Journal of Pharmaceutical and Scientific Innovation
www.jpsionline.com
Review Article

PHARMACOGNOSTIC STUDY OF CASSIA TORA L.: A REVIEW
Rakesh Bansidhar Dubey *, Balaji Sopanrao Sawant
Department of Dravyaguna Vigyan, Smt. K.G.M.P. Ayurveda Mahaviyalaya, Maharashtra University of Health Sciences, Nashik, Maharashtra, India

*Corresponding Author Email: rakeshbdbue@gmail.com

DOI: 10.7897/2277-4572.04446

ABSTRACT
Cassia tora (C. tora) is a small shrub growing as weed in Asian and African countries. It is a known edible leafy vegetable taken up by Asians. It has been traditionally used in ringworm infection over the years. Leaflets and seeds are the primary parts used for medicinal purposes. Different parts of C. tora have found application in Indian and Chinese medicine. The medicinal effects are well documented in many publications. The present article is aimed to provide a broad overview of pharmacognosy, phytochemistry.

Keywords: Cassia tora, Pharmacognosy, Ayurvedic properties, Adulterations & Substitutes, Phytochemistry.

INTRODUCTION
Herbal medicines and food supplement industry has seen quite phenomenal growth in the recent years. India has a wealth of flora with hundreds of the plants possessing medicinal or curative properties. Despite this wealth, India has a small share in medicinal plants trade in the world market. This dismal condition is attributable to several factors including non-identification of bioactive molecules, lack of uniformity in cultivation, processing, storage, transport, extraction and formulation processes.

PLANT PROFILE
Cassia tora (C. tora) (sub-family: Caesalpinioideae; Family: Leguminosae/Fabaceae) is a small shrub which grows up in warm moist soil throughout the tropical parts of Asian and African countries. In Ayurvedic and Chinese medicine books, different medical usage is depicted (DESCRIBED) for different parts of C. tora plant. In traditional Ayurvedic and Chinese Medicine, its usage has been described as an antioxidant, antimicrobial, antihepatotoxic, antidiuretic, anti diarrhoeal and antimutagenic plant.

CLASSICAL NAMES
Chakramarda, Dadrughna, Edagaja, Meshalochana, Prapunnada, Chakri, Punnata, Padmaka.

VERNACULAR NAMES¹
- English - Foetid Cassia, Ringworm plant
- Hindi – Chakavd
- Marathi – Takla
- Gujarati – Kawario
- Punjabi – Chakunda, Panwar
- Rajasthani – Chakuada, Panwar.
- Bengali – Chakunda, Panwar
- Kannada – Taragasi, Gandutogache
- Malayalam –Chakramandarakam, Takara
- Tamil – Tagarai, Senavu

SCIENTIFIC CLASSIFICATION
Kingdom : Plantae
Division : Magnoliophyta
Class : Magnoliopsida
Subclass : Rosidae
Order : Fabales
Family : Fabaceac/ Leguminosae
Sub-family : Caesalpinioideae
Genus : Cassia
Species : tora

BOTANICAL DESCRIPTION
Annual herbs or undershrubs, 1-2m high. Leaves compound, paripinnate leaflets 3-pairs, ovate – oblong. Flowers bright yellow, usually in pairs, axillary. Pods long, slender, obliquely septic, 15-25cm long. Seeds rhombo hedral, green 25-30 in number. The plant bears flowers in the rainy season & fruits in the winter²

DISTRIBUTION
It is found as a weed throughout India ascending up to an altitude of 1550m in Himalayas, universally distributed in wild state in Himachal Pradesh, Bihar & Orissa, Bengal, Punjab, Rajasthan, on waste lands along side of Maharashtra, Karnataka & plains of Tamil Nadu².

PARTS USED
Leaf, Seed, Roots².

PROPAGATION & CULTIVATION
It can easily be propagated by seeds³.

