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Exploring the medicinal potential of cassia tora linn: Phytochemical and pharmacological perspectives

Ragini Kharat, Shubham Pachorkar, Krushna Baviskar, Dr. M R N Shaikh, Gauri Chaudhari
Department of Pharmacy, MET's Institute of D Pharmacy, Nashik, Maharashtra, India
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Abstract
A shrub of great importance, Cassia tora L. (Fabaceae) is usually seen as a weed growing on an annual basis in various Asian and African nations. In the wet season in Asia, Cassia tora Linn., 1.2 m tall (Caesalpiniaceae) has been observed as a rampant weed. He's just a small herb or under shrub for one year. It has been used to treat liver problems, ophthalmic disorders, skin diseases and ringworm infections in traditional medicine worldwide because it is known to be laxative or an agent helping relieve constipation. The given review deals with cassia tora taxonomy; the physical features of its leaves, seeds, roots and fruit pods are described together with its applications Also this section represents chemical composition in detail. Different extracts of Cassia tora exhibit different activities including phytochemical analysis of leaf extract for instance detectcassia tora mucilage acts as potent suspending agent release retardant that makes metformin safe to be used in the formulation.The presence of alkaloids tannins flavonoids and other constituents.It further confirms the safety use O/W cream for psoriasis treatment.Additionally, it shows how nutritive properties,physical characteristics.based on temperatures.the biochemical attributes vary during cassia tora processing steps

Keywords: Cassia tora leguminoseae pharmacological activity pharmacology pharmacognostic study pharmaceutical usescassia tora seed

Introduction

The popularity of medicinal plants and plant-derived medicines as natural supplements or options to synthetic (chemical) medications has been increasing due to their innate hormones. They are widely used in various traditional societies around the world the local and colloquial names for Cassia tora include Ponwar (Hindi), Tarota (Marathi), Charota (Chhattisgarhi), Foetid Cassia (English), Jui Ming Zi (Chinese) and Chakramard (Ayurvedic) [11, 12]. It is native to different parts of the world with tropical and subtropical climates. These include Cassia occidentalis, Cassia tora, Cassia alata and Cassia auriculata. Numerous species of cassias are often planted in Asian countries. It blooms after the monsoon rainy season. This plant possesses several medicinal properties such as antibacterial property, antihepatotoxicity, antimutagenicity, antioxidant property, puragative property, antiulcerogenic activity and anticancer effect [17] Occasionally eaten as vegetables too [1]

Classification according to taxonomy

1] Division : Magnoliophyta / Angiospermae
2] Class : Magnoliopsida / Dicotyledoneae
3] Order : Fabales
4] Family : Leguminosae/ Fabaceae
5] Subfamily : Caesalpiniodeae
6] Tribe : Cassieae
7] Subtribe : Cassiinae
8]Genus : Cassia
9] Species : tora
10] Botanical name : Cassia tora L

The morphological features of C. tora

1. **Leaves:** Usually 7.5–10 cm long, leaves are intricate. Three sets of opposite leaflets, measuring 2.5–4.5 cm on average, are present. They have a moderately oblique base, which is frequently rounded, with six to ten prominent veins that diverge. They have glaucous,

membranous, obovate-oblong, glabrous, and somewhat pubescent characteristics.

2. **Seed:** 1 cm long and 3–4 mm thick, the seed is hard, smooth, and shiny. It can be oblong or rhombohedral. Like they were cut off at an angle on both ends. Twisted, folded, and rolled cotyledons.

3. **Root:** The interior of the root is creamy with a long crack, while the exterior is dark brown. The main root is bent at a 300-degree angle close to the foot area.

4. **Fruit/Pod:** Fruit is subtertragonous, with obliquely septate, 15–23 cm long pods with wide sutu.

Organize plants for their customary purposes

Leaf: In the case of the wheatgrass, it has antirheumatic and laxative properties. was used also for skin ailments and complaints and as a treatment for jaundice. The paste from the leaves can be administered to cure ringworm as well as eczema. Decoction of the leaves and the flowers is taken internally to cure asthma and bronchitis. Just as with tincture iodine, the powdered leaves are used externally toform poultice for the wounds and cuts to help them suppurate. application of a leaf poultice locally for joint pain, sciatica, and gout.

Seed: Anodynes and antipyretics, sedatives, tonics and alteratives, and diuretics and aperients. It is also applied in enhancing eyesight and in treating other liver ailments (eye disease). In Korea, it has the function of the hepatoprotective effect. Employment: The parts utilized for treatment are leaves and seeds and the diseases that are treated include skin diseases such as ring worm and itchy skin. diseases. %Seed can be taken inside to remove ear ache, leprosy and psoriasis%. Seeds of the plant in Chinese traditional medicine is used to reduce high blood pressure, high cholesterol and to improve ones, eyesight. Besides, they are diuretic, aperient, and antiasthenics.

