

Pharmacognostic Studies of *Cadaba trifoliata* Roxb. (Capparaceae) Leaves

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ABSTRACT

Cadabatrifoliata Roxb. is a rigid wiry unarmed shrub. Leaves are palmately trifoliata and the leaflets are oblong and is belongs to Capparaceae family. The study was aimed at establishing pharmacognostical profile for the leaves of *Cadabatrifoliata* Roxb. Establishment of pharmacognostical profile of the leaves helps in standardization. The present study deals with pharmacognostical examination of morphological and microscopical characters of *Cadabatrifoliata* Roxb. leaves including determination of leaf constants, ash values, extractive values, loss on drying and powder microscopy. This paper brings out the expatiate information of *Cadabatrifoliata* Roxb.

Key words: -*Cadabatrifoliata* Roxb (capparaceae), Pharmacognostical studies, vernacular names, Uses

INTRODUCTION

Cadabatrifoliata Roxb (capparaceae) is an evergreen forest plant, and is a rigid wiry unarmed shrub with hairy shoots, smooth grey-brown bark. The roots are deep rooted and tap rooted. The wood is white, turning yellow on ageing, moderately heavy, slightly twisted, grained and coarse textured. Leaves are lanceolate, oblanceolate, and oblong, palmately compound having alternate leaf arrangement having rough surface and green colour. Flowers are yellowish-white in colour with hermaphrodite type with cluster flowers. Seeds are numerous and the fruit is a true fruit.

Synonym^{1,2,3,4}: *Stromeriatrifoliata*, *Cadabatriphylla*

Taxonomy:-

Kingdom: *Plantae*
Subkingdom: *Viridaplantae*
Phylum: *Tracheophyta*
Subphylum: *Euphyllophytina*
Class: *Magnoliopsida*
Subclass: *Rosidae*
Order: *Brassicales*
Suborder: *Capparineae*
Family: *Capparaceae*
Genus: *Cadaba*

Specific epithet: *trifoliata*- Wight & Arn.

Botanical name: - *Cadabatrifoliata* Wight & Arn.

Description: It is an evergreen forest plant, grows about 5-10m on dry or plain land. The plant grows at an altitude of 120m which needs an average rainfall of 300-1300mm. It grows in dry and hot climatic conditions at 15-40°C.

Vernacular names of *cadabatrifoliata*: Chemical constituents^{7,8,9,10}:-

The leaf contains alkaloids, tannins, glycosides, phenolic compounds, steroids, flavonoids. It also

contains betains (prolinebetaine and 3-hydroxy prolinebetaine). The ash contains alkaline chlorides, sulphates and carbonates.

Uses¹¹:

1. Decoction of leaves is given as anti-helminthic for round worms.

2. Decoction of leaves is combined with castor oil and turmeric and found useful in amenorrhoea and dysmenorrhoea.

3. The leaves are given as purgative, anti-syphilitic, anti-phlogistic, anti-rheumatic, and anti-bacterial.

4. Juice of *Cadabatrifoliata* is given in dyspepsia in children.

5. Used as Emmenagogue.

Commercial uses¹¹: Wood of *Cadabatrifoliata* in the form of timber is used for Turnery work.

MATERIALS AND METHODS

Collection of plant: The leaves of *Cadabatrifoliata* were collected around Talakona forest area of Chithoor district.

Authentication: The plant was authenticated by Mr. Dr.K.MadhavaChetty, Assistant professor. Dept of Botany Sri Venkateshwara University, Tirupati

Pharmacognostic study: Macroscopical studies: The morphological studies of leaves such as colour, size, odour, taste, were carried out and reported.

