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Research Article

Quality Standards of Ringworm Cassia

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ABSTRACT

Ringworm Cassia is the commercial name of *Cassia alata* Linn. (Family – Leguminosae). Leaves of *C. alata* are used to cure ringworm – a fungal skin infection. They are also recommended as antibacterial, antiparasitic, antipyretic, anti-inflammatory, antineoplastic, etc. Generally leaves are marketed in dehydrated form for preparation of variety of products like, herbal tea, extracts, tinctures, herbal soaps and shampoos. To ensure the authenticity and quality of leaves of Ringworm Cassia, the pharmacognostic study is of utmost importance. In present work, for first time the pharmacopoeial standards are laid down for the said drug. Along with unique morphological features, the drug anatomically shows glandular trichomes and papillose lower epidermis. In microscopic study of powdered drug, epidermal cells with circular outlines of papillae become diagnostic characteristic. Along with these identifying characters, physicochemical constants are also of help in detection of drug impurities. Thus all these quality standards will prove to be useful in assessment of marketed crude drug. In addition to this, the phytochemical analysis exhibits presence of major secondary metabolites which can act as the indicators of bioactivity of the drug.

Key words: *Cassia alata*, Leaves, Pharmacognosy.

INTRODUCTION

Cassia alata Linn. (English: Ringworm shrub, Sanskrit: Dadrughna, Hindi: Dadmurdan) is an erect shrub growing up to 3-4.5 m in height. It shows large paripinnately compound leaves. The flowers are golden yellow in colour and appear in racemes. Pods are flat, dark brown with many seeds. The plant is cosmopolitan in distribution. It is found wild as well as the cultivated ornamental plant throughout India. [1,2] Various parts of *C. alata* are used for diverse healing actions. According to Ayurvedic literature leaves are sour and cure vata, cough and skin diseases. They act as antipyretic, anti-inflammatory, antineoplastic, diuretic, purgative, abortifacient and antidiabetic agent. The fresh leaves are squeezed, mainly applied for ringworm and also recommended for other infections such as eczema, scabies, leucoderma, blotch, sores, mycosis, etc. [2,3,4,5] Due to various medicinal properties, leaves are used in preparation of herbal formulations such as herbal tea, extracts, tincture, herbal soaps and shampoos. Usually dehydrated leaves of *Cassia alata* are marketed under the trade name 'Ringworm Cassia'. [4,6]

It is evident that, herbal products are often preferred over the synthetic ones but their credibility depends upon availability of genuine quality drugs. Herbal raw materials are always prone to contamination, deterioration or variation in composition. Their quality control is highly essential to ensure desired actions. The rationale behind pharmacognostic evaluation of leaves of Ringworm Cassia is to generate quality standards. These standards are not reported in previous literature. Therefore the present work includes study of botanical, physicochemical and phytochemical aspects of the drug. On the basis of these parameters, efficient quality control can be achieved easily for the said drug.

Fig.1 : Whole leaf of *C. alata*,

MATERIAL AND METHODS

The matured leaves of *Cassia alata* were procured from different regions of Thane district and Mumbai during flowering season of May to August. The botanical identity was confirmed using the standard herbaria at Blatter Herbarium of St. Xavier's College, Mumbai (Accession No. Blat. 15515). Leaves were subjected to artificial drying at 40°C. [7] They were ground into powder which was found to be moderately coarse as seivable through mesh no. 710 with 0.710 mm size of aperture [8]. The herbarium and voucher specimen of the

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Table No. 1 Microscopic Leaflet Constants

Sr. No.	Leaflet constants	Ranges
1.	Stomatal Number	
	• Upper epidermis	224-248-289
	• Lower epidermis	235-277-354
2.	Stomatal Index	
	• Upper epidermis	8.3-8.6-9.7
	• Lower epidermis	11.9-14.1-15.5
3.	Palisade Ratio	1 : 9-10
4.	Vein Islet Number	7-10-14
5.	Vein Termination Number	7-13-20

authentic drug were deposited at Research Laboratory, Botany Department, Dapoli Urban Bank Senior Science College, Dapoli (No. CA-01).

