

Chapter 1

Qualitative phytochemical analysis of *Ficus religiosa* fruits

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Abstract

Fruits of *Ficus religiosa* come under the minor fruit group and are unexplored. Usually, it is believed that fruits are consumed by birds and other faunal species, but in tribal areas of India, children consume the ripened fruits. Keeping this in mind, an attempt has been made to analyse the available secondary metabolites to make it nutraceutical. Phytochemical analysis revealed that fruit extracts showed the presence of phenolic compounds and reducing sugar, which make them nutraceuticals. The present study draws attention to its value addition.

Keywords: *Ficus*, traditional, wild edible fruits

Introduction

Ficus religiosa is a sacred tree in India (**Fig. 1**). It belongs to the Moraceae family. It is commonly known as Peepal, Bodhi, Ashvattha, and other local names as per landscapes. It is considered to have religious significance in Hinduism, Buddhism, Sikhism, and Jainism. This tree is the state tree of Odisha, Bihar, and Haryana. In the Bhagavad Gita, Krishna says, "I am the Peepal tree among the trees, Narada among the Deva Rishi (Divine sages), Bhrigu among the Saptha-Maharishis, Chitraratha among the Gandharvas, and sage Kapila among the Siddhas (**The Bhagavad Gita – Chapter 10**)." In India, the medal for the highest civilian award, Bharat Ratna, is modelled on the leaf of a peepal tree (**Fig. 2**).



Figure 1: *Ficus religiosa* in semi-urban areas

It is used in traditional medicine for several types of disorders, including asthma, diabetes, diarrhea, epilepsy, gastric problems, inflammatory disorders, infectious, and sexual disorders (**Singh et al., 2011**). The fruits of *F. religiosa* are consumed

by different birds and wildlife. The fruits are also consumed by different communities. The fruits can be used as supplements after value additions. Keeping this in mind, an attempt has been made to document the bioactive compounds available on the fruits of *F. religiosa* through phytochemical screening. The present study draws attention to its importance and the need for value addition.



Figure 2: Leaves of *Ficus religiosa*

Methodology

Collection of plant sample and preparation of extracts

The fruits of *F. religiosa* were collected from the roadsides of CDA 9 of Cuttack district of Odisha state in June 2024 (**Fig. 3**). The plant was identified by the senior author. The Soxhlet method of extraction was adopted using different solvents for phytochemical analysis (**Kumar and Jena, 2014; Devi et al., 2023**). Detection of nine secondary metabolites was carried out using standard methods (**Kumar et al., 2013; Rani et al., 2024**).



Figure 3: Fruits of *F. religiosa* for experimental work

Qualitative phytochemical analysis

Test for tannin

About 1 ml of the filtrate of fruit extract was taken. Added about 3-5 drops of 0.1% lead acetate solution into it. The gelatinous precipitate formation confirmed the presence of tannin ([Tallur et al., 2024](#)).

Test for saponin

About 1 ml of the filtrate of fruit extract was taken and mixed with 1 ml of distilled water and allowed to shake it vigorously. The persistent froth formation after shaking confirmed the presence of saponin ([Sreedevi et al., 2024](#)).

Test for flavonoids

About 1 ml of the filtrate of fruit extract was taken and added 2 ml of 2 % NaOH solution followed by H_2SO_4 into it. The colour initially turned to an intense yellow

colour with the addition of NaOH solution and later become colourless with sulphuric acid. This change in colour confirmed the presence of flavonoids.

Test for terpenoids

About 2 ml of the filtrate of fruit extract was added with 6 drops of chloroform and place it in the water bath for few minutes. Then 6 drops of concentrated H_2SO_4 were added. The appearance of reddish-brown interface confirmed the presence of terpenoids.

Test for phenolic compounds

About 1 ml of the filtrate of fruit extract was taken. Few drops of 5% Ferric chloride solution were added into the filtrate extract. The appearance of bluish black colour provides the positive result of the phenolic compounds.

