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REVIEW ARTICLE

Pharmacognostical Properties and their Traditional Uses of *Cassia tora Linn.*

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ABSTRACT

Cassia tora Linn. (Caesalpiniaceae) is a small annual herbs or under shrub growing as common weed in Asian countries in rainy season, the herbs 1.2 m in height. It is well know anthraquinone containing plant, constitutes of Ayurvedic preparation in India. In present review has been made emphasis on it traditional uses and properties and uses in management of various diseases in India and china.

Key words: *Cassia tora*, medicinal uses, pharmacognostical properties, chemical constituent.

INTRODUCTION

Medicinal plants are containing inherent active ingredients used to cure disease and relieve pain [24] . The traditional medicines and medicinal plants have been widely in most developing countries as therapeutic agents for the maintenance of good health [25]. The World Health Organization estimated that 80% of the populations of developing countries rely on traditional medicines, mostly derived from plant sources, for their primary health care needs [26]. Modern pharmacopoeia still contains at least 25% drugs derived from plants and many other synthetic analogues built on plants derived prototype compounds. Medicinal plants represent a part of the natural biodiversity endowment of many countries [24]. Interest in medicinal plants as a re-emerging health aid has been emphasized by the rising costs of prescription drugs in the maintenance of personal health and well being [27]. The use of medicinal plants in the industrialized societies has been traced for the extraction and development of several drugs and chemotherapeutics from these plants [28]. The medicinal properties of plants could be based on the antioxidant, antimicrobial, antipyretic, analgesic, astringent, cardiotonic, anti-inflammatory, diuretic effects of the phytochemicals in them [29].

The use of medicinal plants as raw materials in the production of new drugs is increasing day by day because of their potentials in combating the problem of drug resistance in micro-organisms. Research on medicinal plants is one of the leading areas of research globally. Although, there is a need to pay attention to the bioactivity-safety evaluation and conservation of medicinal plants. Some of the screening tests on medicinal plants are performed *in vitro*. The ultimate aim of the researcher is to use the medicinal plants to treat diseases in humans and animals [23]. Traditionally, herbs have been considered to be nontoxic and used for treating various problems by the general public ‘‘and/or’’ traditional medicine doctors worldwide. The need for effective conservative strategies for medicinal plants [24]. Medicinal plants contain physiologically active principles that have been exploited in traditional medicine for many years to treat various ailments. The drugs contained in medicinal plants are known as active principles [31].

Plants contain a wide variety of active principles [29,32]. There are several standard methods used for the phytochemical screening of medicinal plants. They are as described for alkaloids[33], steroids and phlobatannins[34], phenolics and flavonoids[35], saponins and cardiac glycosides[36], tannins. Methods for quantitative analysis of phytochemicals are as described for phenolics[38], flavonoids (Boham and Kocipal-Abyazan, 1974), alkaloid[33], saponins[40] and glycosides[22]. The most commonly encountered secondary metabolites of plants (phytochemicals) are saponins, tannins, flavanoids, alkaloids, anthraquinones, cardiac glycosides and cyanogenic glycosides. Demand for medicinal

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plants is increasing in both developing and developed countries and surprisingly. The bulk of the material traded from wild harvested sources on forest lands and only a very small number of species are cultivated[23]. The expanding trade in medicinal plants implicated on the survival of several plant species, with many under threat to become extinct. The medicinal plants need effective conservation strategies [24].

Cassia tora Linn. (Caesalpiniaceae) is a small annual herbs or undershrub growing as common weed in Asian countries. The plant is native to Southeast Asia, Fiji, Northern Australia, Africa and Latin America [4]. It is found as a weed throught India, universely in wild state in Himachal Pradesh, Bihar, Orissa. It constitutes an Ayurvedic preparation "Dadhughnavati" which is one of the successful antifungal formulations [18,19]. Ayuerveda Formulation of Cassia tora is Chakramadha Tailamu.

Morphological characters: The herbs 1.2 m in hight. It is an annual foetid herb. Leaves are compound, paripinate, up to 10 cm long rachis grooved, conical gland between each of two lowest pairs of leaflet, leaflets in 3 pairs, opposite, obovate, oblong and base oblique[44]. Flowers bright yellow, usually in pairs, axillary, petals five. Pods long, slender,obliquely sepatate, 15-25 cm long. Seeds 30-50 rhombo-hedral, green [17].

