**REVIEW ARTICLE**

# Future Pharmacological Prospectives and Multiple Diagnostic Recognition of Traditional Medicinal Plant *Ficus racemosa*

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**ABSTRACT**

A significant medicinal plant called '*Ficus racemosa'* of the Moraceae species can be found in Southeast Asia, Australia, and India, Mainly in the states of Maharashtra, Gujarat, Uttar Pradesh, Karnataka, and Tamil Nadu. It is frequently referred to as "gular." Due to the presence of bergenin as a flavonoid, it acts as an anticancer. Numerous isolated active components from various portions of this plant have been discovered to possess advantageous pharmacological characteristics. According to a literature review, it has various pharmacological actions, including liver-protective activity, anti-HIV, antidiabetic, antidiarrheal, antioxidant, antipyretic, anti-inflammatory, antifungal, anticancer and antibacterial activities. This review study does a good job of discussing this particular plant's traditional usage, phytochemistry, pharmacology, and toxicity.

**Keywords:** Gular, Moraceae, Pharmacological, Phytochemical.

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## INTRODUCTION

Traditional medicine is a branch of medicine or a kind of treatment that is based on the use of plants, animals, or the products of those animals, other naturally occurring substances (some of which are inorganic in nature compounds), cultural practices, as well as physical harm and other manipulations. Considering that this healthcare system has essentially not evolved over periods of time. It is referred to as "traditional" for the treatment of many physical and psychological problems. The proper use of products of guaranteed quality, good communication between allopathic practitioners and patients, as well as traditional medicine providers and patients, and the dissemination of scientific information and advice for the general public are just a few of the many aspects of traditional medicine. Ayurveda, Siddha, and Unani are three of the traditional medical systems practiced in India.[1]

Because of their powerful pharmacological activity and cost-effectiveness, herbal medications are in greater demand because they are helping the public. However, extensive study is required to standardize and confirm traditional *Ayurvedic* treatments regarding their potency, safety, and efficacy.[2]

Southeast Asia, Australia, and India are the original *Ficus racemosa* plant home countries. It is extensively distributed, ranging from the outside Himalaya regions to the Punjab region, Khasia Mountain, Chota Nagpur, the state of Bihar and Orissa, India, among other locations. It's used in the states of West Bengal, Rajasthan, the Deccan area, and the majority of South India. Bergenin, the active constituent extracted from the stem bark, has good anticancer (Hypolipidemic Renal Anticarcinogenic) potential. The pharmacological effects of this plant include anticancer, antidiabetic, anti-filarial, and hepatoprotective effects, antidiarrheal, anti-inflammatory, and antipyretic. In this review paper, we go into great detail about the pharmacology and phytochemistry of this plant.[3]

### Characteristics of *F. racemosa*

Species of the Moraceae family are important plants used in traditional medicine. It is naturally scattered in places like Australia, China, Indonesia, and Myanmar. In particular, it may be found in Andhra Pradesh and Assam, Delhi, Goa, Gujarat, Maharashtra, Kerala, and Karnataka, among other places in India. The chosen plant species grow to a height of 30 m. smooth, coarsely flaky, and fibrous bark that is 8 to 10 mm thick, as well as a creamy pink blaze and milky latex. Branchlets have a thickness of 1.5 to 3 mm and are pubescent. Young shoots and twigs are sparsely covered in small white hairs but quickly turn globrous. The dark green, 6 to 10 cm long leaves are on the plant. Large clusters of the plant's pyriform, 2 to 5 cm in diameter fruit receptacles sprout from the center of the trunk. The seeds are small and abundant, looking like grains. Long and brownish in color, the plant's roots are long and unpredictable in form. The plant has a year-round growing season, and it thrives in deciduous forests, damp areas near streams, and woodlands that are evergreen up to 1,800 metres

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**Table 1:** Plant profile and morphological characteristics of plant (Joseph. *et al* 2010. P.246)

