

## Preliminary phytochemical screening of *Ficus religiosa* for identification of bioactive compounds

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### Abstract

Phytochemical screening is a critical step in the isolation of new and innovative chemicals. A crucial step before bulk extraction and isolation is phytochemical screening. To identify the various types of secondary metabolites, the stem of *Ficus religiosa* was chosen for phytochemical examination. Terpenoids, flavonoids, and tannins, among other groups of beneficial secondary metabolites, were detected in the extracts. Terpenoids and flavonoids may be found in the bark. These discovered chemicals are what give *Ficus religiosa* its significant biological functions. In order to find new drugs, the researcher will be instructed to separate novel therapeutic compounds from different regions of *Ficus religiosa*.

**Keywords:** *Ficus religiosa*, phytochemical screening, methanolic crude extract, secondary metabolites.

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## 1: Introduction

Plants have been used for thousands of years to keep people well and enhance the quality of their lives by acting as useful components in medicines, cosmetics, flavors, beverages, and dyes. The idea that plants have innate abilities to enhance health and treat disease is the cornerstone of herbal medicine. The current emphasis on plant study around the world has led to a wealth of data that shows the immense potential of medicinal plants used in many traditional systems. Currently, there is a lot of public interest in the use of herbal remedies [1]. The "Peepal tree," also known as *Ficus religiosa* Linn (Moraceae), is a sizable tree with numerous branches that produces purple fruits in pairs and leathery, heart-shaped leaves on long, slender petioles. Both Buddhists and Hindus hold the tree in high regard as a sacred tree. It has been important in Indian mythology, religion, and medicine since antiquity [2-4]. The tree grows abundantly throughout India, especially close to temples, and is frequently farmed in southeast Asia. The Ayurvedic rasayana medication class includes *Ficus religiosa*. Rasayana has rejuvenating, anti-inflammatory, and stress-relieving properties [5, 6].

*Ficus religiosa* is a sizable deciduous tree with few to no aerial roots. With its long-petioled, rectangular, cordate, glossy leaves on the hanging branches, it is typically an epiphytic plant. Brilliant green leaves have a linear-lanceolate tail at the tip that is nearly half as long as the rest of the blade. The receptacles develop in pairs, are axillary, depressed globose, smooth, and purple when mature. The outside layer of the bark is frequently covered in crustose lichen, which is ash- or brown-colored and has membranous flakes. The cork has been exfoliated, leaving behind an uneven surface with irregular shallow vertical fissures. The inner surface is smooth, yellowish to orange-brown, and fibrous. The bark can be straight or slightly curled. The thickness range from 5 to 8 mm [7,8] It is a native of the Asia-Tropical region, which encompasses Pakistan, Myanmar, Iraq, India, Nepal, Thailand, Vietnam, China, and Bangladesh, and is cultivated in huge tropical expenses [9]. A methanolic extract of *Ficus religiosa* leaves inhibited acetylcholinesterase, demonstrating the herb's effectiveness in the treatment of Alzheimer's disease [10]. According to the early phytochemical investigation, the plant includes steroids, methionine, tannins, phenols, alkaloids, saponins, flavonoids, glycosides, sugars, and terpenoids [11-16]. The *Ficus religiosa*'s bark contains stigmaterol (phytosterolin), -sitosterol-d-glucoside lanosterol, bergaptol, vitamin K1, bergapten, lupen-3-one, and bergapten [17-20]. Ceryl behenate, leucoanthocyanidin, leucocyanidin-3-O-D-glucopyranoside, and leucopelargonidin-3-O-D are additional components

of the bark. Saponin, leucoanthocyanidin, -glucopyranoside, wax, lupeol, -sitosterol, lupeol acetate, and -amyrin acetate [21]. According to tradition, the leaf juice was used to treat ear, eye, and toothaches as well as migraines, scabies, gastrointestinal issues, asthma, diarrhoea, coughing, and haematuria. It was also used to treat sexual difficulties. The leaf decoction was used for toothaches. Scabies, asthma, and other respiratory problems were all treated with the fruit. The stem bark was used to cure bone fractures, gonorrhoea, haemorrhage, paralysis, diabetes, diarrhoea, and as an antiseptic and astringent [22]. The main objective of this work was to the detection of phytochemicals in the extract and fractions which is responsible for the traditional usage of *Ficus religiosa*.

## MATERIALS AND METHODS

### 2. Plant Material

*Ficus religiosa* parts such as stems were collected from the village Kalu Khan of district Swabi Pakistan's Khyber PukhtunKhawa province in the month of January 2022. The plant samples were identified by Dr. Muhammad Ilyas Department of Botany at the University of Swabi. The Voucher specimen Bot-101C was assign to identified plant.

#### 2.1. Extraction

The plant components were dried at room temperature for 10 days. Plant material from *Ficus religiosa* leaves was powdered down to a fine consistency. All plant ingredients were extracted after the components were ground up and steeped in methanol for five days. Using a rotating evaporator and reduced pressure at a temperature below 60 °C, the extracts were then concentrated.

#### 2.2. Phytochemical screening

Chemical investigations of the *Ficus religiosa* leaves extract in methanol employed standard techniques to identify the Sofowora-described components.[23], Evans and Harborne [24], and Trease [25].

#### 2.3. Flavonoids

The presence of flavonoids was determined by dissolving 0.5 g of plant extract in a moderate sodium hydroxide solution and adding a few drops of hydrochloric acid solution. The yellowish solution eventually turned colorless.