Chemical constituents: Cyotine y-hydroxyarginine and aspartic acid are present in *Cassia tora*[16]. Flowers contain kaempferol glucoside. Seeds and leaves contain amino acids, fatty acids, aloe-emodin, chrysomphanol, emodin, rhein and sitosterol. Myricyl alsohol, chrysophanic acid and its 9-anthrone derivative, 8-hydroxy-3methylanthraquinone-1-b-gentiobioside, a naphtho-a-pyrone, physcion, rubrafusarin[21]. Roots contain 6b-gentiobioside and toralactone, 1,3,5-trihydroxy-6-7-dimethoxy-2-methylanthroquinone, leucopelargonidin-3-o-a-L-rhamnopyranoside and beta-sitosterol. Seeds have Naptho-alpha-pyrone-toralactune, chrysophanol, physcion, emodin, rubrofusarin, cchrysophonic acid-9-anthrone. Leaves consist of Emodin, tricontan-1-0l, stigmasterol, β-sitosteral-α-D-glucoside, freindlen, palmitic, stearic, succinic and d-tartaric acids uridine, quercitrin and isoquercitrin[7].

Nine anthraquinones, aurantio-obtusin (1), chryso-obtusin (2), obtusin (3), chryso-obtusin-2-*O*-b -D-glucoside (4), physcion (5), emodin (6), chrysophanol (7), obtusifolin (8), and obtusifolin-2-*O*-b -D-glucoside (9), isolated from an EtOAc-soluble extract of the seeds of *Cassia tora*[20]. Cassia gum is comprised of at least 75% high molecular weight (approximately 200,000-300,000) polysaccharide consisting primarily of a linear chain of 1,4-β-D-mannopyranose units with 1,6 linked α- D-galactopyranose units. The ratio of mannose to galactose is about 5:1. The composition of saccharides is: mannose (77.2-78.9 %), galactose (15.7-14.7 %) and glucose (7.1-6.3 %). Like most polysaccharides, the following formula applies: $(C_6H_{10}O_5)n.H_2O$ [15].

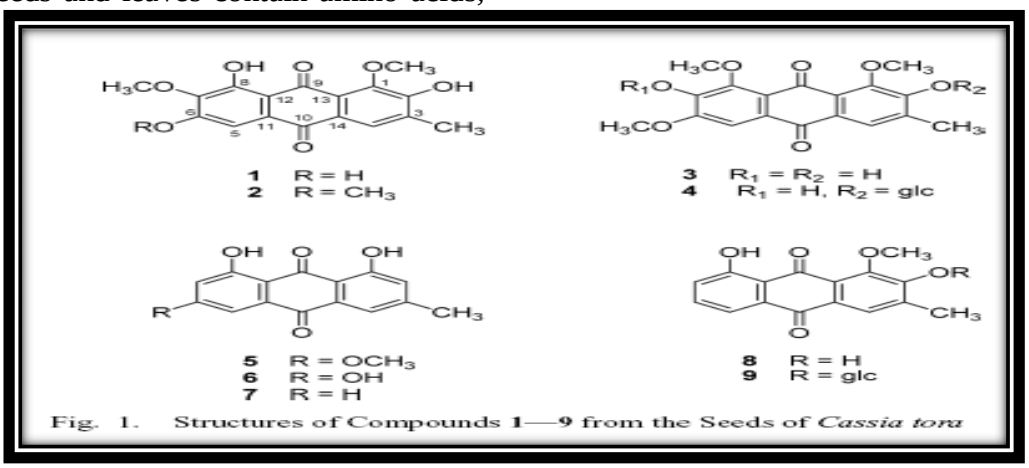
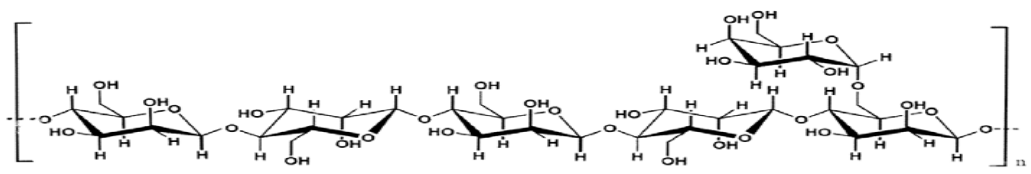