TRADITIONAL USES
Both leaves & seeds constitute a valuable remedy in skin diseases. Seeds steeped in the juice of Euphorbia nerifolia and then made into
the paste with cow’s urine is an application to cheloid tumors; also useful in leprosy, psoriasis, etc., ground with sour buttermilk or lime juice and applied to ease the irritation of itch or skin eruptions. Root rubbed into paste with lime juice is a specific for ringworm, applied also for buboes in plague. Leaves are prescribed in decoction in 2 – ounce doses for children suffering from feverish attacks while vomiting; boiled in castor oil they are applied to foul ulcers; also inflammations caused by irritant substances. They are also used as poultice to hasten suppuration. It forms a warm remedy in gout, sciatica and pain in joints. In China, the seeds are used externally & internally for all sorts of eye diseases. Preparations are also given for liver complaints and boils6,7.

AYURVEDIC PROPERTIES

Rasa : Katu(pungent)
Guna : Laghu(lightness), Ruksha(dryness)
Veerya : Ushna(Hot)
Vipaka : Katu(pungent)
Dosaghnata : Kapha

ROGAGHANATA (Therapeutic uses)

Twakvikara (skin disorders), Dadru (ringworm), Vibandha (constipation), Gulma (tumor like growth), Krimi (worms), Arsha (haemorrhoids), Raktavikara (blood disorders), Hridaroga (heart diseases), Shwas (bronchial infections), Kaasa (cough), Medoroga (obesity), Aoupasargika roga(opportunistic infections)

DOSAGE

Leaf powder : 1-3gm
Seed powder : 1-3gm
Leaf juice : 5-10ml

SUBSTIUTES & ADULTERANTS

Cassia occidentalis Linn. is sometimes used as a substitute for Cassia tora on account of linguistic similarity in regional names. Cassia tora seeds are used as substitute for coffee8.

PHARMACOCGNOSY

MACROSCOPY OF LEAF

<table>
<thead>
<tr>
<th>Size</th>
<th>2.0-5.0cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shape</td>
<td>Lanceolate</td>
</tr>
<tr>
<td>Margin</td>
<td>Entire</td>
</tr>
<tr>
<td>Venation</td>
<td>pinnate veins, anastomosing towards margin</td>
</tr>
<tr>
<td>Apex</td>
<td>Acute</td>
</tr>
<tr>
<td>Base</td>
<td>Asymmetrical</td>
</tr>
<tr>
<td>Texture</td>
<td>Pubescent with press marking</td>
</tr>
<tr>
<td>Colour</td>
<td>Pale green yellowish green</td>
</tr>
<tr>
<td>Taste</td>
<td>Mucilaginous &amp; bitter</td>
</tr>
<tr>
<td>Odour</td>
<td>Faint</td>
</tr>
<tr>
<td>Attachment</td>
<td>Petiolate</td>
</tr>
<tr>
<td>Phyllotaxy</td>
<td>Opposite</td>
</tr>
<tr>
<td>General Appearance</td>
<td>Entire &amp; less broken</td>
</tr>
</tbody>
</table>

MICROSCOPY (Figure 1)10,11

The leaf is typically isobilateral, showing distinct differentiation in palisade and spongy tissue. The microscopy of the leaf reveals following anatomical features:

Upper epidermis

Single layered, few cells contain mucilage, epidermis is covered with cuticle.

Mesophyll

It is differentiated into palisade and spongy tissue. Palisade in Cassia tora leaves is present on both sides of spongy parenchyma and is made up of single layered, elongated, compactly arranged, thin walled chlorenchymatous cells which continues over midrib region only in case of upper palisade, lower palisade doesn’t continue in the midrib region. Spongy parenchyma are loosely arranged, thin walled parenchymatous cells with large intracellular spaces. This region shows presence of spheraphides. Lower epidermis: It is similar to the upper epidermis. Both the epidermii show presence of conical, unicellular, thick walled, covering trichomes.

Midrib

Midrib region shows presence of palisade parenchyma which is single layered. Crystal sheath, present on both dorsal and ventral side, made up of parenchymatous cells and containing calcium oxalate prisms. A sclerenchymatous sheath is present covering vascular bundle. The vascular bundle shows xylem towards the upper epidermis and phloem towards the lower epidermis. Towards the lower epidermis, midrib also shows presence of multi-layered, thick walled parenchyma cells containing cellulose. Surface preparation of the leaves also showed presence of paracytic stomata.

POWDER STUDY

Organoleptic characters

Colour: Grayish green to yellowish green
Taste: mucilaginous, extremely bitter
Texture: fine powder
Odour: faint, Characteristic
A few fragments of both upper and lower epidermii which are polygonal, paracytic stomata, unicellular trichomes, calcium oxalate crystals, prisms and fibres are observed.