Stem bark: Extract can be used in the purification and to ease constipation as well as for some skin complications.

Flowers: Decoction of leaves and ±owers is taken internally for asthma and bronchitis.

Pods: From landmarks, pods are used in treatment of eye disorders and dysentery.

Whole plant: It is the best remedy for curing scabies, scorpions' bite, cold, joint pains, scabies, delayed delivery and night blindness. It is also useful in the extermination of worms/vermicide.

Roots: The root is stomachic, tonic, and bitter; it relieves snakebite. Other use Include treating worm infections, asthma, bronchitis, and stomach cancers in [2]

Cassia Tora Images

Fig 1:

Fig 2:

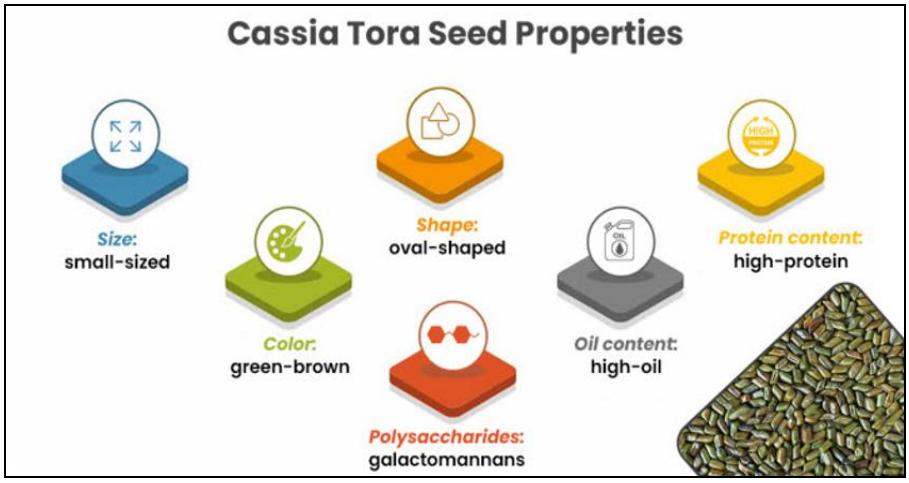

Fig 3:

Chemical constituent

1. **Flowers:** In the tested compounds of this plant, aloe-emodin, chrysomphanol, emodin, rhein, sitosterol, and kaempfer fatty acids are found. Physcion; 8-hydroxy-3-methylanthraquinone-1-Ь- gentiobioside; myricyl alcoholic acid; chrysophanic acid and its 9- anthrone; naphtho-a-pyrone, and rubrafusarin.

2. **Roots:** Special contents of roots are beta-sitosterol, leucopelargonidin-3-oa-Lrhamnopyranoside, 1,3,5-trihydroxy- 6-7-dimethoxy- 2methyl anthroquinone, 6b-gentiobioside and toralactone. [30]

3. **Seeds:** has physcion, emodin, rubrofusarin, cchrysophonic acid-9-anthrone, naptho-alpha-pyrone-toralactune, and chrysophanol. Some chemical constituents present in Cassia obtusifolia seeds include: anthraquinone 1-2%, fats 5-7%, protein 14-19%, and carbohydrates 66-99% [32]

4. **Leaves:** contain the following ; uridine, quercitrin, isoquercitrin, tricontan-1-ol, stigmasterol, β- sitosteral-α-D-glucoside, freindlen, palmitic, stearic, succinic and d-tartaric acids.Nine anthraquinones were isolated from an EtOAcsoluble extract of Cassia tora seeds including aurantio-obtusin (1), chrysoobtusin (2), obtusin (3), chryso-obtusin-2-O-b Dglucoside (4), physcion (5), probabilistic (6), alizarin (7), danthron (8), and These are emodin (6), chrysophanol (7), obtusifolin (8), and obtusifolin2-O -b -Dglucoside (9). At least seventy five percent of the high molecular weight between 200,000 and 300,000 of polysaccharide in cassava gum has the following structure which is a linear chain of 1,4-β-D-mannopyranose linked by 1,6 α-Dgalactopyranose. Mannose to galactose approximately in the ration 5:1. Saccharides consist of three main sugars: As for the individual sugars, mannose constituted the highest proportion at 77. 2 - 78. 9%, followed by galactose at 15. 7 – 14. 7%, and the least amount being glucose at 7. 1 – 6. 3%. While total fat content ranged between 6. 8 – 3. 8%, SG content ranged between 7. 1 – 6. 3%. both total cholesterol (238±142 mg/dL and glucose (7. 1–6. 3 %). And glucose (7. 1–6. 3%). [4]