Fig. 1. Structures of Compounds **1**—**9** from the Seeds of *Cassia tora*



Galactomannan

Traditional uses: Powder of the dry seeds is used in Asthma [21]. Decoctions of parts of Cassia tora are uses as an analgesic, anticonvulsant, antipyretic, antifungal, antihelmint, diuretic,

expectoran, laxative, purgative, and skin disease, ringworm and itch [43]. Many medicinal properties such as antimicrobial, antihepatotoxic and antimutagenic activities have been attributed to this plant. It has been used to treat constipation, oedema, glaucoma, nyctalopia, conjunctivitis, hypertension and hypercholestrolemic, liver damage and sometimes eaten as vegetable.

- Cassia Tora is used as a coffee substitute and has a maturing and anodyne action.
- It is very useful in treating skin diseases like ringworm and itching or body scratch and psoriasis.
- The alcoholic or vinegar maceration of pounded fresh leaves is used externally to treat eczema and dermatomycosis.
- Decoction of the fruit of Cassia Tora is used in the treatment of fever.
- Since the herb acts as a kapha and vata dosha suppressant, it acts as a nerve tonic.
- It is consumed in worm infestation and cures the infection occurring in the body.
- Cassia Tora acts as a liver stimulant, mild laxative and heart tonic.
- The herb helps the body in maintaining the normal level of cholesterol.
- Its paste is used for treating skin ailments and also for getting rid of chronic diseases.
- Cassia Tora proves worthwhile in treating piles and hemorrhoids as well as relieving the pain caused on excretion.
- Its powder proves useful in combating indigestion, toning up heart muscles and purifying blood.
- The juice extracted from its leaves is used in case of skin ailments, rashes and allergies. It is also used as an antidote in case of various poisonings.
- The leaves ad seeds of Cassia Tora are useful in leprosy, flatulence, colic, dyspepsia, constipation, cough, bronchitis and cardiac disorders.

Antioxidant Activity and Hepatoprotective activity: Methanol extract from juemingzi (*Cassia tora* L.) was inhibit peroxidation of linoleic acid, reducing power, free-radical scavenging and ferrous ions chelating activity [14]. The antioxidant activity of water extracts of unroasted *C. tora* L. that showed 94% inhibition of peroxidation of linoleic acid at a dose of 0.2 mg/mL, which was higher than that of α-tocopherol (82%)[5]. Water extracts prepared from *C. tora* L. roasted at 175 °C for 5 min and at 200 °C for 5 min exhibited 83% and 82%, respectively, inhibition of linoleic acid peroxidation. Water extract of *Cassia tora* showed 84% scavenging effect on oxygen free radicals generated in the activation process of mutagen detected by electron paramagentic resonance system [9]. The hepatoprotective effects of *Cassia tora* leaf extract on carbon tetrachloride-induced liver injury and showed an increase in liver marker enzymes SGPT, SGOT and ALP in CCl4 - induced rats and the production of malanoaldehyde was also found to be elevated [1].

Antibacterial Activity: An antibacterial activity of aqueous extract of *Cassia tora* that inhibited *S. aureus*, *P. aeruginosa* and *E. coli* at concentrations of 100µg/ml, 200µg/ml and 250µg/ml respectively but did not inhibit the growth of *B. subtilis* at any of the concentrations tested [7]. Ethanolic extract inhibited only *B. subtilis*, but not effective against the other bacteria tested. Methanolic extract was effective against two of the tested organisms i.e., *S. aureus* and *E. coli* both at the concentration of 64mg/ml. Pet ether did not inhibit the growth of any of the bacteria.

The *Cassia tora* ethanolic extract has antibacterial activity against *Straptococcus aureus, Bacillus subtilis, E. coli* and *Pseudomonas aeruginosa* with zone of inhibition 12, 17, 14 and 13 mm respectively [8].