Table No. 2 Physicochemical analysis

Ash values	Total ash	w/w not > than 11.0%
	Acid insoluble ash	w/w not > than 1.0%
	Water soluble ash	w/w not > than 2.0%
Extractive values	Water extractive	w/w not < than 13.6%
	Alcohol extractive	w/w not < than 11.88%
	Chloroform extractive	w/w not < than 5.05%

Macroscopic study was performed for various parameters. [9] For microscopic inspection hand cut transverse sections of lamina and midrib were stained and made permanent. [10,11] Microscopic leaflet constants were determined with the help of portions of whole leaf cleared in chloral hydrate and surface preparations of epidermii. [9,12] In powder study, the drug was treated with aqueous solution of chloral hydrate and mounted in 50% glycerine for microscopic studies. [13,14] For physicochemical analysis, determination of ash values and extractive values were done as per the standard procedures. [15] In qualitative phytochemical screening, concentrated water, alcohol and chloroform extracts of the drug were tested for different chemical constituents. [16,17]

RESULTS

Macroscopically *Cassia alata* leaves are paripinnately compound, 26.3-36.8 cm in length and 19.0-23.2 cm in breadth. Each leaf consists of 10-12 pairs of leaflets. Distinct gland is present at the tip between the pair of leaflets. Leaflets are dark green, about 7.2-11.2 cm in length, 3.1-8.4 cm in breadth (size increases from base to apex of rachis), opposite, oblong-obovate, papery with asymmetrical base, entire margin, retuse apex and unicostate reticulate venation. The lower surface of leaflet is more pubescent than that of upper one. Taste and odour of leaflets are characteristic.

Anatomically leaflet exhibits a dorsiventral structure. Upper and lower epidermii are covered with unicellular nonglandular and multicelled glandular trichomes. They show presence of mucilage cells and stomata. Lower epidermis is distinctly papillose. Many epidermal cells contain prismatic calcium oxalate crystals and leucoplasts. Mesophyll is well differentiated into upper single layer of palisade and lower 4-5 layers of spongy tissue with few tannin cells. Vascular strands of lamina portion are poorly developed. They are covered by upper and lower patches of sclerenchyma cells. In midrib region underneath the upper epidermis hypodermis is present. It consists of 2-3 layers of collenchyma cells and 3-4 layers of chlorenchyma cells. This region is followed by 3-4 layers of sclerenchyma cells which surround the central vascular tissues. Xylem is arranged in the form of a ring in parenchymatous tissue. Phloem tissue is observed below xylem towards lower epidermis. Ground tissue is made up of compactly arranged parenchyma cells. They contain starch grains and prismatic

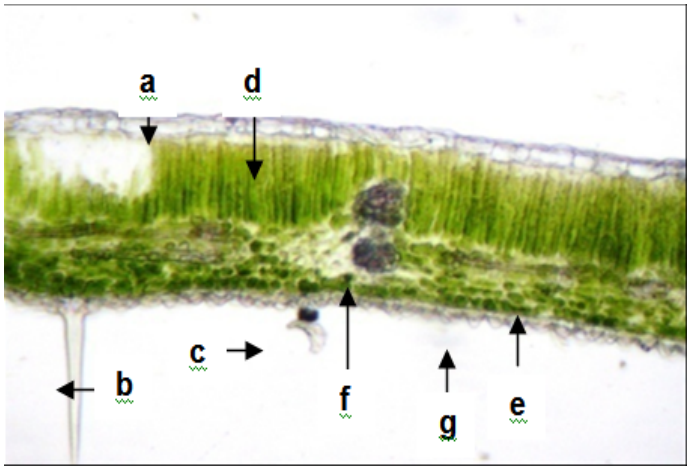

Fig.2 : T.S of Leaflet lamina (a – Upper epidermis, b – nonglandular trichome, c – glandular trichome, d – palisade layer e – spongy tissue, f – sclerenchymatous sheath, g – papillose lower epidermis)

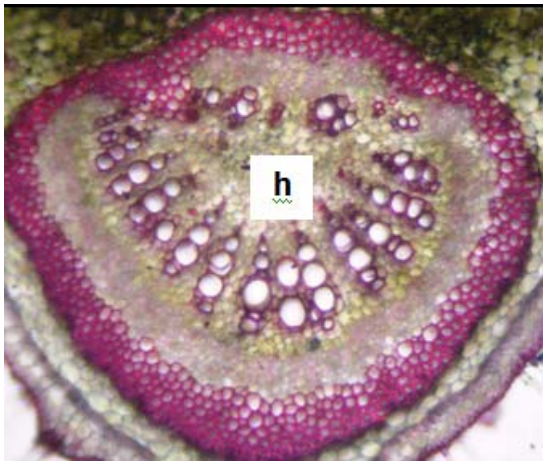

Fig.3 : T.S of midrib (h – xylem ring)