Microscopical characteristics of leaf^{12,13}

1. A part of the leaf passing through midrib was cut.

2. Watch glass was taken with small amount of water and the section was placed in it with the brush.

3. The section was washed with little amount of water.

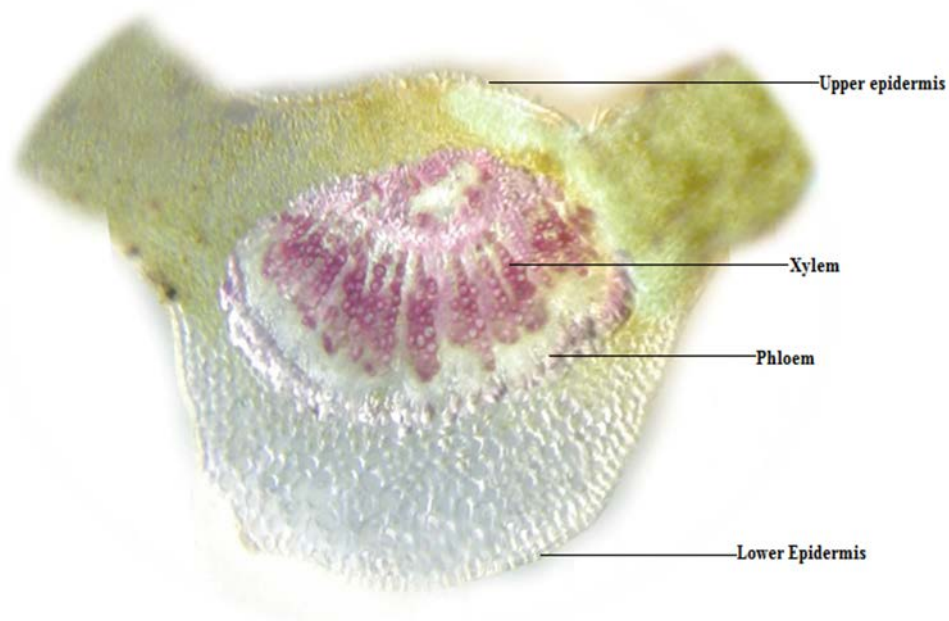
4. Staining was done by using dil. HCl and Phloroglucinol. They were mounted on slide in glycerin and studied under microscope.



Cadabatrifoliata Roxb

Vernacular names of *Cadaba trifoliata*^{5,6}

S. No.	Language	Vernacular name
1	Arabic	Asal, Sarah
2	English	Indian cadaba
3	Tamil	Purna, Velivi, Villuttu, Viluthi, Manudukurundu.
4	Telugu	Chikondi, Mallaguru, Chekonadi, Chimurundu, Nallagara, KoriChikondi, Peddasiva-konita.



Transverse section of *Cadabatrifoliata* leaf

Diameter of starch grains

Parameter	Minimum	Average	Maximum
Diameter (starch grain)	11.8 μ	41 μ	54.4 μ

5. Microphotographs of sections were documented using microscope with camera.

Powder examination: Slide for powder microscopy was prepared for determination of powder characteristics of leaf.

Determination of diameter of starch grains¹³:

1. An eye piece micrometer was calibrated using a stage micrometer.

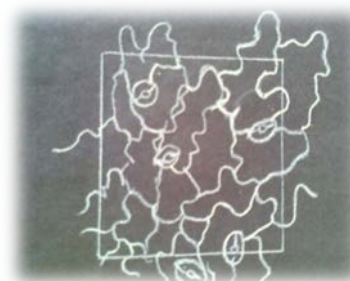
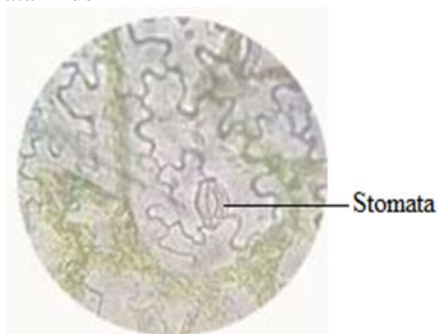
2. A little quantity of crude dry powder was mounted in lactophenol. A drop of dilute Iodine solution was added.