Active constituent, type of extract and activity

1. The leaf stem and seed extract Has antioxidant and antitumor activity, thanks to the active ingredient emodin.
2. A seed methanolic extract containing the active ingredient glucoseaurantiobtusin has hypotensive action.
3. Seed extract exhibits antioxidant action and contains the active ingredients alaternin, cassiaside, and rubrofusarin.
4. 8 Ononitol monohydrate, the active ingredient in an ethanolic leaf extract Hepatoprotective agent is demonstrated (*in vivo*).
5. 9. Methonolic seed extract containing aloe-emodin, the active ingredient in emodin. Purgative action is evident.
6. 11. A 70% ethanolic seed extract containing the active ingredient aurantio-obtusin. estrogenic and antiallergic properties.
7. 12.The methanolic seed extract's butanol fraction contains the active ingredients cassiaside, rubro2fusarin, gentiobioside, and alaternin. Antimutagenic action is demonstrated.
8. 13. The methylene fraction of the methanolic extract of the seed contains the active ingredients aurantio-obtusin, chryso2obtusin, and chrysophanol. it exhibits antimutagenic properties.
9. 14. Naphthopyrone glucoside, the active ingredient in seed extract. Antidiabetic action is demonstrated.
10. 16.Seed extract containing the active flavonoid constituents formononetin-7-O-beta-D-glucoside, quercitin-3-O-beta-2D2glucuronide, and luteolin-7-O-beta-2 glucopyranoside. It exhibits antipsoriatic properties.
11. 18. Seed ethyl acetate extract containing the active ingredients chryo-obtusin-2-O beta D-glucoside and aurantio-obtusin. It exhibits aldose reductase inhibitory action *in vitro.*
12. 19 Seed ethyl acetate extract containing obtusifolin and chyrsophanol as active ingredients It exhibits protein glycation inhibitory action *in vitro* [5]

Preparation of plant extract

We collected the Cassia tora leaves. Following a 48-hour period of room temperature shaking in an orbital shaker, plant materials were sun-dried, crushed into a powder, and extracted using 70% methanol. The extract was then divided into two portions, concentrated, and filtered. Next, half of the extract was separated using a 3:1 ethyl acetate to water ratio. After the ethyl acetate layer was completely colorless, it was evaporated and dried at 60°C to produce the ethyl acetate fraction. Half of the extract was dried in order to produce methanolic extract. The phytochemical chemical components of the extracts were screened using qualitative chemical methods and thin-layer chromatography. A small sample of the subjects underwent testing.

Alkaloids: To ascertain the presence of alkaloids, 0.5 g of the plant extract was boiled to dissolve it in 5 ml of 1% HCl. The mixture was then filtered. The filtrate was then slightly diluted with a few drops of Dragendorff's reagent. It was believed that the presence of alkaloids was indicated by precipitation or turbidity.

Tannins: The presence of tannins or phenolics was ascertained by the FeCl3 test, and this information was validated by the gelatin precipitation test. Tannins were present because the extract's diluted water solution became blue when ferric chloride reagent was added. The extract was mixed with a gelatin solution containing 1% sodium chloride. The production of white precipitate signifies the existence of tannins.

Flavonoids: To create flavonoids, 0.2 g of the extract was diluted with 2 ml of methanol and heated. Then some magnesium metal turnings and a few drops of strong hydrochloric acid were added. An orange or red coloration served as a marker for flavonoids.

Terpenoids: Approximately 0.5 g of the extract was dissolved in 3 ml of chloroform before it was filtered. The filtrate was divided into two parts. Carefully adding concentrated H2SO4 to one part produced the bottom layer. The positive observation of terpenoids was interpreted as a reddish- brown hue at the point of contact. After heating and chilling the leftover filtrate, a few drops of acetic anhydride

were added. After that, strong sulfuric acid was gradually added through the test tube's walls Libermann Burchard's test indicates that the development of a brown ring at the junction indicates the presence of phytosterols [6]

Pharmacological Activity

1. **Immunostimulatory Activities:** In human peripheral blood mononuclear cells (PBMCs), the abilities of four C. tora anthraquinones—rhein, chrysophanol, aloe-emodin, and emodin—to raise immunological responses were examined. Results showed that, at noncytotoxic doses, anthraquinones could increase the release of interferon-γ (IFN-γ) and/or proliferation of human peripheral blood monolayer cells (PBMC) in a resting state. At a dosage of 10 ng mL- 1, rhein, however, blocked the production of IFN-γ and significantly enhanced the 50 proliferation of resting human PBMC. (7)

2. **Hypolipidemic Activity:** The extract's hypolipidemic properties against a triton- induced hyperlipidemic profile were examined, as were the extract's ether and water- soluble fractions. It reduced serum and triglyceride levels of total LDL cholesterol but raised HDL cholesterol levels by different percentages. Due to their unique rheological features and lipid metabolism, the soluble fibers that were isolated from the seeds showed signs of hypolipidemia. The soluble fibers significantly decreased serum cholesterol and enhanced fecal lipid excretion due to a noticeable decrease in the serum concentration of total cholesterol and triglyceride level [25, 35]

3. **Anticancer activity:** C. Tora's bark and roots contain the anthraquinone emodine, which has anticancer qualities. It is demonstrated to impede the regulatory pathways involved in both metasis and angiogenesis. The quinine-like structure of emodin may disrupt the electron transport chain and change the redox state of cells, which may affect the cytotoxic properties of the compound.

