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# Pharmacognosy of Cassia Alata Linn – leaves

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**ABSTRACT:**

*Cassia alata* Linn, Commonly known as semaiagathi in Tamil is well known for its various medicinal properties in Indian systems of medicine. Various parts of this plant are used as vermicide, astringent, purgative, expectorant and to treat skin diseases. The present work deals with the anatomy, quantitative microscopy, physical constants and fluorescence analysis of the plant leaves.

## INTRODUCTION

*Cassia alata* Linn. (Fam: Caesalpiniaceae) is a large handsome shrub with thick downy branches, found wild almost throughout India. Leaflets are 8-12 pairs, lower leaflet oblong-elliptic; upper ones broadly obovate. It is known as Ringworm shrub and winged senna in English; Dadrughna and Dvipagsti in Sanskrit; semaiagathi and Vandugolli in Tamil[1-2]. In India systems if neducube[3-5], the leaves of the plant are used as purgative, expectorant astringent, vermicide and to treat all skin diseases. Extracts of Cassia alata leaves have been reported to possess analgesic6, anti-bacterial [7-11], anti-inflammatory [12], fungicidal [13-17], hypoglycemic [18], laxative [19], and oxytocic [20] and wound healing activity [21] etc. Owing to its medicinal importances, the present investigation was carried out to standardize the leaves of *Cassia alata* by studying its pharmacognostical characters.

## MATERIAL AND METHODS

Fresh specimens of petiole and leaflets of *Cassia alata* were collected form Veil ore and Kanchipuram districts of Tamilnadu. Microtome sections were taken, stained with safranin and fast green and mounted as usual[22]. Quantitative values were determined according to the methods laid down by Kokate[23]. Physical constants such as total ash, acid insoluble ash, water soluble ash and alcohol, water soluble extractives were determined according to the methods given in Indian Pharmacopoeia[24]. Fluorescence analysis of the leaves was performed[25].

### Transverse section of Petiole

Petiole shows circular outline in T.S, with a small projection on the adaxial side with two wings, one on either side (Fig – A). single layered epidermis is composed of tangentially elongated, rectangular cells. Most of them support simple, non-glandular, unicellular, conical trichome. The epidermis is followed by 2-3 cells deep collenchyma,

subjacent to the sub-epidermal collenchyma lies 4-6 layers of parenchymatous zone and some of them contain tannin.

Vasculature exhibits a continuous ring of collateral vascular bundles accompanied by accessory bundles in the wings. Each wing contains one large and two smaller vascular bundles. Each vascular bundle is strongly supported by pericyclic fibres and is arranged as a cap on the adaxial side. These pericyclic fibres are externally accompanied by parenchyma cells containing solitary prisms of calcium oxalate crystals. The ground parenchyma cells are polygonal arranged without any intercellular spaces. Some of the parenchyma cells contain druses of calcium oxalate crystals.

**Transverse section of Leaflet**

**Lamina**

The lamina in transverse section reveals the dorsiventral structure. The adaxial epidermis is composed of rectangular, tangentially elongated cells. The palisade mesophyll is single layered and made up of columnar closely arranged cells and most of them contain tannin. The spongy mesophyll is 4-7 layered made up of oval to rotund chlorophyllous aerenchyma of various sizes and contain huge druses of calcium oxalate crystals. Vascular bundles in the vein region also capped by sclerenchymatous fibres. Numerous prismatic crystals are scattered adjacent to the fibres. The abaxial epidermal cells are papillose (Fig-B)

**Midrib**

Transverse section of midrib shows a very small projection on the adaxial side and convexity on the abaxial side. The adaxial and abaxial sub epidermal regions are made up of collenchyma cells. Palisade tissue is continues over the midrib region except the central small collenchymatous zone. A large collateral vascular bundle is situated in the centre and surrounded by a sclerenchymatous bundle sheath. The ground tissue is parenchymatous and some of these cells adjacent to the lower side of the bundle contain prisms of calcium oxalate crystals.