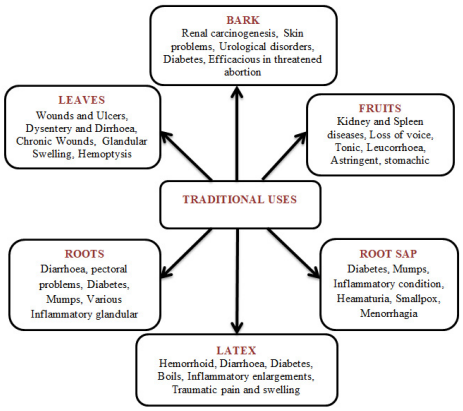
| *Kingdom* | *Plantae* |
|---|---|
| Subkingdam | Viridiplantae-green plant |
| Superdivision | Embryophyta |
| Division | Tracheophyta-vascular plant |
| Subdivision | Spermatophytina-spermatophytes |
| Class | Magnoliopsida |
| Superorder | Rosanae |
| Order | Rosales |
| Family | Moraceae-mulberries |
| Genus | *Ficus* L. |
| Species | racemosa. |
| Common names: | |
| Marathi | umber |
| Sanskrit | udumbar |
| Hindi | Goolar |
| English | Cluster fig |
| Tamil | Atti |
| Telugu | Paidi |
| Distribution | India, China, Indonesia, Myanmar, Nepal, Afghanistan, the island of Sri Lanka, Bangkok, and Vietnam are all included in Asia; Sydney is in Australia. Local distribution: the states that participate in this system are the following: Andhra Pradesh, Bihar, Assam, New Delhi, the state of Goa, Gujarat, India, Jammu and Kashmir, Kerala, Karnataka, Madhya Pradesh, Mumbai, Maharashtra, the Meghalaya Odisha state, the state of Rajasthan, Tamil Nadu, Uttar Pradesh, Uttarakhand, India and West Bengal, among others. |
| Specimen collected from | Near Ranlaka lake area Kolhapur. |
| Morphology | A deciduous tree called *F. racemosa* may grow as high as 34 metres. It has a buttressed bole, bark that is 8–10 mm thick, surface that is soft as well as fibrous, moderately flaky, and pale pink in the blaze and milky in the latex part. Young shoots and twigs have tiny white hairs, but they quickly become glabrous skin. Branches are pubescent and 2–4 mm thick. Leaves: The leaves are 7–10 cm long and dark green. Fruits: This plant produces big clusters of pyriform, 4–7 cm in diameter fruit receptacle that emerge from its primary trunk or wide branches Seeds: The seeds are tiny, numerous, and resemble grains. |
| Chemical constituents | *F. racemosa* is a rich source of numerous phytochemical compounds (alkaloid, flavonoids, tannins, saponins, bergenin, stigmasterol, lupenol, β-sistosterol, α-amyrin, kaempferol, and other compounds). |

from the level of the sea communities, it is frequently grown for its shade and edible fruits.[4]

## Traditional uses of *f. Racemosa*

*F. racemosa* Linn has been used extensively in traditional medicine for a number of ailments. Its tree bark, leaves, fruit, roots, latex-based substances seeds, and other parts are all utilized in a variety of methods for therapeutic purposes, occasionally in conjunction with other plants.[5]

**Figure 1:** *F. racemosa (Joseph. et al 2010. P.246)*




**Flowchart 1:** Traditional uses of *F. racemosa (Parihar S. et al. 202. P.96)*

## Pharmacological activity

the various plant sections demonstrated effective therapeutic actions.

