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Pharmacognostical and Phytochemical Studies on *canthium Angustifolium* Roxb Leaves

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ABSTRCT

The present studies deals with the macroscopical, microscopical, pharmacognostical and phytochemical evaluation on the leaves of *Canthium angustifolium* Roxb Fam: Rubiaceae. The leaves of the plant is used as anti-inflammatory and the roots as anticephalgic. The Macroscopical evaluation of the leaf powder shows the presence of epidermal cells, xylem vessels, trichomes, starch grains and starch prisms. The total ash, acid insoluble ash and water soluble ash content was found to be 5.736 %, 0.94 %, 5.31 % respectively

Keywords: Micro-scopy, Macroscopy, *Canthium angustifolium* Roxb, Fam: Rubiaceae

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INTRODUCTION

Pharmacognosy is the study of the structural, physical, chemical and sensory characters of crude drugs of animals, plants and mineral origin. The search for biologically active compounds from natural source has always been of great interest to researchers looking for new source of drugs useful in infectious diseases. Higher plants have played a vital role as the source of important therapeutic agents. Only a small percentage of higher plant species have so far been exploited and much remains to be done. Standardization of natural products is a complex task due to their heterogeneous composition, which is in the form of whole plant, plant parts or extracts obtained thereof. To ensure reproducible quality of herbal products, proper control of starting material is utmost essential. The first step towards ensuring quality of starting material is authentication. Thus, in recent years there has been a rapid increase in the standardization of selected medicinal plants of potential therapeutic significance. Despite the modern techniques, identification of plant drugs by Pharmacognostic studies is more reliable. According to the World Health Organization, the macroscopic and microscopic description of a medicinal plant is the first step towards establishing the identity and the degree of purity of such materials and should be carried out before any tests are under taken. Pharmacognosy, in recent years has gained immense importance as it is an efficient tool for the authentication and identification of plant raw materials and therefore evaluation of pharmacognostic parameters is an indispensible step when dealing with herbal drugs [1]. *Canthium angustifolium* belongs to family Rubiaceae commonly known as narrow leaved canthium is a large shrub distributed in India[2.]

MATERIALS AND METHOD

Plant material

The plant material was collected from Cheruvandoor, Kerala and taxonomic identification of sample was confirmed by C.M.S College, Kottayam (Voucher specimen no: 274). The fresh parts of plant were used for microscopic studies. The leaves were separated, dried, coarsely powdered passed through sieve no. 40 and stored in a closed container for further studies. Macroscopic and microscopical characters were studied as described in quality control method. Thin projection microscope photograph at different magnification were taken by using Nikon digital camera.

Macrosopy

Various characteristic - features of fresh leaves such as type of leaf base, presence or absence of petiole and characters of lamina (venation, margin, apex, base, surface and texture)were studied.

Microscopy

Thin transverse sections of leaflet was taken, stained with dilute safranin and mounted in glycerin, then observed under binocular and projection microscope using Nikon digital camera 12 megapixel. Powder of the dried leaves was also evaluated microscopically.

Physicochemical evaluation

The quality of the leaves was assessed by determining the proximate parameters like ash content, extractive values and loss on drying using standard Pharmacopoeialmethod.[3]

Qualitative chemical test

The total ethanolic extract of *Canthium angustifolium* Roxb leaves (TEE) was analyzed for the presence of various phytoconstituents and thin layer chromatographic analysis according to the standard methods[4,5].