**Epidermis in surface view**

The adaxial foliar epidermis is composed of large pentagonal to heptagonal cells with slightly wavy walls (Fig –C). The abaxial foliar epidermis is composed of smaller cells with wavy margins. Numerous trichome bases are noticed (Fig –D). Both the epidermis are perforated by rubiaceous (paracytic) stomata but more in the lower surface.

**Trichomes**

Trichomes are unicellular, short with blunt ends and have small bulbous stalkcell (Fig-E).

**Quantitative Microscopy**

In quantitative microscopical studies, the following leaf surface data were determined and the results are given below.

a. Stomatal number

i) For upperepidermis: 14-16-17/mm2
ii) For lower epidermis: 20-21.5-23/mm2

b. Stomatal index

i) For upper epidermis: 23-25.5-27/mm2
ii) For lower epidermis: 30-31-33/mm2

c. Vein-islet number:3-4.5-6/mm2
d. Veinlet-termination number: 23-29.5-36/mm2
e. Palisade ratio: 5-7

**Physical constants**

a. Ash Values
i) Total ash – 7.84%
ii) Acid – insoluble ash-Nil
iii) Water soluble ash – 7.59%

b. Extractive values
i) Chloroform – 7.4%
ii) Alcohol – 5.8 %

**Fluorescence analysis**

Fluorescence characteristics of powdered leaf and extracts of drug were carried out and recorded in Table – 1 and 2.

**DISCUSSION**

Microscopical studies of leaf revealed the following diagnostic features. T.S. of Petiole shows two wings on either side of the adaxial surface and a ring of collateral vascular bundles accompanied by accessory bundles (one large and two smaller in the wings.

The presence of large collateral vascular bundle surrounded by sclerenchymatous fibres, cells containing tannin, paracytic stomata, cluster and prismatic calcium oxalate crystals, papillose lower epidermal cells and short non-glandular, unicellular) conical trichomes with bulbose base in the leaflet are important diagnostic features.

Various extracts and powder showed green and brown fluorescence in visible and short UV light (254nm) and red, green and brown fluorescence analysis, the plant can be identified, authenticated and differentiated from other related species.