4. **Hypotensive activity:** C. tora seeds lower blood pressure in rats that have been administered anesthesia. According to the findings of the experiment, the extract might have a hypotensive effect via a vagal reflex, which reciprocally alters the vasomotor tone of the sympathetic nervous system. According to a study by Koo *et al* on rats given pentobarbital, the medial portion of the medullary reticular formation is directly linked to the hypotensive activity of extracts. It has been suggested that by influencing basic cardiovascular reflexes and encouraging a drop in vasomotor tone, the medullary reticular formation contributes to the hypotension brought on by C. tora [8]

5. **Antiulcer activity:** Using BALB/c mice, the antiulcer activity of C. tora leaf methanol extract was evaluated in an experimental model of ulcerative colitis caused by dextran sulphate sodium. When the medication was given at a dose of 400 mg/kg of body weight for 14 days, it was discovered to treat bleeding, diarrhea, weight loss, and the restoration of damaged colon tissues [2,24]

6. **Antibiofilm:** *In vitro* tests on avian pathogenic Escherichia coli strains reveal that resveratrol has good antibiofilm effect. This action involves the inhibition of motility, including swimming and swarming, as well as the creation and removal of biofilms. It was possible to separate resveratrol from Vitis vinifera, C. tora, and Polygonum cuspidatum [9, 36]

7. **Antinociceptive activity:** On the ileum of guinea pigs, rabbits, and mice, atropine reversibly suppresses the antinociceptive, smooth muscle contracting, and spasmogenic effects of the methanolic leaf extract. The effects vary with concentration. Mepyramine decreased the contractile amplitude generated by the extract as well. The extract speeded up intestinal transit in mice in a dose-dependent manner. C. tora extract significantly reduced the acetic acid-induced abdominal constrictions in mice, with an effect that was comparable to aspirin. Furthermore, the extract significantly reduced the mice's dose-dependent nociceptive response to increasing force (g). It makes sense to use C. tora as a purgative and to treat various ailments because of this [10]

8. **Antifertility Activity:** C. tora leaf extract (200 mg/100 mg/kg body weight) showed the highest level of antifertility activity in female rats. There is proof that the medication's antifertility effects are linked to its oestrogenic activity [7, 37]

9. **Larvicidal action:** Against Anopheles stephensi, the medicinal plant cassia tora, a member of the leguminaceae family, exhibits strong larvicidal action. This research reports on the larvicidal activity of an extract obtained from the Cassia tora plant. Anopheles stephensi is highly vulnerable to the alcoholic extract's larvicidal properties. The medicinal plant Cassia tora contains seeds that are high in flavonoids, alkaloids, glycosides, tannin, and protein. Alcoholic extract outperformed sugars, gum, and phenolic substances in its ability to combat Anemone stephensi. [11, 34]

10. **Antioxidant activity:** Numerous diseases and disorders are associated with oxidative stress caused by free radicals. Antioxidants serve as an essential line of defense against toxicity caused by free radicals by averting damage. Free radicals can be scavenged by antioxidants, which can also prevent lipid peroxidation and save other processes that free radicals are known to mediate. This implies that they can shield human organs from a range of illnesses, such as Alzheimer's, Parkinson's, atherosclerosis, and cancer. Polyphenols possess the ability to avert oxidative harm to cellular constituents, thus diminishing the probability of many degenerative illnesses associated with oxidative stress [11, 23]

11. **Antiandrogenic activity:** An oral ethanolic extract of the plant was given to castrated male wistar rats to investigate its mode of action on androgen in order to create an affordable, safe, easily administrable, orally effective, and reversible method of controlling male fertility. This is because using cassia tora plant products to control fertility has no negative side effects. The

results indicated that male fertility was impacted by the anti-spermatogenic and antiandrogenic properties of oral cassia tora therapy. The reduced weight of the accessory sex organs after the extract therapy is indicative of insufficient androgen. Reduced amounts of proteins, fructose, and silica were seen in rats treated with cassia tora extract; these findings are all consistent with lower testosterone production [12]

12. **Wound healing:** This drug was tested on a wound It is shown that in albino mice, the medicine extract significantly reduces wound protection and increases healing. Different quantities, or extracts in propylene glycol, ranging from 0.5 to 1.5% w/w, were made and added to the basic cream recipe listed in Table 1. The basic cream utilized as a control, F1, is extract-free. [13, 28–33]

13. **Anti-inflammatory qualities:** When administered to rat hindpaw edema, a methanol-prepared extract of Cassia tora leaves was also discovered to exhibit potent anti-inflammatory qualities. Carrageenan, histamine, and serotonin were the three substances that produced inflammation in this study. [14]

