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Qualitative Analysis of Phytochemicals of *Cassia tora* Linn. Seeds: A Review

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Abstract

Cassia tora Linn., an annual plant, is widely grown throughout Southeast Asia, including in India, Northern Australia, and the Americas. The enormous therapeutic powers of *Cassia* species are well known in the Indian medical system. The plant's leaves, seeds, and roots are among the parts that are said to have medicinal properties. It is widely used in traditional medicine as a laxative and is effective in treating leprosy, ringworm infection, ophthalmology, skin and liver issues, and diabetes mellitus. Several phytochemicals such as saponin, fixed oil/fats, protein, carbohydrates, tannins, flavonoids, alkaloids, gum, phenolic compounds, terpenoids, steroids, phenols, anthraquinones, glycosides, naptho-α-pyrone toralactune, chrysophanol, physcion, emodin, rubrofusarin, and chrysophonic acid-9-anthrone have been reported. The presence of some phytochemicals such as tannin, saponin, and steroids, was demonstrated in the medicinal properties of the plant in its therapeutic applications by various researchers. This review article includes a literature review on the phytochemicals found in *Cassia tora* Linn. seeds.

Keywords: *Cassia tora*, phytochemical studies, solvent extract, seeds

Introduction

Plants are a major source of medications and are essential to maintaining global health (Constabel, 1990). In almost every civilization, both ancient and modern, plants have been employed as medicine (Deshpande and Bhalsing, 2013). Over 80% of the world's population, according to the WHO, relies on traditional medical practices, many of which are plant-based, to address their basic medical needs (Mazid et al., 2012). For all illnesses, the traditional medical system in our nation is crucial to the health of rural residents (Taid et al., 2014) . Since the Rigveda and Atharvaveda, the curative potential of conventional herbal remedies has been recognised and documented (Bhattacharjya and Borah, 2008). Plants and their extracts have been utilised therapeutically ever since, and even today, medicines made from plants remain crucial to the global health care system (Yadav et al., 2006). About 45,000 plant species are found in India, and more than 35,000 of these are thought to have medicinal characteristics and are employed in various human societies around the globe (Lewington, 1993). Plants are a great source of a variety of bioactive substances that are used either directly or indirectly to treat a variety of human diseases (Dogra et al., 2015). Many cultures have employed plants from the genus *Cassia* in traditional medicine. 580 species of trees, shrubs, and plants belong to the genus *Cassia* (Malik et al., 2020).

The family Caesalpiniaceae, which includes *Cassia tora* Linn, is primarily found in the tropics, West China, India, and Sri Lanka. It grows on dry soil throughout tropical regions, high hills with elevations up to 1800 m, as well as the plains in India, where it is a wasteland rainy season weed (Jain and Patil, 2010). The plant is 30 to 90 cm tall, with green leaves, yellow flowers, and subtetragenous obliquely septate pods that are 15 to 23 cm long and contain 23 to 30 seeds per pod [Fig. 1(a), Fig. 1(b) and Fig. 1(c)] (Kamble and Shubhangi, 2019). According to the conventional system of Indian medicine, this plant has a number of therapeutic characteristics (Pawar and D'mello, 2011). According to Ayurveda, leaves and seeds are astringent, laxative, antiperiodic, anthelmintic, ophthalmic, liver tonic, cardiotonic, expectorant, etc., and are beneficial for treating leprosy, ringworm, colic, dyspepsia, constipation, cough, bronchitis, and cardiac problems (Bhot and Barua, 2015).

Fig. 1(a): Plant of *Cassia tora* Linn.

Fig. 1(b): Flowers of *Cassia tora* Linn.

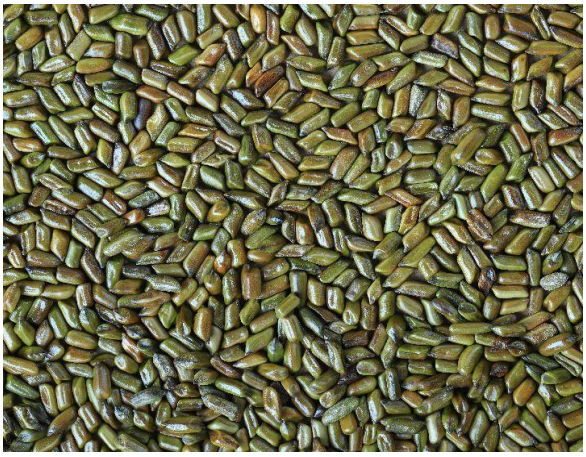

Fig. 1(c): Seeds of *Cassia tora* Linn.