Test for reducing sugar

About 1 ml of the filtrate of fruit extract was taken and 2 drops of Fehling's solution A followed by Fehling's solution B were added and kept it in water bath for few minutes. The presence of red orange precipitate confirmed the positive result of the test for reducing sugar.

Test for steroids

About 1 ml of the filtrate of fruit extract was taken. 1 ml of chloroform and 1 ml of concentrated sulphuric acid was added into it. The appearance of upper red and lower yellow with green fluorescence provide the positive result for the presence of steroids.

Test for alkaloids

About 1 ml of the filtrate of fruit extract was taken and added 3 to 4 drops of Dragendroff's reagent. The formation of reddish-brown precipitate confirmed the presence of alkaloids.

Test for carbonyl compounds

About 1 ml of the filtrate of fruit extract was taken and added 3 to 4 drops of 2,4- Di-nitrophenylhydrazine reagent. The formation of yellow crystal confirmed the presence of carbonyl compounds.

Results and discussion

Phytochemical screening revealed that aqueous extract of fruits showed the presence of tannin, saponin, phenolic compounds and reducing sugar (Fig. 4). It was noticed that tannin, saponin, phenolic compounds, and reducing sugar were detected in methanol and ethanol extracts of fruits of *F. religiosa* (Table 1; Fig. 5-6).

Table 1: Phytochemical screening of secondary metabolites using different extracts of *F. religiosa* fruit

Bioactive compounds	Aqueous	Methanol	Ethanol
Tannin	+ve	+ve	+ve
Saponin	+ve	+ve	+ve
Flavonoids	-ve	-ve	-ve
Terpenoids	-ve	-ve	-ve
Phenolic compounds	+ve	+ve	+ve
Reducing sugar	+ve	+ve	+ve
Steroids	-ve	-ve	-ve
Alkaloids	-ve	-ve	-ve
Carbonyl compounds	-ve	-ve	-ve

(+ve: positive; -ve: negative)

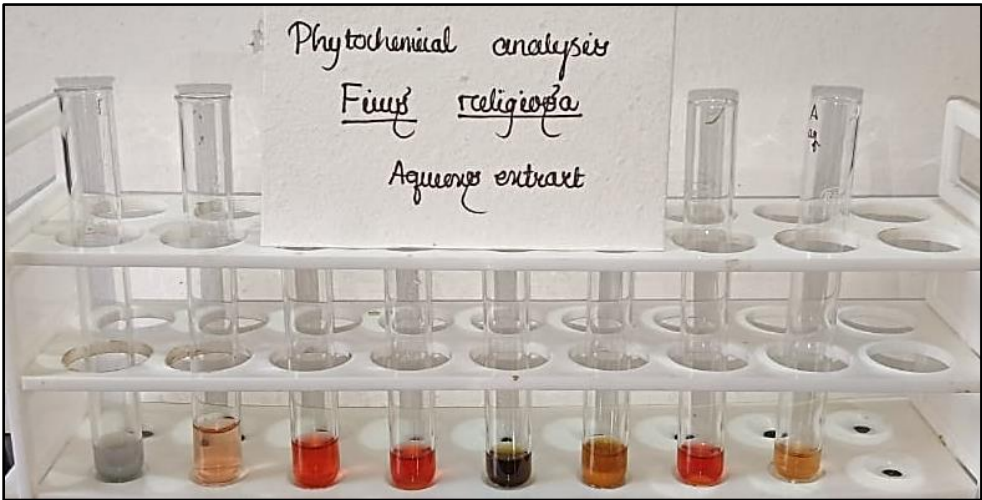


Figure 4: Detection of secondary metabolites using aqueous extract of *F. religiosa* fruit



Figure 5: Detection of secondary metabolites using methanolic extract of *F. religiosa* fruit



Figure 6: Detection of secondary metabolites using ethanolic extract of *F. religiosa* fruit

Researchers have reported pharmacological potential of *F. religiosa* leaves (Chandrasekar et al., 2010; Parameswari et al., 2013; Bhangale and Acharya, 2016) and other parts but less reports on fruits. Gulecha et al., (2011) documented the analgesic and anti-inflammatory activities of leaves of *F. religiosa* whereas Soni

and Dhiman, (2020) reported larvicidal and antibacterial activity of aqueous leaf extract of Peepal (*F. religiosa*) synthesized nanoparticles.