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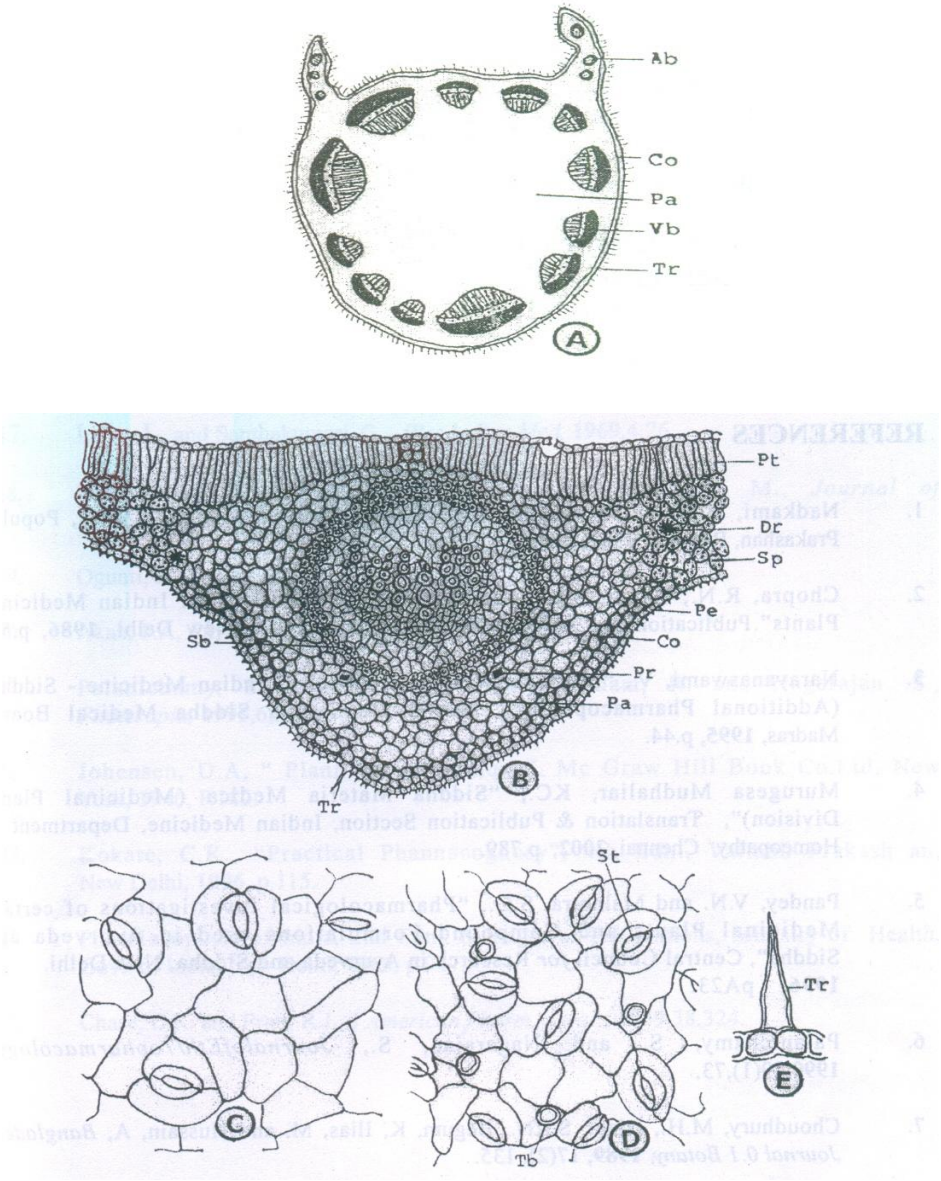
**Table – 1**
**Fluorescence characteristics of leaf powder of *Cassia alata***

| **Reagents** | **Visible light** | **Short UV light (254 nm)** | **Long UV light (366nm)** |
|---|---|---|---|
| Powder as such | Dark green | Brown | Brown |
| Powder + IN NaOH(aqu) | Dark green | Dark green | Red |
| Powder + IN NaOH(alc) | Brownish green | Green | Brownish green |
| Powder + 1 NHCI | Colourless | Pale green | Pale green |
| Powder + 50% H2SO4 | Pale green | Dark green | Green |

**Table – 2**
**Fluorescence characteristics of leaf powder of *Cassia alata***

| Extracts | Visible light | Short UV light (254 nm) | Long UV light (366nm) |
|---|---|---|---|
| Benzene | Brownish green | Green | Red |
| Chloroform | Brown | Dark green | Red |
| Ethanol | Emerald green | Emerald green | Red |
| Acetone | Emerald green | Emerald green | Red |
| Water | Pale green | Pale green | Pale green |

**FIGURE**



## ILLUSTRATION OF THE FIGURES

A. T.S. pf Petiole – A diagrammatic sketch
B. T.S. of leaflet
C. Adaxial foliar epidermis – Surface view
D. Adaxial foliar epidermis – Surface view
E. Trichome.

## ABBREVATIONS

| | | | |
|---|---|---|---|
| Ab | - Accessory bundle | Sb | -Sclerenchymatous bundle sheath |
| Co | -Collenchyma | Sp | - Spongy parenchyma |
| Dr | - Druses of calcium oxalate crystals | St | - Stoma |
| Pa | – Parenchyma | Tp | -Trichome base |
| Pe | – Papillose epidermis | Tr | - Trichome |
| Pr | – Prism of calcium oxalate crystal | Vb | - Vascular bundle |
| Pt | -Palisade tissue | | |

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