PHYSICOCHEMICAL ANALYSIS

Loss on drying: 4.5%

Ash values

<table>
<thead>
<tr>
<th>Ash</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total ash</td>
<td>Not more than 9%</td>
</tr>
<tr>
<td>Water soluble ash</td>
<td>Not more than 6.5%</td>
</tr>
</tbody>
</table>

Extractive values

<table>
<thead>
<tr>
<th>Extractive value</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water extractive value</td>
<td>Not less than 15%</td>
</tr>
<tr>
<td>Alcohol extractive value</td>
<td>Not less than 35%</td>
</tr>
</tbody>
</table>

Preliminary phytochemical screening

5 gm of powder was cold macerated (24 hours) with 25 ml of distil water to obtain the test solution. This test solution was subjected to various chemicals to detect the presence of secondary metabolites.

<table>
<thead>
<tr>
<th>TEST</th>
<th>Aqueous Extract</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alkaloids</td>
<td>--</td>
</tr>
<tr>
<td>Steroids</td>
<td>--</td>
</tr>
<tr>
<td>Coumarins</td>
<td>--</td>
</tr>
<tr>
<td>Flavonoids</td>
<td>--</td>
</tr>
<tr>
<td>Tannins</td>
<td>--</td>
</tr>
<tr>
<td>Saponins</td>
<td>--</td>
</tr>
<tr>
<td>Cyanogenic glycosides</td>
<td>--</td>
</tr>
<tr>
<td>Cardiac glycosides</td>
<td>+++</td>
</tr>
<tr>
<td>Anthraquinone glycosides</td>
<td>--</td>
</tr>
<tr>
<td>Proteins</td>
<td>--</td>
</tr>
<tr>
<td>Amino acids</td>
<td>--</td>
</tr>
<tr>
<td>Mucilage</td>
<td>+</td>
</tr>
<tr>
<td>Sugars</td>
<td>+</td>
</tr>
</tbody>
</table>
CASSIA TORA - SEED

MACROSCOPY

Colour: shiny brown
Odour: bitter
Taste: bitter
Size: Length: 4 – 5 mm
Thickness: 1 – 2 mm
Shape: elongated, ovoid, and obliquely pointed
Texture: smooth

MICROSCOPY (Figure 2)\textsuperscript{10,11}

Testa:
(A) Outer Integument:
Epidermis: single layer, polygonal tabular cells with thin anticlinal walls filled with mucilage.
Sub–epidermis: one or two layers of cylindrical collenchyma

(B) Inner Integument:
Sclerichymatous layer: Longitudinally elongated, lignified sclerides, 120-190 μ long and 14 – 17 μ wide, thick walled, pitted, very small lumen.
Parenchymatous layer: One or two layers, thin, tangentially elongated, collapsed parenchymatous cells.
Pigment layer: single layer of flattened polygonal pigment cells with reddish brown contents.
Endosperm: Polyhedral, cellulosic parenchyma with oil globules and aleurone grains.
Aleurone grains: upto 20 μ in diameter with globoid crystals.
Cotyledon: Cells and cell contents are similar to endosperm.

POWDER STUDY

Organoleptic characters

Colour: Brown
Odour: Faint
Taste: Mucilaginous, bitter
Powder shows presence of yellow coloured sclerenchymatous fibres with pitted walls and narrow lumen, fragments of collenchymatous hypodermis and polygonal epidermis filled with mucilage, aleneone grains and fatty oil globules, few cells from pigment layer shows square cells with yellow mass.

PHYSICOCHEMICAL ANALYSIS

Loss on drying: 2%
Ash values

<table>
<thead>
<tr>
<th>Ash values</th>
<th>Limit (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total ash</td>
<td>Not more than 9%</td>
</tr>
<tr>
<td>Water soluble ash</td>
<td>Not more than 6.5%</td>
</tr>
</tbody>
</table>

Extractive values

<table>
<thead>
<tr>
<th>Extractive values</th>
<th>Limit (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water extractive</td>
<td>Not less than 30%</td>
</tr>
<tr>
<td>Alcohol extractive</td>
<td>Not less than 40%</td>
</tr>
</tbody>
</table>

Preliminary phytochemical screening

5 gm of powder was cold macerated (24 hours) with 25 ml of distill water to obtain the test solution. This test solution was subjected to various chemicals to detect the presence of secondary metabolites.