14. **Oxytocic activity:** The drug's seeds demonstrate this characteristic by inducing uterine contractions in guinea pigs [15]

15. **Neuropharmacological activity:** The current research suggests that further investigation is required to isolate and characterize the active components accountable for the neuropharmacological activities of Cassia tora flowers, as well as to pinpoint the precise mechanisms of action underlying these activities. Mice who received 500 mg/kg body weight of both extracts (AEC and EEC) and 300 mg/kg body weight of valproic acid showed a significant decrease in the time it took for them to recover from an electrically induced convulsion in comparison to the control group [16]

16. **Antimicrobial Intensity:** Alcoholized extract from C. tora seeds inhibited the development of many microorganisms, including Phtheriae Corynebacterium, Micrococcus citreus, and Micrococcus pyogenes var. albus. The effects of phenolic glycosides, their aglycones, and other compounds on Escherichia that are structurally related to them were studied. Certain strains of Albus Staphylococcus aureus, E. Coli K12, and Pseudomonas aeruginosa PAO1 [17, 26]

Pharmaceutical uses such as

Suspending agent: Cassia tora's suspensibility to suspend was evaluated in relation to substances like gelatin, tragacanth, and Acacia. Experiments were carried out to characterize Cassia tora's pure mucilage. The assessment parameters that were employed were sedimentation volume, rheology, and particle size analysis. The data obtained formed the basis for a comparative analysis of the suspending agents that were the subject of the inquiry. Cassia tora mucilage is safe to use as a suspending agent in meals for both people and dogs, based on usage levels comparable to other suspending agents. Consequently, it can be said that out of all the materials studied, Cassia tora mucilage has the strongest suspending potential. This is due to the fact that its high viscosity makes it a great option for stabilizing circumstances where high viscosity required [18]

Cream: O/W creams were made at various doses using benzoic extract from Cassia tora leaves, and their acute cutaneous toxicity was assessed thereafter. The several O/W creams have passed testing for sensitivity, irritation, grittiness, and bleeding, and they all show good physical qualities. The C dermal toxicity data indicated that the cream was safe at dosages up to 2000 mg/kg. The psoriasis model's histopathological examination revealed the presence of Munro's oral cassia tora therapy. The reduced weight of the accessory sex organs after the extract therapy is indicative of insufficient androgen. Reduced amounts of proteins, fructose, and silica were seen in rats treated with cassia tora extract; these findings are all consistent with lower testosterone production [12]

Cassia tora with Metformin:

Using the natural mucilage of Cassia tora as a release retardant, an investigation into the formulation and evaluation of a Metformin HCL matrix tablet has been conducted throughout the entire project. The matrix tablet was created using varying ratios of medication to polymer. Pre- and post-compression techniques were evaluated for the developed tablet formulation. The bulk density, tapped density, Carr's index, and Hausner's ratio pre-compression parameter findings were found to be within the ranges, indicating that the granules had satisfactory flow properties. According to the swelling index, swelling rises as mucilage content rises [20, 29]

Thermophysical, nutritional, and physical properties of cassia tora seeds

It was found that the endosperm, gum layer, and husk are the main components of cassia tora seeds. By using sieve analysis, the average size was found to be 0.612 mm. These seeds were incredibly rich in protein, with 23.44% protein and 25.68% carbohydrates. displayed above- average levels of iron, calcium, and phosphorus when compared to the makeup of seeds. The thousand-seed's weight ranged from 14.8001 to 14.7501 g, while its sphericity values fluctuated between 0.697 and 0.451. With porosity levels ranging from 11.60% to 11.31%, it was discovered that the bulk densities of Cassia tora seeds were lower than their actual densities. The angle of repose for cassia tora seeds varied from 41.35 to 38.66 degrees Interestingly, the seeds displayed elevated [1]

Temperature-dependent changes in the biochemical properties of cassia tora:

Under persistent stress from a range of abiotic factors, especially high temperatures, plants struggle to thrive. Fourteen-day-old Cassia tora and Cassia auriculata seedlings were subjected to 16 hours of differential temperature stress treatments at 30°C, 37°C, 42°C, and 44°C. Upon analysis, it was shown that the high temperature stress increased several biochemical indicators, such as total protein, reducing sugars, chlorophyll content, and antioxidant enzyme system. Both Cassia species exhibited a significant increase of total protein, chlorophyll, and reducing sugars at 42ºC. C. tora has a greater POX activity (0.41 U/mg) at 42°C than C. auriculata (0.24 U/mg).