Antigenotoxic properties: The Antigenotoxic properties of water extracts from *Cassia tora* L. (WECT) treated with different degrees of roasting (unroasted and roasted at 150 and 250°C) evaluated by the Ames Salmonella/microsome test and the Comet assay [41]. Results indicated that WECT, especially unroasted *C. tora* (WEUCT), markedly suppressed the mutagenicity of 2-amino-6-methyldipyrido(1,2-*a*:3′:2′-*d*)imidazole (Glu-P-1) and 3-amino-1,4-dimethyl-5*H*-pyrido(4,3-*b*)indole (Trp-P-1). In the Comet assay performed on human lymphocytes, WECT exhibited significant protective effect on Trp-P-1-mediated DNA damage followed the order of unroasted (55%) > roasted at 150°C (42%) > roasted at 250°C (29%). Pre-treatment of the lymphocytes with WEUCT resulted in 30% repression of DNA damage. The effects of water extracts from *Cassia tora* L. (WECT) treated with different degrees of roasting on benzo[*a*]pyrene (B[*a*]P)-induced DNA damage in human hepatoma cell line HepG2 At a concentration of 1 mg/mL, the inhibitory effects of WECT on DNA damage were in the order unroasted (72%) > roasted at 150 °C (60%) > roasted at 250 °C (23%)[41].

Purgative Activity: Aloe-emodin, 1,8-dihydroxy-3-(hydroxymethy1)-anthraquinone isolated and identified from the methanolic extract of the dried leaves of Cassia tora Linn. and reported that the extract have significant purgativeactivity the purgative activity in Wistar rats due to aloe-emodin[10].

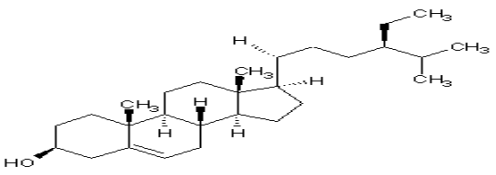
Hypolipidemic activity: Ethanolic extract of seeds of *Cassia tora* L. investigated for hypolipidemic activity and observed that the ethanolic extract and its ether soluble and water soluble fraction decreased serum level of total cholesterol (by 42.07, 40.77 and 71.25%, respectively), triglyceride (by 26.84, 35.74 and 38.46%, respectively) and LDL level (by 69.25, 72.06 and 76.12%, respectively) and increase the serum HDL-cholesterol level by 6.72, 17.20 and 19.18%, respectively [11].

Anthelmintic Activity: The anthelmintic property of ethyl acetate extract of *Cassia tora* L. leaves compared with a standard drug, albendazole[13]. The results indicate that among the extracts of *C. tora*, the ethyl acetate fraction is the most potent one and requires less time to the paralysis (7±1.01 min.)and death of the worms (11±0.99 min) as compared to the methanolic extract that causes paralysis in 10±1.64 min. and death of the worms in 16±1.04min. The anthelmintic activity of Alcohol and aqueous extracts of the seeds of *Cassia tora* against *Pheretima posthuma* and *Ascardia galli* determine the time of paralysis and time of death of the worm at different concentrations (25, 50, 100 mg/ml)[2]. Both the extracts exhibited significant anthelmintic activity at highest concentration of 100 mg/ml.

Antifungal Activity: The ethanol and aqueous extract of leaves and seeds from *Cassia tora* for antifungal activity in vitro against three fungi, *Aspergillus fumigatus, Microsporum canis* and *Candida albicans* using the disc diffusion method test [12]. He observed inhibition zone at 25 mg/ml concentration of *Cassia tora* seeds extract is 8.8 mm and at 30 mg/ml is 11.1 mm in diameter and observed positive results for *Candida albicans* and ethanol extracts of leaves inhibited the *Microsporum canis* growth. The fungicidal activities of *Cassia tora* chloroform extract and the isolated aloe-emodin showed strong and moderate fungicidal activities against *B. cinerea* and *R. solani*[42]. At 1 g/L concentration the chloroform fraction of *C. tora* showed a strong fungicidal activity against *B. cinerea*, *E. graminis*, *P. infestans*, and *R. solani*. Crude methanol extracts from leaves of *Cassia alata, Cassia fistula* and *Cassia tora* were investigated for their antifungal activities on three pathogenic fungi (*Microsporum gypseum, Trichophyton rubrum* and *Penicillium marneffei*). The The IC_{50} for inhibition of % Hyphal growth for *T. rubrum, M. gypseum* and *P. marneffei* was 1.2, 1.8 and 1.8 mg/ml respectively and % conidial germination inhibition was 4.1 mg/ml. The antifungal activity of methanolic extract of leaves of *Cassia tora* and found the inhibition of the growth rate of *Trichophyton rubrum, Trichophyton mentagraphytes, Aspergillus fumigates* and *Microsporum canis* after 11th day 1.50, 4.90, 12 and 10 mm. The antifungal activity of the dealcoholized extract of leaves of *Cassia tora* Linn. on five different fungal organisms. The crude leaf extract significantly inhibited the growth of *C. albicans, A. niger, S. cerevisiae* and *T. mentagophytes.*