## Anticancer

*In-vitro* cytotoxicity and anti carcinogenic activities of *F. racemosa* Lin. with relation to the MCF7 human carcinoma of the breast cell line. The effects of the ethanolic extracts of the tender fruits of *F. racemosa* on MCF7 human carcinoma of the breast cell lines were evaluated using the Sulphorodamine B (SRB) assay. There were three observations: $LC_{50}$, TGI, and GI 50. At 540 and 690 nm, absorbance was measured using an Elisa Plate reader. *F. racemosa* of Lin. Exhibited LC50, TGI, and GI50 activity at an 80 g/mL concentration. As a result, *F. racemosa* Lin can be mentioned. The fruit extract includes a few cytotoxicity and anti-carcinogenic effect at 80 g/mL. In the concentration of plant-based extracts on the human carcinoma of the breast MCF7 cell line,[6]different investigator postulated that the cytotoxic effects of the methanol extract of F. racemosa were capable of killing several hepatic malignant cell lines, including HepG2, HL-60, HEK-293T and NCI-H23. Even though the methanol extract extract's 50% inhibition concentration ($IC_{50}$) values were very small, the researchers found that it had higher degrees of cytotoxic on HepG2 and HL-60cells than on different widely used cell lines.[7]

**Renal anticarcinogenic Activity**

*F. racemosa* Lin. When given at dosages of 200 mg as well as 400 mg per kg of body weight, respectively, the extract considerably lowered the enzymes of xanthine oxidase, peroxidation of lipids, glutamyl transpeptidase, and hydrogen peroxide in the body. Renal glutathione levels and antioxidant enzyme activity considerably increased, but the creation of DNA, blood levels of urea nitrogen-containing compounds, serum creatinine level, and ornithine decarboxylase activity significantly decreased.[8] Similar outcomes were seen when ferric nitrilotriacetate (Fe-NTA) was used as a renal cancer.[9]

**Antioxidant function**

The activity of antioxidants is measured using the 1,1-diphenyl-2-picrylhydrazyl radical (DPPH), a substance that neutralizes free radicals. Hydrazine reacts with hydrogen donors to decrease the DPPH free radical, which then undergoes hydrogen donation to generate stable DPPH molecules. By a decrease in DPPH absorbance at 519 nm, this method makes it simple to assess the antiradical potency of a substance with antioxidant activity. The colr of the DPPH altered from purple to yellow as well as discoloration when the absorbance at 517 nm of the methanol extract of the leaves and stems was measured. The leaf and stem extract showed antioxidant properties when it was put up against commercial hydroxytoluene butylated (BHT).[10]

**Hypolipidemic Activity**

By producing alloxan, an ethanol extract of barks at a dosage of one hundred to five hundred mg per kg body weight was given to diabetic rats. When compared to standard glibenclamide, it exhibits hypolipidemic activity. It also exhibits hypocholesterolemic effects in rats induced by dietary fiber-rich fruits. The evaluation A close proximity administration of cold aqueous extract (FRC) and hot aqueous extract (FRH) demonstrates suppression of action against pig renal and rabbits lungs ACE. In compared to cool extract, hot aqueous extract has more hypertensive activity, and both extracts show higher inhibition of ACE in pig renal and rabbits lungs. FRH had lower values for the $IC_{50}$ at Concentrations 1.36 and 1.91 g/mL compared with FRC at Concentrations 128 and 291 g/mL for pig renal and rabbits pulmonary ACE.[11] when compared with FRC, ACE at doses of 128 and 291 g/mL in pig renal and rabbits lungs tissues, respectively. Radial scavenging activity was used to study the enzyme responsible for Angiotensin converting is inhibited. Dosage of both extracts was administered For the extracts FRC and FRH, it shows an effective inhibition of approximately 87 and 75% at a concentration of 25 g/mL, respectively FRH at 10.8 g/mL demonstrates a lower $IC_{50}$ value when compared with FRC and BHT with concentrations of 15.8 g and 16.5 g/mL, respectively.[12]

**Anti-inflammatory Properties**

Histamine and serotonin were shown to be inflammatory, while petroleum ether from the leaves of plants has been demonstrated to possess anti-inflammatory effects. Dextran-induced swelling is reduced and is mediated by serotonin and histamine.[13] Bark extract in ethanol inhibits the production of phospholipase A2, COX-1, 5LOX and PGE2. The effects of petroleum ether of leaf extract against dextran-induced rat hind paw edema, carrageenan and, serotonin, and histamine range from 200–400 mg per, depending on body weight. At a dosage of 400 mg peak results were seen in chronic testing when compared with phenylbutazone and NSAIDs.[14]