However, the results of Catalase activity in both species were similar, peaking about [21]

Physical and thermal properties of cassia seed

The dry basis moisture content of 9.97% was used to measure the thermal and physical characteristics of charota seeds. Measurements showed that the seeds' lengths varied from 6.13 to 3.41 mm, widths from 2.25 to 1.56 mm, and thicknesses from 2.03 to 1.15 mm. The seeds had arithmetic mean diameters ranging from 3.39 to 2.41 mm and geometric mean diameters between 2.92 and 2.12 mm. The weight of a thousand seeds ranged from 14.8001 to 14.7501 g. The morphology of charota seeds also included aspects such as aspect ratio, volume, surface area, and sphericity. The shape's sphericity varied from 0.697 to 0.451, indicating how much it resembles a sphere of the same volume. The surface area ranged from 26.84 to 14.06 mm^2.as the 13.203 mm^3 capacity changed from 53.927 mm^3. For sesame seeds, Tunde-Akintunde and Akintunde (2004) found comparable sphericity values. Similarly, Coskun *et al*. (2006) obtained sphericity values ranging from 0.615 to 0.635 for sweet corn seeds. The surface area of caper seeds varied from 15.81 to 23.07 mm^2, as reported by Dursun and Dursun (2005). These findings are consistent with the findings of the current study. The width-to-length ratio and the seed's propensity for an elongated form are represented by the aspect ratio, which ranged from 59.53 to 31.66. The aspect ratio finding was found to be consistent with Kabas *et al*.'s 2007 study.

Charota seed actual density ranged from 923.11 to 920.10 kg/cm^3, whereas bulk density varied from 878.44 to 793.64 kg/m^3. It's interesting to see that the true density consistently beat the bulk density of the seeds. The porosity of the charota seeds, which ranged from 11.60% to 11.31%, is increased by the difference in density between the two values. It should be noted that the porosity of the bulk seeds is described by the resistance to airflow throughout the aeration and drying processes (Ixtaina *et al*., 2008) The observed tendency of higher bulk density in comparison to actual density aligns with the findings of Kabas *et al*. for seeds of cowpeas in 2007. The angle of repose for cassia seeds was determined to be between 41.35° and 38.66°. This feature is essential for building chutes for bulk seed transfer, side wall slopes for storage bins, and hopper apertures. Kenghe *et al* (2013) and Sologubik *et al*. (2013)

Table 1: Physical properties of Cassia tora seed at 9.97% (db) moisture content

Particulars	Max	Min	Mean	SD
Length, mm	6.13	3.41	4.57	0.50
Width, mm	2.25	1.56	1.90	0.17
Thickness, mm	2.03	1.15	1.76	0.16
Sphericity	0.697	0.451	0.559	0.050
Surface area, mm^2	26.84	14.06	17.04	2.69
Volume, mm^3	53.927	13.203	22.745	7.425
Thousand seed weight, g	14.8001	14.7501	14.77	0.0258
Aspect ratio	59.53	31.66	42.06	5.77
Arithmetic mean diameter, mm	3.39	2.41	2.74	0.20
Geometric mean diameter, mm	2.92	2.12	2.47	0.17
Bulk density, kg/m^3	878.44	793.64	816.06	35.15
True density, kg/m^3	923.11	920.10	921.33	1.58
Porosity, %	11.60	11.31	11.43	0.15
Angle of repose, °	41.35	38.66	40.02	0.95
Coefficient of friction				
Plywood	1.81	1.71	1.75	0.036
Rubber	1.47	1.41	1.44	0.032
Mild steel	1.47	1.41	1.44	0.032
Glass	1.47	1.41	1.45	0.032
Thermal conductivity, $W \cdot m^{-1} \cdot K^{-1}$	0.0735	0.0591	0.0663	0.0101
Thermal resistivity, °C cm/W	0.0014	0.0017	0.00155	0.000212

showed similar results for lathyrus seeds and barley seeds, respectively. The coefficient of friction ranged from 1.81 to 1.71 on plywood surfaces and from 1.47 to 1.41 on other surfaces when measured. surfaces made of rubber, mild steel, and glass. Notably, tests conducted on plywood surfaces showed that the coefficient of friction of the seeds was higher. This coefficient of friction statistic is essential for assessing silos, or deep bins, and constructing material handling equipment. Similar findings were made by Solomon and Zewdu (2009) and Amin *et al*. (2004) in their separate studies on niger and lentil seeds. Their investigations' findings demonstrated that the static and kinetic coefficients of friction were lowest when interacting with glass surfaces. The thermal properties of the charota seeds were determined using a thermal analyzer. Thermal resistivity, which is the reciprocal of thermal conductivity, was applied. The seeds' thermal conductivity varied from between 0.0735 to 0.0591 W.m-1 K-1, while the thermal resistivity was found to be within the range of 0.0014 to the thermal and physical properties of charota seeds, measured at a dry basis moisture content of 9.97%. The seeds' lengths ranged from 6.13 to 3.41 mm, widths from 2.25 to 1.56 mm, and thicknesses from 2.03 to 1.15 mm, according to measurements. The seeds showed geometric mean diameters of 2.92 to 2.12 mm and arithmetic mean diameters ranging from 3.39 to 2.41 mm. A thousand seeds weighed between 14.8001 and 14.7501 g. The features of charota seeds' morphology also included sphericity, surface area, volume, and aspect ratio. The shape's sphericity, which measures how closely it resembles a sphere of the same volume, ranged from 0.697 to 0.451. The range of the surface area was 26.84 to 14.06 mm^2.0.0017 ^oC-cm/W [1]