The seeds of *C. tora* have yielded a number of anthraquinones (Raghunathan et al., 1974). In Chinese medicine, the seeds of *C. tora* have been used as aperients, antiasthma treatments, diuretics, and to enhance visual function (Asolkar et al., 1992). The plant significantly contributes to a variety of biological functions such as antioxidant, hepatoprotective, hypolipidemic, antibacterial, antifertility, antimutagenic, antitumor, anti-inflammatory, antifungal, and antihelmintic activities due to various phytochemicals such as anthraquinone glycosides, naphthopyrone glycosides, phenolic compounds, flavonoids, sennosides, rubrofusarin triglucoside (Das et al., 2011). Therefore, the focus of this study work is on the qualitative analysis of phytochemicals found in *Cassia tora* Linn. seeds.

Phytochemical Analysis

The ethnopharmacological uses of medicinal plants in treatment, including the prevention of many diseases and disorders, have some biochemical support because of the phytochemical analyses of plants (Okigbo et al., 2009). After reviewing the literature, there are several phytochemicals, reported by various researchers, found in *Cassia tora* seeds: Saponin, fixed oil/fats, protein, carbohydrates, tannins, flavonoids, alkaloids, gum, and phenolic chemicals have been investigated (Supare and Patil, 2015). Alkaloids, flavonoids, and terpenoids were present, but saponins and tannins were not, (Sahadeo et al., 2014). The presence of saponins, tannins, flavonoids, and steroids was investigated (Khatak et al., 2014). In contrast to the absence of carbohydrates and gum, researchers observed the presence of alkaloids, flavonoids, terpenoids, saponins, tannins, phenols, amino acids/proteins, anthraquinones, glycosides, and steroids (Suradkar et al., 2017). The presence of tannin, saponin, protein, steroids, terpenoids, carbohydrates, alkaloids, flavonoids, and glycosides was studied (Shaikh and Syed, 2016). Alkaloids, flavonoids, terpenoids, carbohydrates, anthraquinones, glycosides, and the absence of saponins and tannins were all reported to be present (Patil and Shah, 2019). Steroids, carbohydrates, and proteins were present, but alkaloids and tannins were absent in the seeds of *C. tora.* (Pandya et al., 2017). In the investigation of seed mucilage, it was found that there were carbohydrates, proteins, and lipids present but no flavonoids, tannins, saponins, sterols, alkaloids, terpenoids, or starch (Singh et al., 2010). *C. tora* seeds contain quercetin and its

analogue, as well as emodin, chrysophanic acid, 1,8-dihydroxy anthroquinone, β-sitosterol, rhein like aglycones, cassiaside, rubrofusarin, and torosachrysone (Yen et al., 1998).

The novel compounds torachrysone tetraglucoside, nor-rubrofusarin gentiobioside, demethyflavasperone gentiobioside, torachrysone gentiobioside, rubrofusarin triglucoside, and torachrysone apioglucoside were isolated from the seeds of *Cassia tora* (Hatano et al., 1999). It was reported that two new naphtho-pyrone glycosides, 9-[(β-D-glucopyranosyl-(1→6)-O-β-D-glucopyranosyl)oxy]-10-hydroxy-7-methoxy-3-methyl-1H-naphtho[2,3-c]pyran-1-one and 6-[(α-apiofuranosyl-(1→6)-O-β-D-glucopyranosyl)oxy]-rubrofusarin, together with cassiaside and rubrofusarin-6-β-gentiobioside were also discovered from the seeds of *Cassia tora* Linn. (Wong et al., 1989).

The seeds of *C. tora* contain sitosterol in petroleum ether extract. Chyrsophanol, physicon, emodin, and rubrofusarin were present in $CHCl_3$ extract, and ethanolic extract also shows glycosides II and I, in which Nitrofurarin-6-β-gentiobioside was recognised as glycoside II (Jain and Patil, 2010). The hydroalcoholic seed extracts of *Cassia tora* showed high anti-diabetic effects (Adamu and Oladosu, 2023).

Naptho-α-pyrone toralactune, chrysophanol, physcion, emodin, rubrofusarin, and chrysophonic acid-9-anthrone were all present in the seeds of *Cassia tora*. From the butanol soluble extract of the seeds, three napthopyrone glucosides were isolated: cassiaside, rubrofusarin-6-O-β-D-gentiobioside, and toralactone-9-O-β-D-gentiobioside (Soumyanath, 2005; Mukherjee, 2002).

Conclusion

Cassia tora is one of the most significant sources of medicinally useful phytochemicals. It is widely used in both Chinese and Ayurvedic medicine. The contents of the phytochemicals in *Cassia tora* seeds were covered entirely in the information that was compiled from contemporary literature sources. Among the medicinally useful phytochemicals, alkaloids, carbohydrates, saponins, glycosides, proteins, tannins, phenols, anthraquinones, terpenoids, and other bioactive compounds are most significant, but the chemical components vary qualitatively and quantitatively not only from plant to plant but also in different samples of the same species depending on various atmospheric factors and storage conditions. As a result, it can be said that *Cassia tora* Linn. contains a wide range of phytochemicals that are useful in different ways to treat a wide range of disorders. As a result, *Cassia tora* has a lot of potential for research and may be further utilised as a source of beneficial phytochemical compounds for the pharmaceutical industry.

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