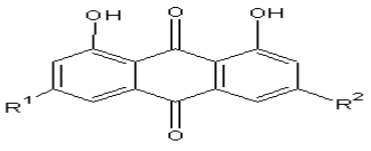
Suspending Agent: *Cassia tora* mucilage (2.5%w/v) produced a comparable suspending ability as 4%w/v compound tragacanth[3].

Root

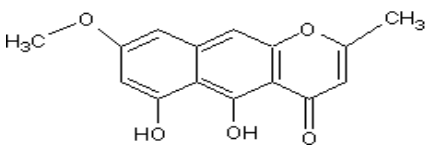


β sitosterol

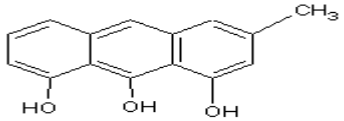
Seed



Anthraquinone

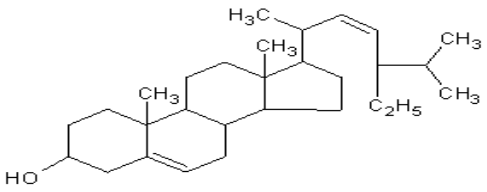


Rubrofusarin

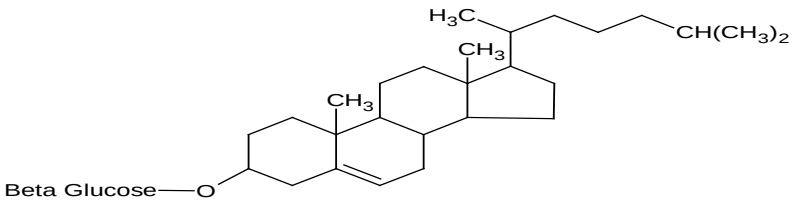


Chrysophanic acid-9-anthrone

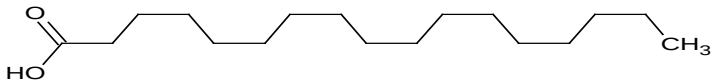
Leaves



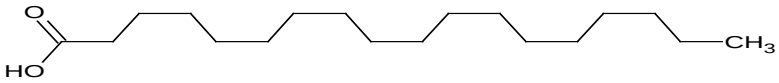
Stigmasterol



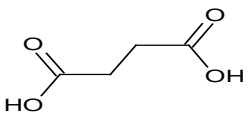
β-sitosterol-β-D-glucoside



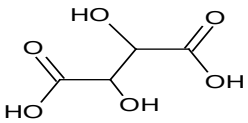
Palmitic Acid



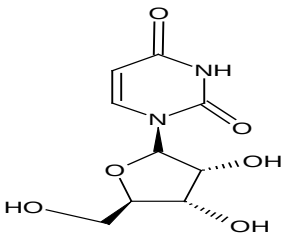
Stearic Acid



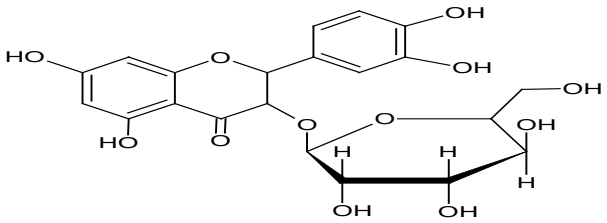
Succinic Acid