#### **2.4. Steroids**

In a mixture of 2 ml H<sub>2</sub>SO<sub>4</sub>, 2 ml acetic anhydride, and 2 ml, each extract was combined with 0.5 g. Steroids were found in some of the samples when the color changed from violet to blue or green.

#### **2.5. Tannins**

Each extract was filtered after being boiled in a water bath after being diluted with water. A few drops of ferric chloride were diluted and added to the filtrate. A dark green solution indicates the presence of tannins.

#### **2.6. Anthraquinones**

The minute fractions of the plant extract (0.5 g) and 10% HCl were coupled with a little amount of CHCl<sub>3</sub> and 10% ammonia to each filter, briefly brought to a boil, filtered, and heated. The rose-pink color indicates the presence of anthraquinones.

#### **2.7. Saponins**

When plant extract (0.3 g) is boiled in distilled water, the presence of saponins is indicated by a white foamy appearance (5 ml).

#### **2.8. Phlobatanins**

Before filtering, the extract (0.6 g) was diluted in distilled water. A 2% HCl solution was used to boil the filtrate. Phlobatanins appear as a red-colored precipitate.

#### **2.9. Terpenoids**

Concentrated H<sub>2</sub>SO<sub>4</sub> (3 ml) was carefully added to 0.4 g of each extract in 2 ml of chloroform to create a layer. The interface was successful in producing a reddish brown colour to show that terpenoids were present.

#### **2.10. Test for Cardiac Glycoside:**

To 2ml of plant extract, 1ml of glacial acetic acid and 5% ferric chloride was added. Then few drops of concentrated H<sub>2</sub>SO<sub>4</sub> were added. Presence of 2-4 greenish blue colour indicates the presence of cardiac glycosides.

**2.11. Test for Caumarine:**

Exact 3 ml of 10% NaOH was added to 2ml of aqueous extract formation of yellow colour indicates the presence of caumarine.

**2.12. Test for Anthocyanin and Betacyanins:**

0.5 ml of 1 N NaOH was added to 2 ml of plant extract and heated for 5 minutes at 100C. Anthocyanins, which provide a bluish-green colour, and betacyanins, which produce a yellow tint, are both present.

**2.13. Test for Soluble Starch:**

5% KOH was added to a little amount of each part before being heated, cooled, and acidified with H<sub>2</sub>SO<sub>4</sub>. The presence of soluble starch was interpreted as a yellow hue.

**2.14. Test for Glycosides:**

Each extract underwent HCl hydrolysis and NaOH solution neutralisation. Each mixture received a few drops of Feelings solution A and B. The presence of glycosides is shown by the red precipitate's formation.

**3. Results**

The results of the phytochemical screening of *Ficus religiosa* are given in Table 1.0. The various tests performed for the phytochemicals screening confirmed the presence of tannins, steroids, terpenoids, cardiac glycoside, coumarins and betacyanin in methanolic extract crude and its fractions of *Ficus religiosa*.

**Table 1.0:** Phytochemical s analysis of a crude extract of *Ficus religiosa* in methanolic fraction.

Phytochemicals	Hexane	Chloroform	Ethyl acetate	Methanol
Glycoside	–	–	–	–
Tannins	–	–	–	+
Saponins	–	–	–	–
Anthraquinone	–	–	–	–
Flavonoids	–	–	–	–
Phlobatanins	–	–	–	–
Steroids	+	+	+	+
Terpenoids	+	+	+	+
Cardic glycoside	–	+	+	+
Caumarins	–	+	+	+
Anthocyanin	–	–	–	–
Betacynin	–	+	+	+
Soluble starch	–	–	–	–

#### 4. Discussions

*Ficus religiosa* belongs to the family Moraceae and is found throughout the tropical and subtropical regions. Phytoconstituents are natural compounds that occur in various portions of plants. These are termed as primary and secondary metabolites. The presence of tannins, steroids, terpenoids, cardiac glycoside, coumarins, and betacynin were confirmed in the methanolic crude extract and fractions of *Ficus religiosa*. The polar compounds were identified in polar extract while nonpolar in non polar fraction.

The plants rich with these phytoconstituents are so much important owing to their multiple uses in traditional medicines, modern allopathic medicines, and food supplements [26]. The presence of tannins and steroids in methanol extract and were found to use against malaria and different forms of pains [27]. The methanol crude extract tested positive for tannins and glycoside and these phytochemical constituents are significant for the pharmacological activities of the plant [28].

Tannins, steroids terpenoids and cardiac glycosides were phytochemicals found in the crude methanol extract of plant. The experimental results tally with literature. The tannin phytoconstituents has anticancer and cytotoxic effect. The phenolic compounds such as tannins and terpenoids have anti-helminthic property so *Ficus religiosa* can be used to treat stomach problems [29]. The phenolic phytoconstituents such tannins and terpenoids present both in aqueous and methanol extract and found effective in scavenging the free radical cells [30]. In methanol crude extract the qualitative phytoconstituents screening confirmed the presence of tannins, steroids, terpenoids and caumarins. Study revealed that the biological activities such as anti-inflammation, anti-carcinogenic, cardiovascular protection and anti-apoptosis of the plant owing to these secondary metabolites [31]. Phyto-metabolites such as tannins, steroids, caumarins, betacyclin and cardiac glycosides were present in the methanolic extract. These secondary metabolites have in development of modern medicines [32].

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