Toxicology

An evaluation was conducted on the acute and subacute toxicity of a methanolic extract of Cassia tora in mice. Three

groups of three mice were given the extract orally at acute doses of 100 mg/kg,1000 mg/kg, and 10,000 mg/kg, respectively, and the results included excitement, restlessness, and depression. When this dosage range of extract was administered to the mice, none of them died This indicates that oral use of the plant did not result in the mice's instant death. Since mice administered extract did not die, even at the maximal dosage of 20,000 mg/kg, the oral LD50 could not be determined. In the subacute study, however, the extract administered orally to mice for four weeks caused notable morphological and clinical abnormalities in addition to mortality. According to this, C. Tora [22]

Conclusion

The thorough analysis of the literature reveals that cassia tora is a roadside plant that grows organically and has a number of medicinal uses, such as antinociceptive, insecticidal, and wound- healing qualities. The plant's extract's phytochemical analysis was also looked at. Medications can be used as an O/W cream, metformin release retardant, and suspending agent without risk Furthermore, it has been shown that C. tora seeds have temperature-dependent nutritional, physical, and thermal properties, and that their toxicity suggests that prolonged use may be hazardous.

References

1. Pooja Sahu, S Patel, PS Pisalkar, Pratibha Katiyar, D Khokhar. Nutritional, physical and thermal properties of Cassia tora (Charota) seeds. Pharma Innovation,2023:12(9):2291-2299.
2. Umesh B. Telrandhe and Mahendra C. Gunde Phytochemistry, pharmacology and multifarious activity of Cassia tora L.: A comprehensive review Ann. Phytomed,2022:11(2):231-239. http://dxc
3. Meena AK, Niranjan US, Yadav AK, Singh B, Nagariya AK, MRao M. Cassia tora Linn: A review on its ethnobotany, phytochemical and pharmacological profile. J Pharm Res,2010:3(3):557-560
4. Yogesh Shakywar, YS Ankit, Jain AJ, Meena Verma, MV Panwar, AS, Ashish Agarwal AA. Pharmacognostical properties and their traditional uses of Cassia tora Linn, 2011.
5. Biswas I, Seth P, Laskar S. Exploration of therapeutic potential of anthraquinones and flavonoids isolated from different species of Cassia: A promising journey from ethnomedicineto biomedicine. Indian Journal of Scientific Research,2017:13(1):01-08. ISSN No. 0976-28
6. John J, Mehta A, Meht P. Evaluation of antioxidant and anticancer potential of Cassia tora leaves. Asian Journal of Traditional Medicines,2012:7(6):260-267.
7. Bhalerao SA, Verma DR., Teli NC, Gavankar RV, Trikannad AA, Salvi PP. Bioactive constituents, ethnobotany and pharmacological prospectives of Cassia tora Linn. Int J Bioassays,2013:2(11):1421-1427
8. Ahire DK. Studies on Phytochemical and Pharmacological profile of Cassia tora Lin: An Overview, 2022.
9. Ruan X, Deng X, Tan M, Yu C, Zhang M, Sun Y, Jiang N. *In vitro* antibiofilm activity of resveratrol against avian pathogenic Escherichia coli. BMC Veterinary Research, 2021:1:71-9.
10. Burbure VS, Baheti A M, Deshmukh CD, Wani MS, Maitreyee D. PHYTOCHEMICAL AND PHARMACOLOGICAL PROFILE OF CASSIA TORA.
11. Supare S, Patil M. Estimation of phytochemical components from Cassia tora and to study its larvicidal activity. International Journal of Pharmaceutical Science Invention, 2015:4(6):11-16.
12. Khan S, Mali PC. Evaluation of Antiandrogenic Effects in Castrated Rats Treated with Cassia tora Extract. SSR Inst. Int. J. Life Sci.,2019:5(2):2259-2268.
13. Deoda RS, Kadam PV, Shivatare RS, Narappanawar N S, Yadav KN, Patil MJ. Pharmacognostic and Phytopharmacological Profile of Cassia tora Linn-A Review. Inventi Rapid: Planta Activa, 2012.
14. Maity TK, Mandal SC, Mukherjee PK, Saha K, Das J, Pal M, Saha BP. Studies on antiinflammatory effect of Cassia tora leaf extract (fam. Leguminosae). Phytotherapy Research: An International Journal Devoted to Pharmacological and Toxicological Evaluation of Natural Product Derivatives,1998:12(3):221-223.
15. Pawar HA, D'mello PM. Cassia tora Linn.: an overview. International journal of pharmaceutical sciences and research,2011:2(9):2286
16. Hussain T, Hafiz A, Ravi V, Kumar D, Kazmi I. A Review-Study on Phytochemical and Neuropharmacological Effects of Cassia Tora Flowers, 2022.
17. Bhandirge SK, Patel V, Patidar A, Pasi A, Sharma V. An overview on phytochemical and pharmacological profile of Cassia tora Linn. Int J Herb Med,2016:4(6): 50-55.
18. Mann AS, Jain NK, Kharya MD. Evaluation of the suspending properties of Cassia tora mucilage on sulphadimidine suspension. Asian J Exp Sci,2007:21(1):63-67.
19. Manmohan Singhal, Niraj Kansara, "Cassia tora Linn Cream Inhibits Ultraviolet-B-Induced Psoriasis in Rats", International Scholarly Research Notices, vol. Article ID 346510, 6, 2012, https://doi.org/10.5402/2012/346510
20. Dwivedi C, Rao SP, Roy A, Saraf S, Verma N, Pradhan DK. Formulation and characterization of metformin hydrochloride sustained release matrix tablet containing Cassia tora mucilage. Journal of Drug Delivery and Therapeutics2017:7(6):66-75.
21. Geetika Pant, Sibi G., Sangeetha Annie George, Shubha Bhadran, Ugam Chauhan. Variations in Biochemical Attributes of Cassia tora L. and C. auriculata L. under Temperature Stress. American Journal of Life Sciences. Special Issue: Recent Developments in Health Care through Plants and Microbes,2014:(2)6-1:16-21. doi: 10.11648/j.ajls.s.2014020601.14
22. Ambali SF, Silas A, Ayo JO, Ibrahim NDG, Obalowu AA, Salami SO. Toxicity studies on the methanolic extract of the leaves of Cassia tora Linn in mice. Nigerian Veterinary Journal,2005:27(1):54-61.
23. Verma NK, Singh AK, Chaurasiya AK. Cassia Tora Linn: Importance and Properties: A Review.
24. Devhare LD, Gokhale N. Antioxidant and Antiulcer property of different solvent extracts of Cassia tora Linn. Research journal of pharmacy and technology,2022:15(3):1109-1113.