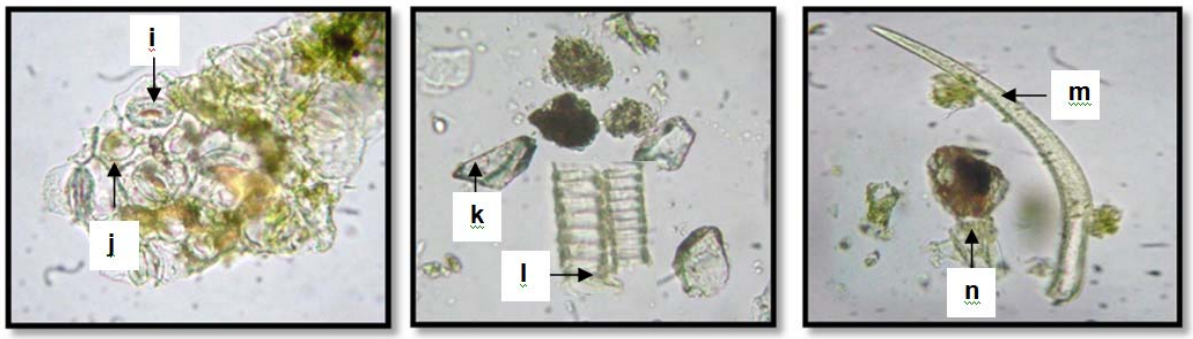

Fig.4, Fig.5, Fig.6 : Powdered elements (i - paracytic stomata, j - circular outline of papilla in epidermal cell, k - calcium oxalate crystal, l – annular vessel, m – nonglandular trichome, n – glandular trichome

calcium oxalate crystals. This region is separated from lower epidermis by 2-3 layers of collenchyma cells.

Powder is greenish yellow in colour and characteristic in taste and odour. In microscopic study, it shows nonglandular and glandular trichomes, tannin filled cells, sclerenchymatous fibres, annular and pitted vessels, prismatic calcium oxalate crystals, simple starch grains and leucoplasts. Among these, the most important diagnostic feature is paracytic stomata and lower epidermis cells with distinct outlines of papillae at the centre.

DISCUSSION

It is observed that in countries like India, Malaysia and Indonesia, leaves of *C. alata* are used as raw material in various herbal preparations. For judging authenticity and quality of whole as well as powdered drug of *C. alata*, pharmacopoeial standards are mandatory. These standards are lacking in the literature. Through present work, the noteworthy data of leaves is generated. This data is directly useful to the herbal product manufacturers. Macroscopic observations are helpful for the wholesale dealers in gross identification of the drug. Anatomical features like glandular trichomes, papillose lower epidermis and xylem ring along with leaflet constants are of significance in recognition of fragmented leaflets. Authentication of powdered drug can be done reliably on the basis of diagnostic characters of paracytic stomata and lower epidermal cell which shows circular outline of papilla at the centre. Physicochemical parameters of ash and extractive values are of help in detection of adulteration of pounded drug if any. In brief, all these findings are beneficial for efficient assessment of authentic and pure drug before its use. The pharmacognostic study also involved qualitative phytochemical screening. It revealed the presence of diverse types of phytochemicals namely, alkaloids, tannins, glycosides, steroids, terpenoids, flavonoids, saponins, etc. They are useful in prediction of pharmacological activity of the drug. Detailed phytochemistry and pharmacological studies of *Cassia alata* leaves are in progress and will be available in short period of time.

ACKNOWLEDGEMENT

Table No. 3 Qualitative phytochemical screening

Sr. No.	Phytoconstituents	Tests	WE	AE	CE
1.	Reducing	Fehling's test	+	+	+
	Sugars	Benedict's test	+	+	+
2.	Mucilage	Ruthenium red test	+	+	+
3.	Alkaloids	Wagner's test	+	+	+
		Dragendorff's test	+	+	+
		Mayer's test	+	+	+
4.	Tannins	$FeCl_3$ test	+	+	-
		Lead acetate test	+	+	-
5.	Cardiac glycosides	Kellar-Killani test	+	+	+
6.	Cyanogenetic glycosides	Guignard test	+	+	+
7.	Anthraquinone glycosides	Borntrager`s test	+	+	+
8.	Steroids	Lieberman-Burchard`s test	-	+	+
9.	Sterols	Conc. H_2SO_4 test	+	+	-
10	Terpenoids	Salkowski test	-	+	-
11.	Flavonoids	Shinoda test	-	+	-
12.	Saponins	Foam test	+	-	-

WE – Water Extract, AE – Alcohol Extract, CE – Chloroform Extract, '+' Present, '-' Absent

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