3. The diameter of isolated starch grains were measured by focusing on scales of eye piece of micrometer.

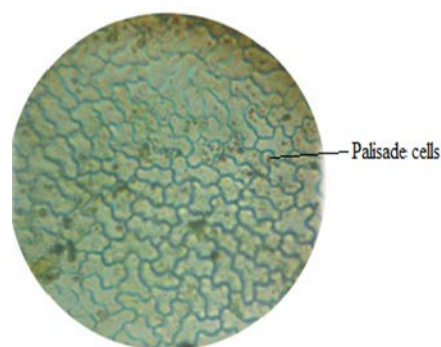
Quantitative Microscopy of *Cadabatrifoliata* leaf

Parameter	Range
Stomatal index	9-11-14
Palisade ratio	13-14-16
Vein islet number	6-8-9
Vein-let termination	5-6-7

Stomatal index



Stomata cells



Stomatal index



Palisade cells

Vein termination:

Preliminary phytochemical screening

S.No	Chemical Constituents	Water extract (Maceration)	Alcoholic extract (soxhlation)
1	Alkaloids	--	+
2	Glycosides	+	+
3	Tannins	+	+
4	Flavonoids	--	+
5	Phenolic acids	+	--
6	Steroids	+	+

(+) = Present (-) = Absent

4.The numbers of divisions covered by starch grains were noted.

5.The dimensions of 50 starch grains were calculated, the divisions were multiplied by Calibration factors.

6.The average value was calculated and ranges of starch grains were given.

Leaf constants¹³: Leaf constants such as stomatal number, stomatal index, Palisade ratio, Vein-islet number, vein-let termination number for the leaf of *Cadabatrifoliata* were performed according to the standard methods.

Proximate analysis¹³: Proximate analysis of the powdered drug such as total ash, acid-insoluble ash, water soluble ash, alcohol, water, chloroform and petroleum ether soluble extractive values and loss on drying (moisture content) for the leaf of

Cadabatrifoliata were performed according to the standard methods.

Preliminary Phytochemical Screening¹³: The powder of the air dried leaf of *Cadabatrifoliata* was extracted with different solvents like alcohol and water. The extracts were dried and percentage extractive value was determined. The dry extracts were screened for the presence of various phytoconstituents.

Determination of Crude Fiber by Dutch Method: Weighed 2 grams of powdered drug in a beaker and add 50 ml of 10% v/v nitric acid, heat to boil with constant stirring (till about 30 seconds after boiling starts). Strain through fine cotton cloth on a Buchner funnel and given washing to the residue with boiling water. (Suction may be used). Transfer residue from the cloth to a beaker. Add 50 ml of 2.5% v/v sodium hydroxide solution. Heat to boil, maintain 30 seconds at



Phytochemical screening

Proximate Analysis

S.NO	Parameters	% Yield
1	Total ash	12.5%
2	Acid insoluble ash	1.5%
3	Water soluble ash	6.5%
4	Alcohol soluble extractive	40.8%
5	Chloroform soluble extractive	28.2%
6	Ether soluble extractive	8%
7	Water Extractive	42.5%
8	Loss on drying	27.86%
9	Crude fiber content	35%

Flourescence analysis of *Cadabatrifoliata* leaf powder:

Reagent	Day light	Short wavelength	Long wavelength
Drug as such	Green	Pale green	Pale green
Toluene	Emerald Green	Dark green	Brownish green
Dil.HCl	Pale Green	Brownish green	black
5% FeCl ₃	Pale brown	Emerald green	Dark brown
Acetic acid glacial	Pale brown	Brown	Reddish brown
Iodine	Pale Green	Emerald green	Emerald green
Dil.HNO ₃	Green	Green	Dark green
Potassium-di chromate	Orange green	Dark green	Blakish green
1M Sulphuric acid	Pale Green	Green	Green
Methanol	Dark brown	Emerald green	Green
1M Sodiun hydroxide	Brownish green	Emerald Green	Blakish green
1M HCl	Light green	Pale green	Pale green
Dil. AMMONIA	Pale Green	Emerald green	Green
Ethanol	Green	Dark green	Blakish green

boiling point and stirred constantly. Strain and wash with hot water as mentioned earlier. For quantitative determination, transfer the residue in a cleaned and dried crucible. Weighed the residue and determine percentage crude fibers.

Fluorescence Analysis^{14,15}: Powder leaf part of *Cadabatrifoliata* was subjected to analysis under ultra violet light after treatment with various chemical and organic reagents. Three parameters were taken into account i.e long U.V (365nm), short U.V (256nm) and normal day light.

