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# Phytochemical Analysis and Traditional uses of two locally available *Ficus* species (*beneghalensis* and *sycomorus*)

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## Abstract

Two *Ficus* species that are commonly used in Sudanese Traditional Medicine for the management of various ailments were screened for their phytochemical groups using chemical reagent and Thin Layer Chromatography. Qualitative phytochemical tests were used to detect the presence of flavonoids, saponins, tannins, alkaloids, phenolic compounds and anthraquinones. Six compounds from F. benegalensis and seven from F. sycomorus quenching were reported from the various parts of these two plants. However , more number of compounds were found in the leaves. The data generated from this study have provided the chemical basis for wide use of *F. sycomorus* as therapeutic agent for treating various ailments. However, there is need to further carry out advanced hyphenated spectroscopic studies in order to elucidate the structure of these compounds. Furthermore, this data may be handy in probing of biochemistry of this plant in the future.

**Keywords:** Sudanese Traditional Medicine, Qualitative Phytochemical Tests, *Ficus benegalensis. F. sycomorus*.

## Introduction

Many medicinal plants play important role in individuals and communities health. The medicinal value of these plants depends on some chemical compounds that produce a definite physiological action in the human body. The most important of these bioactive constituents of plants are alkaloids, tannins, flavonoids and phenolic compounds.

The awareness of the role of medicinal plants in health care delivery of developing countries has resulted in researches into traditional medicine, with a view to integrating it with modern orthodox medicine (Sofowara, 1993).

The ethnopharmacological use of these two well known species indicate them to be rich of phytomedicines. *Ficus beneghalensis* and *F. sycomorus* possesses various pharmacological activities, however , it is imperative that more clinical and

pharmacological studies should be conducted to investigate the unexploited potential of these plants.

According to Ayurveda , *F. benegalensis* is astringent to bowels; useful in treatment of biliousness , ulcers, erysipelas, vomiting, vaginal complains, fever, inflammations, leprosy and is well known to be useful in diabetes. Accodring to Unani system of medicine, its latex is aphrodisiac , tonic, vulnerary, maturant lessens inflammations; useful in piles, nose-disease , gonorrhea etc. The aerial roots in styptic , useful in syphilis , biliousness, dysentery and inflammation of liver (Oudhia, 2004; Patil *et al*., 2010).

The antioxidant effect of aqueous extract of the bark of *F. benghalensis* has been evaluated in hypercholesterolemia rabbits ( Shukla et al., 2004). Two flavonoidal compounds obtained from the stem bark evaluated for their antioxidant action in hyperlipidemic rats (Daniel *et al*., 1998).

The methanolic, chloroform and petroleum ether extracts of the roots of *F. benghalensis* have potent anthelmintic activity (Aswar *et al*., 2008).

The anti-inflammatory effect of ethanolic and petroleum ether extracts of the bark were evaluated in experimental animals (Patil *et al*., 2009).

The aqueous extract of *Ficus benghalensis* at a dose of 500 mg/Kg/day exhibits significant antidiabetic activity streptozotocin induced diabetic rats (Mahalingam *et al*., 2008).

*F. benghalensis* leaves yield quercetin-3-galactoside , rutin, friedelin, taraxosterol, lupeol, beta-amyrin along with psorallen, bergapten and beta-sitosterol. The bark showed the presence of 5,7-dimethyl ether of leucopelargonidin -3-O-alpha-L rhamnoside and 5,3- dimethyl ether of leucocynidin 3-O-alpha-D- galactosyl cellobioside , glucoside , 20-tetra-triaconthene -2-one, 6-heptatriacontene-10-one, pentatriacontan-5-one have been isolated from the bark of the *F. benghalensis* (Patil *et al*., 2010). Biomonitoring ability of *F. benghalensis* leaves to temporal variations in Varanasi city (India) was recorded (Prajapati and Tripathi, 2008).

Ethnomedically the *F. sycomorus* is widely used in the management of some ailments. Humans, birds and mammals use the fruits as foods. The infusion when taken orally is used to treat tuberculosis. The dried root extracts and leaf infusion are used for diarrhea. The stem bark is used to increase lactation (Ibrahim *et al*., 2008). The powdered stem bark is soaked in water for about 6 h and the resulting aqueous solution is administered to the patient orally three times daily for several days for the treatment of a variety of ailments such as mental illness, epilepsy , insomnia , diarrhea and to relief pain (Quinn-Beattie, 2003).