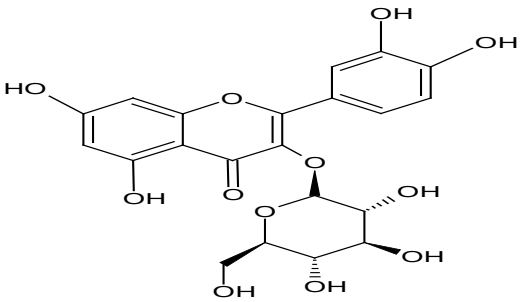
D-tartaric acids



Uridine

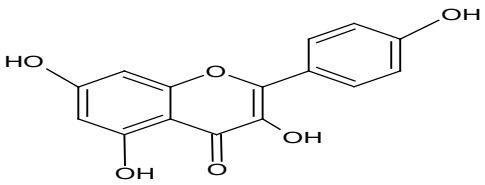


Quercitrin

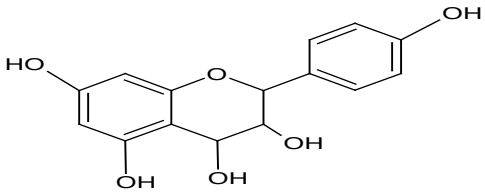


Isoquercitrin

Flower

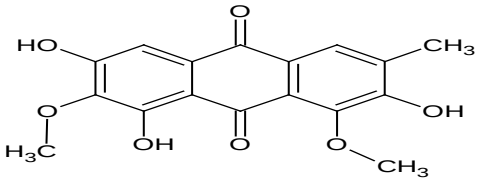


Kaempferol

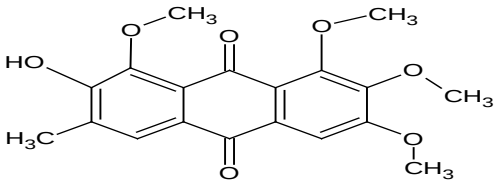


Leucopelargonidin

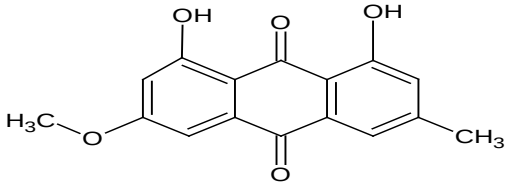
Nine anthraquinones



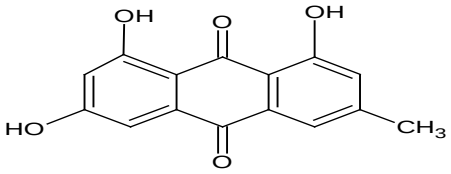
Aurantio-obtusin



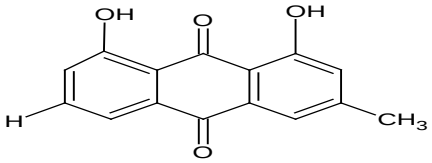
Chryso-obtusin



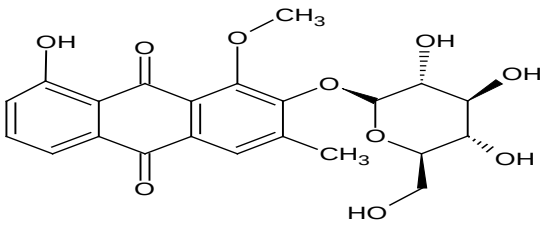
Physcion



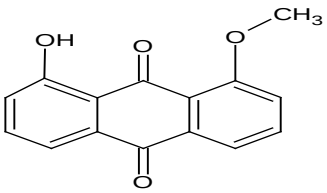
Emodin



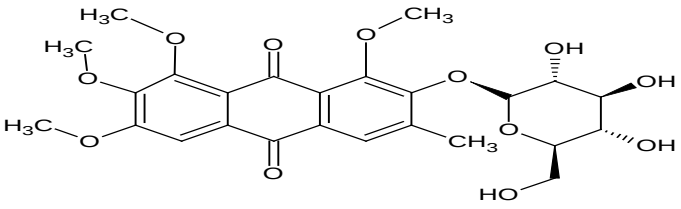
Chrysophanol



Obtusifolin-2-*O*-b -D-glucoside



Obtusifolin



Chryso-obtusin-2-*O*-b -D-glucoside

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