Conclusion

The present study indicates the presence of phenolic compounds and reduced sugar in the fruits of *Ficus religiosa*, which shows its nutraceutical potential. The study recommends taking the necessary steps on the value addition of fruits for sustainable utilization.

References

- Bhangale JO and Acharya SR. (2016). Anti-Parkinson Activity of Petroleum Ether Extract of *Ficus religiosa* (L.) Leaves. *Advances in Pharmacological Sciences*.9436106. doi: 10.1155/2016/9436106.
- Chandrasekar SB, Bhanumathy M, Pawar AT and Somasundaram T. (2010). Phytopharmacology of *Ficus religiosa*. *Pharmacognosy Review*. 4(8):195-199.
- Devi RS, Bihari SK and Kumar S. (2023). Validation of tribal claims for formulation of future drugs through evaluation of ethno-pharmacological values of *Ludwigia adscendens*. *Medicinal Plants*. 15(4): 691-697.
- Gulecha V, Sivakumar T, Upaganlawar A, Mahajan M and Upasani C. (2011). Screening of *Ficus religiosa* leaves fractions for analgesic and anti-inflammatory activities. *Indian Journal of Pharmacology*. 43(6):662-666.
- Kumar S and Jena PK. (2014). Chromatographic, antibacterial, and FT-IR analysis of *Dioscorea pentaphylla* L. tuber extracts. *Plant Science Research*. 36 (1 &2): 83-90.
- Kumar S, Behera SP and Jena PK. (2013). Validation of tribal claims on *Dioscorea pentaphylla* through phytochemical screening and evaluation of antibacterial activity. *Plant Science research*. 35: 55-61.
- Parameswari SA, Chetty CM and Chandrasekhar KB. (2013). Hepatoprotective activity of *Ficus religiosa* leaves against isoniazid+rifampicin and paracetamol induced hepatotoxicity. *Pharmacognosy Research*. 5(4):271-276.
- Rani J, Dhal A, Topno SC, Jena N, Kumar S and Tripathi G. (2024). Qualitative phytochemical analysis of bark of *Terminalia arjuna* (Roxb. ex DC.) Wight & Arn.: a medicinal tree. *Medico Biowealth of India*. APRF Publishers. 16: 47-56.
- Ranjan, Amitav (4 February 2014). "Sachin's Bharat Ratna today a medal from 2000". *The Indian Express*. New Delhi.
- Singh D, Singh B and Goela RK. (2011). Traditional uses, phytochemistry and pharmacology of *Ficus religiosa*: A review. *Journal of Ethnopharmacology*. 134 (3): 565–583.
- Soni N and Dhiman RC. (2020). Larvicidal and antibacterial activity of aqueous leaf extract of Peepal (*Ficus religiosa*) synthesized nanoparticles. *Parasite Epidemiology Control*. 11: e00166. doi: 10.1016/j.parepi. 2020.e00166.

Sreedevi A, Gurjar ES, Abidi A, Sharma BP, Jena N and Kumar S. (2024). Qualitative phytochemical analysis of *Artabotrys hexapetalus* (L.f.) Bhandari fruits: a medicinal tree of India. Medico Biowealth of India. APRF Publishers. 16: 37-46.

Tallur PN, Verma RK, Limaye P, Jena N and Kumar S. (2024). Qualitative phytochemical analysis of fruits of *Suregada multiflora* (A. Juss.) Baill.: a medicinal tree of India. Medico Biowealth of India. APRF Publishers. 16: 28-36.

The Bhagavad Gita – Chapter 10 – The Yoga of Manifestation". santosha.com.