*F. sycomorus* have been suspected to posses antidiarrhoeal activities (Ahmadu *et al*., 2007). The sedative and anticonvulsant properties of this plant have also been reported (Sandabe *et al*., 2003).

The leaf ethanolic extract of *F. sycomorus* was observed to be more potent against ciprofloxacin – sensitive and resistant tested bacteria than the stem bark extract of the same plant. The crude ethanol extract of the stem bark was found to have a median

lethal dose ($LD_{50}$) of 471.2 mg $Kg^{-1}$ in mice (i.p.). The crude ethanol extract of the plant was found to have anticonvulsant and sedative effects and antidiarrhoeal activirty (Ibrahim *et al*., (2008).

The phytochemical analysis of *F. sycomorus* revealed the presence of secondary metabolites such as tannins, anthraquinones, flavonoids, saponins, steroids, alkaloids (Adeshina *et al*., 2009). *F. sycomorus* contain flavonoids in their leaves and stem bark (Olusesan *et al*., 2010). Phytochemical screening of ethanol extract of the stem bark showed the presence of carbohydrates, flavonoids, saponins, tannins, steroids and triterpenes but alkaloids and anthraquinones were absent (Ibrahim *et al*., 2008). The aqueous extract of the stem bark showed the presence of tannins, alkaloids , reducing compounds, saponins, flavonoids , steroids, triterpenoids and anthraquinoside. The stem bark extract did not contain flavonoids , saponins and reducing compounds (Zaku *et al*., 2009).

The main objectives of the present study are to record ethnobotanical uses of two *Ficus* species (*F. beneghalensis* and *F. sycomorus*) and to compare between *F. beneghalensis* and *F. sycomorus* leaves, stem bark and root bark phytochemically.

**Materials and Methods:**

Collection of plant material and identification:

Two Ficus species (*F. benghalensis and F. sycomorus*) leaves , stem bark and root bark used in this study were harvested in April 2010, from Botanical Garden, Khartoum.

**Identification of the specimens:**

Voucher specimen had to be identified directly in the field. The correct classification , where a book "Trees and shrubs of the Sudan" (EL-Amin, 1990) was used. Voucher specimens of the plant material were deposited at the Faculty of Pharmacy, University of Science and Technology.

**Preparation of Herbarium specimens:**

The voucher specimens were directly dried in the field using a conventional press. A number tag was added to each specimen and it was placed on an open folder (newspaper) and sandwiched between pieces of newspaper and corrugated paper. The straps were fastened tightly and the press was placed in laboratory. The papers were changed regularly to keep the moisture content as low as possible ( to avoid mould and decay) and to check for insect attack.

**Plant materials for Phytochemical screening:**

The plant materials were milled into powder with the aid of an electrical grinder and finally stored in air tight bottles before phytochemical analysis.

**Preliminary Phytochemical screening :**

**Extraction of Plants:**

50 g plant powder of each plant material was macerated with ethanol (80%) in a conical flask for 24 hours separately. Crude ethanolic extract was filtered out and evaporated

to obtain ethanolic extract, while plant material residue was discarded. All extracts were stored dry in sterilized containers at room temperature until used for phytochemical screening.

**Tests:**

The ethanolic extracts of each investigated plant species were tested for flavonoids, saponins, tannins, alkaloids, anthraquinones, phenolic compounds . The phytochemical tests were performed according to the method of Brinda *et al*., 1981 and are presented in Table 1.

**Table 1. Preliminary Phytochemical screening**

| Test | Observation | Influence |
|---|---|---|
| 1 ml of plant solution + bit of magnesium and 2 drops of conc. HCl and heat | Red colour | Presence of flavonoids |
| 1 g of plant powder with 5 ml distilled water and vigorously shaked for 30 seconds and allow to stand | Foam | Presence of saponins |
| 1 ml of plant solution extract + Water+ lead acetate | White precipitate | Presence of tannins |
| 1 ml of plant solution extract + 2M HCl aqueous layer formed, decanted and two drops of Mayer s reagent added. | White precipitate | Presence of alkaloids |
| 1 ml plant solution extract + 1 drop of ferric chloride III | Intense colour | Presence of phenolic compounds |
| 1 ml of plant solution extract + 5 ml of benzene + 2.5 ml of 10% ammonia solution. | Reddish colour | Presence of anthraquinones |

**Thin Layer Chromatography Techniques:**

Phytochemical studies included Thin Layer Chromatography (TLC) profiles of extracts. Chromatograms were carried out on silica gel G-60 $PF_{253}$ with three mobile phase (Table 2).