PROCEDURE

2gm of powdered drug sample was taken in a beaker and dissolved in 5ml of ethanol. The sample was transferred to a watch glass and observed under an U.V

chamber for color and fluorescence reported. Similar procedure and observations are reported with different chemicals such as 50% Sulphuric acid, 10% Sodium hydroxide and dil. Hydrochloric acid etc.

Behaviour of *Cadabatrifoliata* leaf powdered drug with different chemical reagents^{14,15}:

Powder leaf part of *Cadabatrifoliata* was treated with various chemical and organic reagents to observe their behaviour.

RESULTS AND DISCUSSIONS:

Macroscopy: Leaves are green in colour, having characteristic odour with acrid taste. Leaves are palmately trifoliate, often bifoliate. Leaflets are oblong or lanceolate,

Microscopical characteristics of leaf:-

Behaviour of *Cadabatrifoliata* leaf powdered drug with different chemical reagents

Reagent	Observation	Inference
powder+ Iodine	Black colour observed	Presence of starch
powder+ HgCl ₂	Blue colour observed	Presence of Alkaloids
powder+ Ammonia	No pink colour observed	Absence Of Cardiac Glycosides
powder+ AgNO ₃	No ppt formed	Absence of Protiens
powder+ Picric Acid	Colour change	Presence of Alkaloids
powder+ Water (shaking)	Foam not appeared	Absence of Saponins
powder+ conc H ₂ SO ₄	Black	Presence of starch
powder+FeCl ₃	Bluish black	Presence of tannins
powder+ Conc HNO ₃	Orange yellow	Presence of tannins

a) Transverse section of leaf:-The transverse section of the leaves showed

Lamina:Upper epidermis:Contains single layered rectangular cells covered with cuticle. Collenchyma was found beneath the epidermis, 4-8 rows of collenchymatic cells were observed, the cells are polygonal in shape.

Palisade was found beneath the upper epidermis, single layered, compact and readily elongated.

Spongy parenchyma consists of loosely arranged parenchymatous cells of 4-5 layers with intra cellular spaces.

Lower epidermis was identical to that of upper epidermis.

Xylem vessels are lignified annular to spiral.

Phloem: Non lignified, parenchyma were present.

Anisocytic or Cruciferous type of stomata was observed in both epidermal layers

b) Determination of diameter of starch grains:

Determination of Leaf constants:

Preliminary phyto-chemical screening:Preliminary phytochemical screening performed on extracts, which disclosed the presence of Alkaloids, Glycosides, Tannins, Phenolic acids and steroids in water extract and Alkaloids, Glycosides, Tannins, Flavonoids and steroids in alcohol extract.

Proximate analysis: The moisture content was found to be 27.86%, which was not so high as to facilitate bacterial growth.The other parameters help in evaluating the quality and purity of the drug.

Quantitative determination of some pharmacognostic parameters is useful for setting standards for crude drugs. The vein islet, and vein termination numbers and the other parameters determined in the quantitative microscopy, are relatively constant for plants and can be used to differentiate closely related species. The physical constant evaluation of the drugs is an important parameter in detecting adulteration or improper handling of drugs.

CONCLUSION

The detailed pharmacognostic studies of *Cadabatrifoliata* leaves like microscopical studies have given clear detailed information regarding the various cell characters and various constants.

Transverse section of leaf showed distinct lamina and midrib region. The phytochemical screening of leaf extracts revealed the presence of tannins, alkaloids, glycosides, flavonoids, steroids and phenolic compounds and is useful for detecting the adulteration.

Proximate analysis i.e Total ash, Acid insoluble ash, Water soluble ash, Alcohol soluble extractive, Chloroform soluble extractive, Ether soluble extractive ,Water Extractive, Loss on drying values were recorded which may serve as standard.

After the present investigation, the pharmacognostical studies of the leaves of *Cadabatrifoliata* provided a set of qualitative and quantitative parameters, these can be helpful for the identification of quality & purity of the drug for further studies.

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