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# PRELIMINARY PHYTOCHEMICAL AND PHARMACOGNOSTICAL STUDIES ON *CAPPARIS SEPARIA* L.

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## ABSTRACT

The field of Pharmacognosy is an important link between pharmacology and medicinal chemistry. As a result of rapid development of phytochemistry and pharmacological testing methods in recent years, new plant drugs are finding their way into medicine as purified phytochemicals, rather than in the form of traditional galenical preparations. The root of *Capparis separia L.* is accredited with febrifugal and tonic properties: also found useful for skin troubles. The present paper deals with macroscopic, microscopic, fluorescence analysis, preliminary phytochemical and pharmacognostical analysis of *Capparis separia.* Catechin is predominately present in the all the extracts.

## INTRODUCTION

Traditional healing arts are generally based on a single medicinal plant drug or multiple drugs. In such circumstances the medicinal plant used for the preparation of a drug should be authentic and genuine. The formulae used in some Ayurvedic and Siddha drug preparations are taken even from palm - leaf manuscripts. The consumers should be assured of the quality of the drugs. Hence scientific methods of standardization are needed to confirm the authenticity of medicinal plants used in the preparation of a drug. To standardize or to evaluate a crude drug means to identify it and to determine its quality and purity. The identification of a crude drug can be established by actual collection of the drug from a plant. Quality refers to the intrinsic value of the drug that is the amount of medicinal principles or active constituents present. The evaluation or standardization of a crude drug involves pharmacognostic methods. The present study has reported pharmacognostic studies on *Capparis separia.* The medicinal plant *Capparis separia* L. (Family: Capparaceae) commonly is called as Sengaththari and Kattukathiri in Tamil. It is climbing and scrambling prickly shrub of the dry lands. Root of *Capparis separia* L**.** has febrifuge and tonic properties and also found useful for skin troubles.[6 and 7]

## MATERIAL AND METHODS

The identified plant species was confirmed with Voucher specimen No: XCH 5090 available in the St. Xavier's College Herbarium, Palayamkottai, Tamil Nadu. The plant parts were soaked in 70% alcohol, free hand sections of the leaf, stem and root were taken for detailed microscopic observations and figures were drawn by following Johansen (1946) [5]. Dry powder of the leaf, stem and root was used for chemical analysis. Physico-chemical analysis was carried out as per standard procedure Anonymous (1966) [1]. The fluorescence analysis of the powder drug under Ultra Violet was done according to the methods described by Chase and Pratt [4.]. The preliminary phytochemical analysis was done by the methods described by Brinda *et al.,* 1981 [2].

## RESULTS AND DISCUSSION

### Macroscopic Studies

Much branched, erect, woody climber to 4 – 5 m: branchlets zig-zag, grey – pubescent. Leaves 1.5 – 2.5 x 0.5 – 0.7 cm: elliptic to suborbicular, thin-coriaceous, acute at apex; spines recurved, 4 – 7 mm. Flowers 1 cm; pedicel 1 cm. Sepals 4, ovate or orbicular, outer pair coriaceous, inner pair membranous. Petals 4, white, spathulate, hairy. Stamens 30 – 50, free: Gynophore 0.5 – 1 cm. Ovary ovoid, glabrous. Berry globose, 0.8 – 1cm across seeds 2 .

**Synonym:**

*Capparis incanescens DC.*

**Vernacular Names**

Sanskrit: Kakadani, Bengali: Kaliakara, Hindi: Kanthari, Marathi: Kanthar, Punjabi: Hiungarna Tamil: Karunjurai, Sengaththari and Kattukathiri, Telungu: Nallavuppi

**Microscopic Studies:**

**Stem:** The transverse section of the stem showed a single layer of compactly arranged epidermal cells, followed by a hypodermis of 3 to 5 layer of thin walled collenchyma cells. It was followed by many layered iso-diametric thin walled paranchymatous cortex. The endodermis which was distinct encloses by pericycle. Secondary vascular tissues were arranged in a ring. Secondary xylem was well developed. Narrow vessels occur in the wood. Secondary phloem occurred in patches above the secondary xylem. Pith is parenchymatous and large. The vascular tissue consists of separate fibres and arranged in short uniseriate row and rays are wide.

**Leaf:** In the dorsiventral leaf surface, epidermis is single layered, rectangular cells, distinct cuticle covering with uniseriate, multicellular glandular trichomes with blunt tips. Trichomes are usually 2 –6 celled long. In the lower epidermis few stomata are seen. In lamina the mesophyll cells consists of single layered compactly arranged radially elongated palisade cells. It is followed by few layers of spongy parenchyma with chloroplast. In the midrib an arc shaped vascular bundle occur in the center. Above the lower epidermis are made up of few layers of collenchyma cells. Rest of midrib filled with parenchyma. Vascular bundles are closed and xylem consists of groups of vessels, tracheids and parenchyma. Phloem has usual sieve tube tissue accompanied by large parenchymatous cells

**Root:** Transverse section of root showed irregular in outline. The outer zone of cork get peeled off consequent of secondary growth. This is followed by phellogen (1 to 3 layers) and secondary cortex (5 to 6 layers) whose cells contain abundance of starch grains. The cortex is consists of parenchymatous cells and endodermis indistinguishable due to secondary growth. The secondary phloem consists of sieve tube and phloem parenchyma. Secondary xylem occurring layer are in the centre. Vessels are scatterly arranged in the xylem.