**Table 2. Thin Layer Chromatography (TLC) for detection secondary metabolites:**

| No | Solvent system |
|---|---|
| 1 | n-Butanol:glacial acetic acid : Water (4:1:5 v/v/v) |
| 2 | Acetic acid : Water (3:2) |
| 3 | Acetone:Toluene :Formic acid (9:9:3) |

Iodine vapor was used as developer.

## Results and Discussion

In Sudanese traditional medicine, a decoction of stem bark is given for cough , throat infections and also is used as an emollient. The stem latex collected from the tree is smeared on the teeth gum to relieve teething pain.

The curative properties of medicinal plants are perhaps due to the presence of various secondary metabolites such as alkaloids , flavonoids, etc. The extracts of leaves , stem bark and root bark of Ficus species (benghalensis and sycomorus) have revealed the presence of flavonoids, tannins and phenolic compounds Tables 3 and 4). Thus the preliminary screening tests may be useful in the detection of the bioactive principles and subsequently may lead to the drug discovery and development. Further, tests facilitate their quantitative estimation and qualitative separation of pharmacologically active chemical compounds.

The data of qualitative separation of some secondary metabolites from leaves, stem bark and root bark of *F. benghalensis* and *F. sycomorus* by Thin Layer Chromatography is tabulated in the Tables 3 and 4.

Six compounds from *F. benghalensis* and seven from *F. sycomorus* quenching were reported from the various parts of these plants. However, more number of compounds were found in the leaves (3 spots).

**Table 3 The results of phytochemical screening of the ethanolic extract of the investigated species**

| Plant/Plant part | FL | SA | TA | AL | AQ | PC |
|---|---|---|---|---|---|---|
| *Ficus benghalensis* | | | | | | |
| Leaves | + | - | + | + | + | + |
| Stem bark | + | - | + | + | + | + |
| Root bark | + | - | + | + | + | + |
| | | | | | | |
| *Ficus sycomorus* | | | | | | |
| Leaves | + | - | + | + | - | + |
| Stem bark | + | - | + | - | - | + |
| Root bark | + | - | + | - | + | + |
| | | | | | | |

FL = Flavonoids ; SA = Saponins; TA = Tannins; AL = Alkaloids; AQ = Anthraquinones; PC= Phenolic compounds.

**Table 4. The results of TLC examination of some secondary metabolites :**

| Plant/Plant part | No of spots | Rf value | Colour |
|---|---|---|---|
| *Ficus benghalensis* | | | |
| Leaves | 1 | 0.36 | Pale brown |
| Stem bark | 1 | 0.38 | Pale brown |
| Root bark | 1 | 0.39 | Pale brown |
| | | | |
| *Ficus sycomorus* | | | |
| Leaves | | | |
| Stem bark | | | |
| Root bark | 1 | 0.40 | Pale brown |
| | | | |

| Solvent system: n-Butanol:glacial acetic acid:Water (4:1:5 v/v/v) | | | |
|---|---|---|---|
| | | | |
| | | | |
| *Ficus benghalensis* | | | |
| Leaves | 1 | 0.82 | Yellow |
| Stem bark | 1 | 0.75 | Brown |
| Root bark | 1 | 0.74 | Brown |
| | | | |
| *Ficus sycomorus* | | | |
| Leaves | 1 | 0.25 | Yellow |
| | 2 | 0.30 | Green |
| | 3 | 0.70 | Pale yellow |
| Stem bark | 1 | 0.25 | Pale brown |
| | 2 | 0.72 | Green |
| Root bark | 1 | 0.76 | Brown |

Solvent system: Acetic acid : Water (3:2)

**Conclusion and Recommendations**

The present study deals with the phytochemical screening of therapeutic importance from *Ficus* species (*benghalensis* and *sycomorus*) , an important medicinal plants. This study involves the preliminary screening , qualitative Thin Layer Chromatographic separation of secondary metabolites from the leaves, stem bark and root bark of *F. benghalensis* and *F. sycomorus*.

The data generated from this study have provided the chemical basis for wide use of *F. sycomorus* as therapeutic agent for treating various ailments. However, there is need to further carry out advanced hyphenated spectroscopic studies in order to elucidate the structure of these compounds. Furthermore, this data may be handy in probing of biochemistry of this plant in the future.

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