**Antidiarrheal Action**

Rats were used in various experimental types of diarrhea to study the effects of a stem bark ethanol extract. Animals such as rats were used in studies to induce constipation with castor oil, enteropooling with PGE2, and eating the charcoal every time the inhibitory action was evident. This extract exhibits antidiarrheal action when used on rats.[15]

**Antipyretic Activity**

*F. racemosa* Lin. Bark a methanol extract, shows antipyretic action when given at concentrations of 200 and 300 mg per body weight. Body temperature significantly decreased at a dose-dependent rate when comparing healthy and yeast. Induced in albino rats pyrexia. The extract's antipyretic effects were on par with those of the common antipyretic medication, paracetamol (150 mg/kg bw).[16] When rats were exposed to yeast-induced pyrexia, The leaf's petroleum ether extraction and decoction exhibited strong antipyretic properties via equal to indomethacin.[17]

**Antiulcer**

The 50% ethanol extracts of fruits were administered orally twice per day for five days to study the outcomes of pylorus ligature, alcohol, as well as cold-restraining stress-induced ulceration in the rats. The extract showed a dose-dependent decrease of the index of ulceration across all three categories of the ulceration model.[18]

**Liver-protective behaviour**

The methanol extract of the stem bark showed hepatoprotective action against the carbon tetrachloride ($CCl_4$)-induced Model in the rats at dosages of between 250 and 500 mg/kg, PO. All enzyme levels, including aspartate aminotransferase, alanine aminotransferase, and alkaline phosphatase, were lower in the extract-treated animals than in the control group. In an analogous experiment, the investigators evaluated several oxidative parameters and considered that serum, the renal system, and hepatic levels of the enzyme superoxide dismutase as well as catalase, increased along with the amount of oxidized lipid decreased.[19] The study *in-vivo* rat model utilizing leaves containing extract of ethanol showed a similar ability in an alternative experiment.[20]

**Analgesic**

The ethanol-based extract of the leaves as well as the bark was evaluated for its analgesic properties using dosimeters of 100, 300, and 500 mg and it was discovered that it had an analgesic effect as well.[21]

**Anthelmintic Activity**

The tree bark water extract demonstrated anthelmintic action on grown-up earthworms in an experiment of spastic paralysis

(dose 50 mg/mL), and its effect was comparable to that of 3% piperazine citrate (dosage of 3%). Standard). After five hours of regular treatment, the worms return to their normal state, while the water extract paralyzes them completely. This demonstrates the anthelmintic property of the bark.[22]

**Memory enhancing active**

The ability of the anticholinesterase activity of *F. racemosa* shell (water extract) to increase acetylcholine levels was evaluated. The results of their study demonstrated that it had anti-dementia effects in rats.[23]

**Chemopreventive effect on the nephron**

The extract of *F. racemosa* (200 and 400 mg/kg of body weight PO) included a variety of phenolic and flavonoid components, such as quercetin as the compound ellagic acid, gallic acid, a type of acid, and the terpenoids lupeol, lupeol acetate, and α-amyrin. Subsequently, this extract decreased the oxidative damage on the renal system and testes.[24]

**Wound healing**

In multiple rat wound models, stem bark (ethanol extract) demonstrated a therapeutic effect.[25]

**Antitussive**

The antitussive effects of methanol extract from the plant's stem bark were assessed in rats using a cough paradigm caused by sulfur dioxide gaseous form. The extract's highest inhibiting efficacy was 56.7% at a dosage of 200 mg/kg. (p.o.) Two hours after consuming the medication.[26]

**Hypoglycemic Activity**

An orally administered 250 mg/kg/day, extracted from ethanol, was used to evaluate the hypoglycemic activity study and hypoglycemia was determined after two weeks. *F. racemosa* exhibits hypoglycemic activity. Alloxan rats with albino diabetes exhibit hypoglycemic behavior.[27] At 200 to 400 mg/kg, p.o. dosages, the methanolic stem bark extract also had hypoglycemic effects. This test was performed on