<table>
<thead>
<tr>
<th>TEST</th>
<th>Aqueous Extract</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alkaloids</td>
<td>--</td>
</tr>
<tr>
<td>Steroids</td>
<td>--</td>
</tr>
<tr>
<td>Coumarins</td>
<td>--</td>
</tr>
<tr>
<td>Flavonoids</td>
<td>++</td>
</tr>
<tr>
<td>Tannins</td>
<td>--</td>
</tr>
<tr>
<td>Saponins</td>
<td>--</td>
</tr>
<tr>
<td>Cyanogenic glycosides</td>
<td>++</td>
</tr>
<tr>
<td>Cardiac glycosides</td>
<td>--</td>
</tr>
<tr>
<td>Anthraquinone glycosides</td>
<td>+++</td>
</tr>
<tr>
<td>Proteins</td>
<td>++</td>
</tr>
<tr>
<td>Amino acids</td>
<td>--</td>
</tr>
<tr>
<td>Maculage</td>
<td>+</td>
</tr>
<tr>
<td>Sugars</td>
<td></td>
</tr>
</tbody>
</table>

PHYTOCHEMISTRY

Various types of phytochemical investigations have been carried out for Cassia tora. All of these investigations explored novel compounds from the plant which is summarized below: 3,5,8, 3',4', 5 – hexahydroxy flavone, hydroxycomarin, auraptenol, euphol, basseol, emodin, rhein, palmitic, stearic, linoleic acids, torosachrysone, questine, glucose, galactose, xylose, raffinose, two lactones – isotoracnone and cussialactone , naphtho – α- pyrone – torolactone, chrysophanol, physcion, emodin, rubrofusarin and chrysophanic acid -9-anthrone (seeds). methyl anthraquinone , emodin, triaccontan-1-ol, stigmasterol, β – sitosterol- β – D-glucoside, fridelin, palmitic, stearic, succinic, d-tartaric acid, uridine, myoinositol, d-aconititol, kaempferol, isoquercitin (leaves) kaemferol glucoside (flowers); amino acids, fatty acids, aloemodin, chrysophanol, emodin, rhein, and sitosterol;seeds and leaves/mericyl alcohol, chrysophanic acid, its 9-anthrone derivative, 8-hydroxy 3- methyl anthraquinone -1-β- gentiobioside, a naphtho – α- pyrene physcion, rubrafulsarain , its 6 β gentiobioidose , torolactone 1,3,5 – trihydroxy – 6,7- dimethoxy -2- methylanthraquinone, β- sitisterol, leucopelargonidin -3,0- α – L-rhamnopyranoside physcion, rubrofusarin & chrysophanic acid (roots)\textsuperscript{21,23}.

FORMULATIONS & PREPARATIONS

Dadrughni vati, Dadrugajendrasingh rasa, Madhyammanjishthadi kwatha, Brihatmarichayadi taila, Somraji taila, Trinaka taila, Kandarparsara taila, Mahatrinaka taila, Sarvatobhadra taila\textsuperscript{13,25}.

CONCLUSION

The Cassia tora plant is native plant of Indian subcontinent. The pharmacological activities reported in this is present review confirm that the therapeutic value of Cassia tora is very high having a leading capacity for the development of a new, safe, effective and cheaper drug in future, but more pharmacological investigations, clinical trials and public awareness for the best utilization of its medicinal properties is required. Hence, pharmaceutical companies should also come forward with new concepts and methods towards the best use of this potential medicinal plant.
REFERENCES


6. Atal CK & Kapur BM. Cultivation & Utilization Of Medicinal Plants, Regional Research Laboratory,CSIR, 1982 .Pg. 15, 394, 479


12. Prakash D, Prasad S. Pharmacognostical Studies on Cassia tora Linn.(Chakwad), Indian Journal Of Medical Research,Vol.6, 1971 pg.270-280


18. Pandey YN. Cassia seeds used as a drug in indigenous medical systems of India, Quarterly Journal Of Crude Drug Research, Vol.13(2), 1975 pg. 61-64


Source of support: Nil, Conflict of interest: None Declared