Figure1: Leaves of *Canthium angustifolium* Roxb

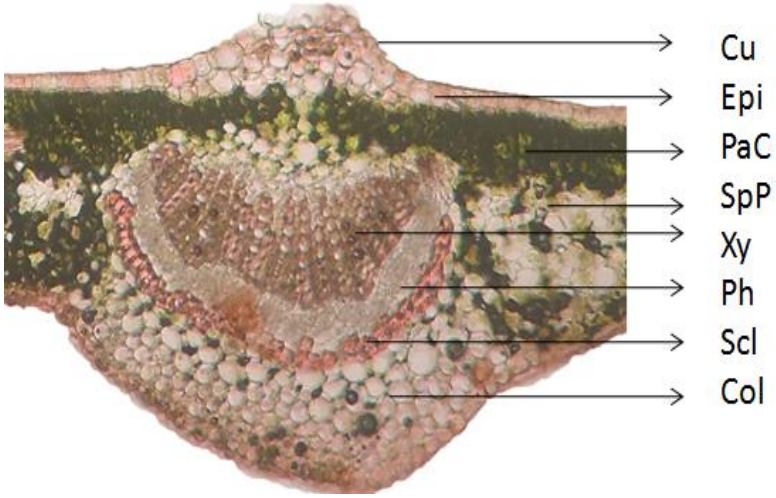
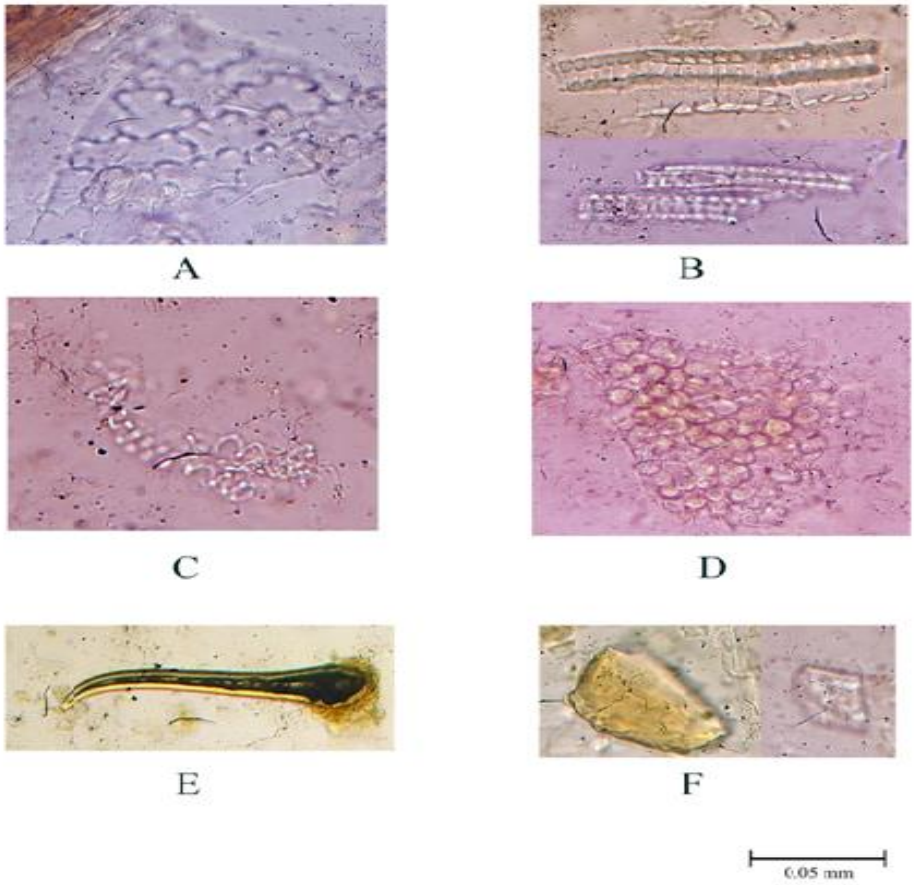


Figure 2: transverse section of the leaf

Abbreviations

Cu- Cuticle, Epi- Epidermis, PaC- Palisade cells, SpP- Spongy parenchyma, Xy- Xylem, Ph- Phloem, Scl- Sclerenchyma, Col- Collenchyma



A- Epidermal cells, B & C - Fragments of xylem vessels, D- Group of starch grains, E- Trichomes, F- Starch prizams

Figure 3: Powder microscopy leaves showing epidermal cells, fragments of xylem vessels, starch grains, trichomes and starch prisms.

RESULTS AND DISCUSSION

Macroscopy

Leaves on the youngest shoot in single, 4.5-9cm in length and 2-4cm in width, opposite pairs; on the older branches fascicled, all are short petioled, lanceolate, entire, long, taper-pointed, firm and polished.

