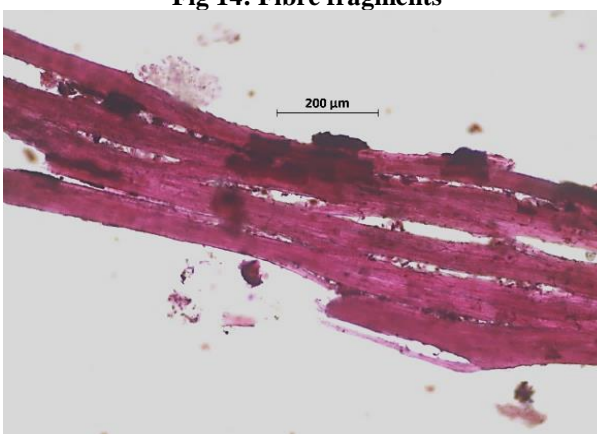
**Fig 13: Starch grains**



**Fig 14: Fibre fragments**



**Fig 15: Fibre fragments**



**Fig 16: Fibres**

### 3.4 Physicochemical Characters

Evaluation of identity, quality and purity is of prime importance to assure the safety of the drugs. Various parameters like solvent extractive values, moisture content, ash values etc can be used to establish the identity and quality of the plant drug. Determination of ash values is significant as it helps in detecting low grade products and exhausted drugs. Ash value mainly increases with adulteration and contamination. Insufficient drying may sometimes lead to enzymatic deterioration of active constituents therefore determination of moisture content is another important parameter to be assessed. Details of physicochemical properties were given in table 2.

**Table 2: Physicochemical evaluation of *Kydia calycina* Roxb.**

PARAMETER	VALUE (%W/W)
Moisture content	2
Total ash	9.2
Acid insoluble ash	3.4
Water soluble ash	2.1
Water soluble extractive value	2
Alcohol soluble extractive value	6
Mucilage content	1
Swelling index	1 ml

### 3.5 Phytochemical studies

Preliminary phytochemical screening was carried out by Successive solvent extraction. The solvents used for extraction ranges from non polar to polar range. Colour, consistency, and the average value of each extract are given in table 3.

**Table 3: Colour, Consistency and yield of each extract.**

SOLVENT	COLOUR & CONSISTENCY	AVERAGE VALUE OF EXTRACT (%W/W)
Petroleum ether	Brown Colour, Semisolid	2.1
Benzene	Dark brown colour, Sticky semisolid	2.7
Chloroform	Brownish-black, Solid	1.2
Acetone	Brown colour, Solid	0.6
Ethanol	Yellowish brown colour, Solid	1.5
Water	Brownish-black, Solid	2.3

Phytochemical analysis was performed by various qualitative chemical test and shows the presence of alkaloids, flavanoids, carbohydrates, phenolic

compounds and tannins, mucilage, phytosterols, fixed oils and fats.

**Table 4: Phytochemical tests in different extracts.**

Test	Petrol-eum Ether	Benzene	Chloroform	Acetone	Ethanol	Water
Alkaloids	-	-	+	+	+	+
Carbohydrate	-	-	-	-	-	+
Phytosterols	+	+	-	-	-	-
Fixed oils & fats	+	+	-	-	-	-
Saponins	-	-	-	-	-	-
Phenolic compounds & tannins	-	-	-	+	+	+
Proteins	-	-	-	-	-	+
Mucilage	-	-	-	-	-	+
Flavonoids	-	-	-	-	+	+

Qualitative chemical tests shows that petroleum ether and benzene extract shows the presence of phytosterols, fixed oils and fats. Chloroform extract shows the presence of alkaloids only. Acetone extract shows the presence of alkaloids, phenolic compounds and tannins. Alkaloids, phenolic compounds, tannins and flavanoids are present in ethanol extract. And alkaloids, carbohydrates, phenolic compounds, proteins, mucilage and flavonoids are present in aqueous extract.

### 4. CONCLUSION

On the basis of results obtained from the present study, it is concluded that the plant *Kydia calycina* Roxb. shows the presence of various phytoconstituents like flavonoids, alkaloids, carbohydrates, phytosterols, fixed oils and fats. Also pharmacognostical and physicochemical characters of the bark was also determined.

## 5. ACKNOWLEDGEMENT

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## 6. REFERENCES

1. Goyal PK, Jeyabalan G.A. A comprehensive review on pharmacological properties of *Kydia calycina*. *International Journal of Pharmacognosy*, 2020; 10: 11.
2. Smith, E.E., Jr. 1971. Preparing Herbarium Specimens of Vascular Plants. U.S.D.A. Agriculture Information Bulletin No. 348. Washington, D.C
3. Jadhao AB, Bhadage DG. Physio-Chemical and Anatomical Characterization of *Kydia calycina* Roxb. (Malvaceae). Stem and Leaf. *International Journal of Science and Research*, 2005; 4: 32-5.
4. Pandey A, Tripathi S. Concept of standardization, extraction and pre phytochemical screening strategies for herbal drug. *Journal of Pharmacognosy and Phytochemistry*, 2014; 2(5): 115-9.
5. Khandelwal K.R. Practical Pharmacognosy techniques and experiments. Nirali Prakashan, 8th Edition, 2001.
6. Kokate CK., In, Practical pharmacognosy. Vallabha Prakashan, New Delhi, 103-107.