25. Awasthi, V. K., Mahdi, F., Chander, R., Khanna, A. K., Saxena JK, Singh R, Singh RK. Hypolipidemic activity of Cassia tora seeds in hyperlipidemic rats. Indian Journal of Clinical Biochemistry,2015:30:78-83.
26. Sathya A, Ambikapathy V. Studies on the Phytochemistry, Antimicrobial Activity and Green Synthesis of Nanoparticles Using Cassia tora L. Drug Invention Today, 4(8).
27. Maity TK, Mandal SC, Mukherjee PK, Saha K, Das J, Pal M, Saha BP. Studies on antiinflammatory effect of Cassia tora leaf extract (fam. Leguminosae). Phytotherapy Research: An International Journal Devoted to Pharmacological and Toxicological Evaluation of Natural Product Derivatives,1998:12(3):221-223.
28. BAKORIYA R, THOMAS T, BHARTI M, CHAURASIYA S, VISHYAN S, BAGHEL K. Formulation and evaluation of Wound Healing activity of methanolic leaf extract of Cassia tora.
29. Daharwal SJ, Rao SP, Singh VK, Chandrakar K Singh, VD. Formulation and Characterization of Metformin HCl Sustained Release Matrix Tablet by using Cassia tora Mucilage. Research Journal of Pharmacy and Technology,2015:8(7):871-879.
30. Renuka J, Poonam S, Jain SC. Chemical analysis of the roots of Cassia tora. Asian Journal of Chemistry,2010:22(10):7585-7590.
31. Sarwa KK, Mithun Rudrapal, MR, Manabendra Debnath, MD, Atul Kumar AK, Verma VK. Phytochemical and biological potential of Cassia tora Linn, 2014.
32. Ali MY, Park S, Chang M. Phytochemistry, ethnopharmacological uses, biological activities, and therapeutic applications of Cassia obtusifolia L.: a comprehensive review. Molecules,2021:26(20):6252.
33. Jaina S, Patilb UK. Formulation and characterization of poly herbal cream with wound healing activity. Pharmacologyonline,2011:3:1470-1477.
34. Vats S. Larvicidal activity and *in vitro* regulation of rotenoids from Cassia tora L. 3 Biotech, 2018:8(1):13.
35. Patil UK, Saraf S, Dixit VK. Hypolipidemic activity of seeds of Cassia tora Linn. Journal of ethnopharmacology,2004:90(2-3):249-252.
36. Telrandhe UB, unde MC. Phytochemistry, pharmacology and multifarious activity of Cassia tora L.: A comprehensive review. Annals of Phytomedicine, 2022:11(2):231-239.
37. Khan S, Mali PC. Reversible antifertility effect of Cassia tora Linn in male rats. Int. J. Life Sci. Scienti. Res,2017:3(5):1415-23.