Microscopy; Transverse section of leaf

Transverse section of the leaf shows two major portions; central midrib region with vascular tissues. Laminar region present on either side of the midrib. Tissue arrangement in the laminar portion of the leaf shows the leaf as dorsiventral leaf. Cuticle is the outermost layer of the leaf

made up of cutin, chitin, suberin and cellulose. This layer provides protection from invasion of insects and other microbial growth. Just beneath cuticle is epidermis, made up of layer of cylindrical to oval isodiametric cells intercepted with stomata, incidence of stomata is more on the lower portion of the leaf. Upper portion of the midrib just below the epidermis is made up of 3- 4 layer of parenchymatous cells without intercellular spaces. This layer is followed with 3-4 layers of closely arranged collenchymatous cells loaded with chlorophyll which extends on both sides of the lamina upto the palisade cells. Xylem occupies the upper portion followed with phloem at the bottom. This is collateral type of arrangement. Xylem vessels are arranged in alternate rows between xylem parenchyma and xylem fibres and are larger near the top and narrow towards phloem, entire xylem portion appears as red due to the presence of lignocelluloses and xylose (a pentose).Phloem succeeds xylem from the top. In between xylem and phloem there is a layer of meristamatic cells always invisible called cambium. Phloem appears white in colour made up of phloem vessels (sieve tubes, sieve elements) and companion cells. Beneath phloem a layer of sclerenchymatous cells present in red colour and appears like a necklace made up of beads. Upper epidermis is succeeded with closely arranged cylindrical pillar shaped palisade. Parenchyma cells loaded with chlorophyll. Loosely arranged spongy parenchyma cells are seen in between lower epidermis and palisade parenchyma.

Powder microscopy of leaves

Powder microscopy of the leaf powder showed the presence of fragments of xylem vessels, epidermal cells, starch grains, trichomes and starch prisms.

Physicochemical analysis

The values obtained for ash content (total ash, acid insoluble, water soluble ash), loss on drying and extractive values for leaves are summarized in Table 1.

Table1: Physicochemical parameters

Physicochemical parameter	Mean ±SD(%w/w)
Total ash	5.736±0.23
Acid insoluble ash	0.94±0.13
Water soluble ash	5.31±0.006
Alcohol soluble extractive value	3.834±0.051
Water soluble extractive value	4.88±0.03
Loss on drying	11.704±1.21

Phyotochemical analysis

The result obtained for the chemical tests for phytoconstituents and TLC analysis of TEE of *Canthium angustifolium* Roxb are tabulated in table 2 and 3.Phytochemical analysis of the TEE

of *Canthium angustifolium* Roxb revealed the presence of alkaloids, phenolics, tannins, flavanoids, steroids, saponins and reducing sugars and the TLC analysis showed the presence of alkaloids, flavanoids, tannins and phenolics

Table 2: Chemical tests

Sl no.	Phytoconstituents	Chemical test	TEE
1	Alkaloids	Mayer's test	+++
		Hager's test	+++
		Wagner's test	+++
		Dragendorff's	+
2	Phenolics &Tannins	Ferric chloride	+++
		Lead acetate	+++
3	Flavanoids	Aqueous NaOH test	+++
		Shinodatest	-
4	Steroids	Salkowski's test	+++
5	Reducing sugars	Benedict's test	+++
		Fechling's test	+++
6	Saponins	Foam test	+++

Table3: TLC analysis of TEE

Solvent system	TEE	
	No. of spots	R_f values
Toluene: ethyl acetate (7;3)	3 yellow spots	0.38, 0.62, 0.81
Ethyl acetate: formic acid: glacial acetic acid: water (100:11:11:2.7)	1 yellow spot	0.45
Toluene: ethyl acetate: diethylamine (7:2:1)	1 green spot	0.56
Toluene: methanol (86:14)	1 green spot	0.88
Ethyl acetate: methanol: water(100:13.5:10)	1 yellow spot	0.17
Chloroform: ethyl acetate: formic acid(2:2:0.8)	1 green, 1 yellow spot	0.39, 0.23

CONCLUSION

Plants serve as a classic source of various phytoconstituents that exhibit varied pharmacological action. Thus, proper identification and authentication of the plant raw material becomes a necessity before its intended use as a drug, individually or as an ingredient in formulation. In the same context, the present study involves the evaluation of pharmacognostic parameters and qualitative chemical tests and TLC studies of leaves of *Canthium angustifolium* Roxb which may ensure its quality, purity and authenticity. Thus, findings of this study could be useful for the compilation of a monograph in suitable pharmacopoeia for its proper identification and quality control.

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