**Fluorescence analysis:** The behavior of the powdered drug in different solution and their extracts towards ordinary light and U.V light were observed and the results were recorded in Table 1. It can be used as diagnostic tool for testing adulteration if any, under fluorescent light leaf showed different colour in various extracts.

**Quantitative determination:** The physico-chemical methods employed for determining the quality and purity of drugs. The determination of ash is useful for detecting low grade products, exhausted drugs which have been coated with chalk, lime or calcium sulphate. The physico – chemical parameters like total ash, acid soluble ash, water soluble ash, moisture content, extractive values were determined by standard methods and presented in Table 2.

**Preliminary Phytochemical Screening:**

The leaf, stem and root powders with various extracts subjected to preliminary phytochemical screening were presented in Table 3. Phytochemical screening extracts showed positive for phenol, tannin, alkaloid, amino acid, catachin and saponin in stem. Catechin is predominately present in the all the three different extracts.

The presence of the secondary metabolites could justify to some extent the traditional use of these plants against infectious diseases. Indeed phenol, alkaloids and saponin are known to posses antimicrobial properties (Bruneton 1993)[3].

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**Table 1: Fluorescence Analysis of Leaf, Stem, and Root powder of *Capparis separia* L.**

| S. No | Particulars of treatment | Plant part | Under visible light | Under UV light (365 nm ) |
|---|---|---|---|---|
| 1 | Powder+water | Leaf | Pale green | Green |
| | | Stem | Pale yellow | Light green |
| | | Root | Red | Light green |
| 2 | Powder + 1N NaOH | Leaf | Green | Dark green |
| | | Stem | Pale yellow | Yellowish green |
| | | Root | Red | Green |
| 3 | Powder + Acetic acid | Leaf | Yellowish green | Light green |
| | | Stem | Pale yellow | Pale green |
| | | Root | Light red | Light green |
| 4 | Powder + 1N HCl | Leaf | Light green | Dark green |
| | | Stem | Light yellow | Light green |
| | | Root | Light red | Light green |
| 5 | Powder +Conc.$HNO_3$ | Leaf | Dark brown | Dark green |

| | | | | |
|---|---|---|---|---|
| | | Stem | Light brown | Green |
| | | Root | Dark brown | Dark green |
| 6 | Powder +5% Iodine | Leaf | Dark brown | Dark green |
| | | Stem | Brown | Dark green |
| | | Root | Dark brown | Black |
| 7 | Powder +5% $FeCl_3$ | Leaf | Pale green | Green |
| | | Stem | Light yellow | Yellowish green |
| | | Root | Light red | Dark green |
| 8 | Powder + 1N $H_2SO_4$ | Leaf | Pale green | Green |
| | | Stem | Light yellow | Light yellowish green |
| | | Root | Light red | Pale green |
| 9 | Powder + Dil. ammonia | Leaf | Green | Green |
| | | Stem | Yellowish green | Green |
| | | Root | Red | Dark green |
| 10 | Powder + petroleum ether | Leaf | Pale green | Green |
| | | Stem | Light yellow | Yellowish green |
| | | Root | Light red | Pale green |
| 11 | Powder + benzene | Leaf | Pale green | Yellowish green |
| | | Stem | Light yellow | Pale green |
| | | Root | Light red | Pale green |
| 12 | Powder + chloroform | Leaf | Yellowish green | Green |
| | | Stem | Light yellow | Yellowish green |
| | | Root | Light red | Dark green |
| 13 | Powder + methanol | Leaf | Light green | Yellowish green |
| | | Stem | Light yellow | Yellowish green |
| | | Root | Light rose | Light green |
| 14 | Powder + acetone | Leaf | Light green | Green |
| | | Stem | Light yellow | Light yellowish green |
| | | Root | Light rose | Light green |

**Table 2: Comparative analysis of Physico-chemical characters of Leaf, Stem and Root of *Capparis separia* L.**

| *S.No* | *Particulars* | *Leaf w/w* | *Stem w/w* | *Root w/w* |
|---|---|---|---|---|
| 1 | Total ash | 11.55 | 3.45 | 3.55 |
| 2 | Water soluble ash | 8.70 | 2.90 | 2.60 |
| 3 | Acid insoluble ash | 3.80 | 1.50 | 2.60 |
| 4 | Moisture content | 53.33 | 61.94 | 78.57 |
| 5 | Water soluble extractive value | 36.16 | 10.48 | 12.80 |
| 6 | Alcohol soluble extractive value | 9.04 | 6.72 | 4.80 |

**Table 3: Preliminary Phytochemical analysis of leaf, stem and root extract of *Capparis separia* L.**

| S.No | Phytochemicals | Extract(s) | | | | | |
|---|---|---|---|---|---|---|---|
| | | Leaf | | Stem | | Root | |
| | | Ethanol | Water | Ethanol | Water | Ethanol | Water |
| 1 | Steroids | - | - | - | - | - | - |
| 2 | Triterpenoids | - | - | - | - | - | - |
| 3 | Reducing sugars | - | - | - | + | - | + |
| 4 | **Sugars** | + | + | + | + | + | + |
| 5 | Alkaloids | - | - | - | + | - | - |
| 6 | Phenolic compounds | - | - | + | - | + | - |
| 7 | Flavonoids | - | - | - | - | - | - |
| 8 | **Catechins** | + | + | + | + | + | + |
| 9 | Saponins | - | + | - | + | - | + |
| 10 | Tannins | - | + | + | + | + | + |
| 11 | Anthroquinones | - | - | - | - | - | - |
| 12 | Amino acids | - | + | + | + | + | + |

(+ indicates present - indicates absent)

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