Chapter 7

Qualitative phytochemical analysis of fruits of *Ficus benghalensis* L.

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Abstract

Indian banyan is a sacred tree in India. It has lot of ecological values but less documentation on fruits of Indian banyan. Therefore, fruits are selected as per their food values and qualitative phytochemical analysis was carried out. Results showed that fruits are rich with phenolic groups of compounds which indicates its medicinal and nutraceutical values. Further, more experimental works are needed in pharmacological aspects.

Keywords: Sacred groves, sacred trees, medicinal uses

Introduction

In Indian culture and mythology, a lot of tree species are sacred, like sacred fig, sacred garlic pear, cannonball, wood apple, weeping fig, Indian banyan, golden champa, mango tree, jackfruit tree, etc. (Das *et al.,* 2022; Kumar *et al.,* 2021). They are usually observed in sacred places, religious premises, and village gardens (Kumar *et al.,* 2018). The question is: why are they deeply associated with Indian culture and mythology? The answer could be that they have medicinal and food values along with ecological significance (Kumar and Jena, 2017). The question and answers clearly indicate their uses for human beings (Nayak and Kumar, 2023). In the contemporary global health and climatic situation, raising awareness through documentation, restoration, physical discussion, and print and online media is an important task and way to check the rapid destruction of life forms on earth and among the human populace of the world. Keeping this in view, an attempt has been made to document the phytochemicals available in the fruits of the sacred tree, *Ficus benghalensis* (Figures 1–2), through qualitative phytochemical analysis. It is commonly known as the Indian Banyan tree, and ecologically, it is the lifeline of

many pollinators. Fruits are edible and comes under minor edible fruits of India. The present paper highlights the importance of fruits as medicinal agents.



Figure 1: Leaves and fruits of Indian banyan



Figure 2: Fruits of Indian banyan

Methodology

Collection of plant sample and preparation of extracts

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

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.

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.

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

Field survey in different parts of India (Odisha, Jharkhand, and Uttarakhand) revealed that fruits are edible but occasionally. Phytochemical screening of fruits revealed that tannin, saponin, phenolic compounds and reducing sugar are detected (Table 1; Figures 3-5) in all three extracts (aqueous, methanol and ethanol) of fruits of *F. benghalensis*. The plant parts of *F. benghalensis* were also reported to contain carbohydrates, phenolic compounds, oil, fats, saponins, flavonoids, alkaloids, proteins, and tannins as major constituents that contribute to their antioxidant capacity (Murugesu *et al.,* 2021), which subsequently influences the pharmacological effects. It has lot of other pharmacological values (Murugesu *et al.,* 2021) which are illustrated in Figure 6.

Table 1: Phytochemical screening of secondary metabolites using different extracts of *F. benghalensis* fruits

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



Figure 3: Detection of secondary metabolites using aqueous extract of *F. benghalensis* fruits



Figure 4: Detection of secondary metabolites using methanolic extract of *F. benghalensis* fruits

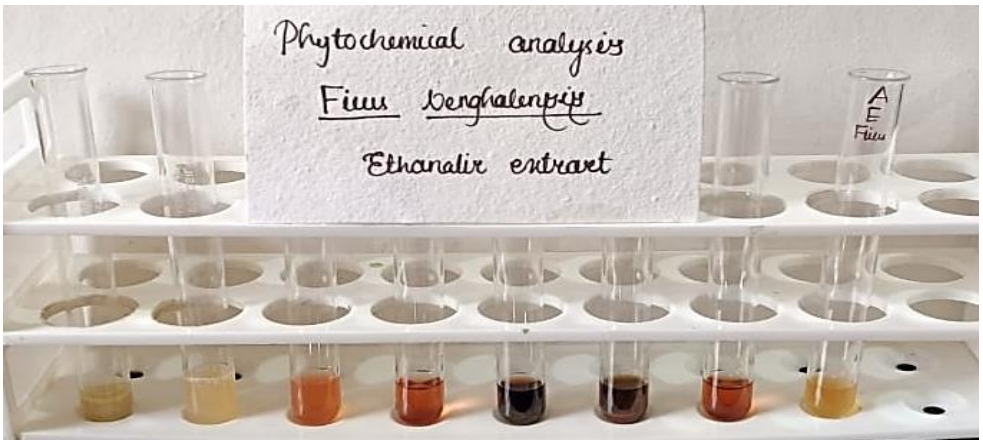

Figure 5: Detection of secondary metabolites using ethanolic extract of *F. benghalensis* fruits

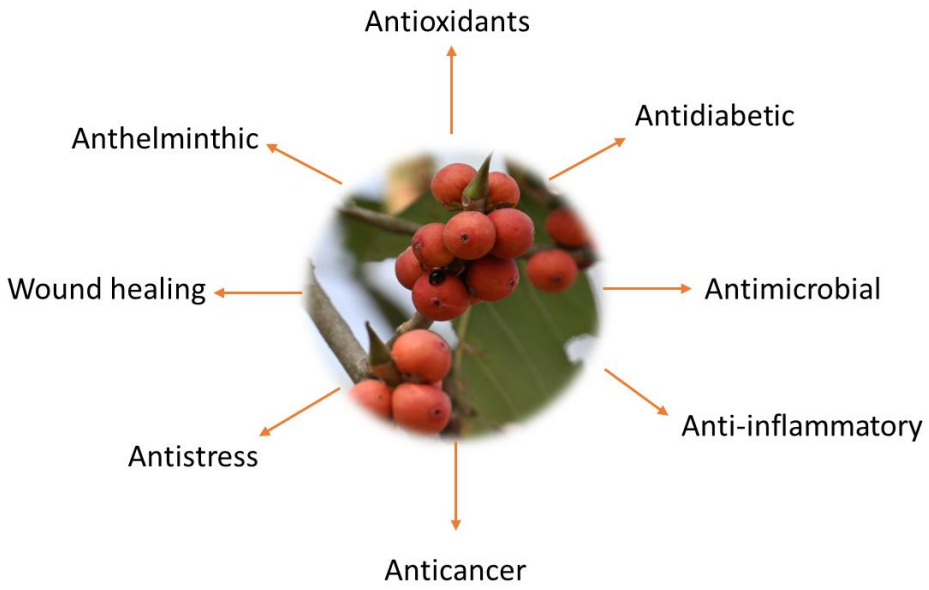

Figure 6**:** Common pharmacological values of *F. benghalensis*

Conclusion

In Indian culture, the banyan tree is revered. The tree is highly prized by Indians. There are numerous studies and documents supporting the therapeutic properties of roots, barks, and leaves, but fewer on fruits. This study emphasizes the nutritional, therapeutic, and ecological benefits of *F. benghalensis* fruits. The article also makes recommendations for conservation and large-scale plantations.

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