**Table 2:** Phytochemical constituents found in different parts of plant extract (Sangameswaran B. *et al* 2008. p. 79)

| *Sr.No* | *Name of the Compound* | *Molecular formula* | *Part of the plant* | *Pharmacological activity* |
|---|---|---|---|---|
| 1. | Bergenin | $C_{14}H_{16}O_9$ | Stem bark | Anticancer,<br>Anti-dibetic,<br>Anti-infective, Hepatoprotective |
| 2. | β - sitosterol | $C_{29}H_{50}O$ | Stem bark<br>Trunk bark<br>Latex | Hypoglycemia,<br>Antidiabetic,<br>Anticancer,<br>Anti-microbial, immunomodulatory activities |
| 3. | α-amyrin acetate | $C_{32}H_{52}O_2$ | Stem bark | Anti-inflammatory, antioxidant |
| 4. | Lupeol acetate | $C_{32}H_{52}O_2$ | Stem bark<br>Fruits | Antiprotozoal<br>Both anti-microbial and anti-inflammatory,<br>antioxidant, and anti diagnostic,<br>Cancer prevention and wound healing |
| 5. | Stigmasterol | $C_{29}H_{48}O$ | Stem bark<br>Trunk bark | anticancer, and antioxidant, anti diabetic,<br>antibacterial,neuroprotective, immunostimulating,<br>and anti fungal |
| 6. | Tiglic acid | $C_5H_8O_2$ | Fruits | Anti-inflammatory |
| 7. | Friedelin | $C_{30}H_{50}O$ | Fruits | Analgesic,<br>Antipyretic,<br>Anti-<br>inflammatory |
| 8. | Lanosterol | $C_{30}H_{50}O$ | Leaf | Anti-inflammatory |
| 9. | Lupenol | $C_{30}H_{50}O$ | Stem bark<br>Trunk bark<br>Fruits | Anti-microbial,<br>Anti-inflammatory<br>Anti-protozoal. |
| 10. | Gallic acid | $C_7H_6O_5$ | Stem bark | Antioxidant,<br>Anti-inflammatory<br>Anti-neoplastic properties |
| 11. | Racemosic acid | $C_4H_6O_6$ | Leaf | Anti-inflammatory<br>COX-1, COX-2 inhibitor,<br>Antioxidant |
| 12. | Kaempferol | $C_{15}H_{10}O_6$ | Stem bark<br>Fruits | Antioxidant,<br>Reduce the risk of<br>chronic disease,<br>Anticancer |
| 13. | Campesterol | $C_{28}H_{48}O$ | Stem bark | Anticarcinogenic,<br>Cholesterol-lowering |

| | | | | |
|---|---|---|---|---|
| 14. | Euphol | $C_{30}H_{50}O$ | Latex | Anti-cancer, Molluscicide. |
| 15. | Tirucallol | $C_{30}H_{50}O$ | Stem bark Leaf | Anti-mutagenic, Molluscicide, Antibacterial, Anti-hereptic |
| 16. | Taraxerol | $C_{30}H_{50}O$ | Fruit | Anti- inflammatory COX-1, COX-2 inhibitor, Antioxidant, Anti-microbial, Anti-allergic. |

mice with normal alloxan-induced diabetes. However, this action demonstrated an antidiabetic effect compared with the conventional antidiabetic drug glibenclamide at 10 mg per dosage. Compared to different isolated compounds, β-sitosterol from the bark has a stronger effect. Fruit extracts in methanol administered lower glucose levels in normal and alloxan-induced insulin-dependent animals like rabbits at one, two, three, and four g/kg dosages. Compared with a mouse model of streptotocin-induced diabetes, blood sugar was reduced by 18.4% and sucrose by 17.0% when α-amyrin acetate, an essential ingredient extracted from fruit, was used at a 100 g/kg dose.[28,29]

## CONCLUSION

The purpose of the current review study showed *F. racemosa* can be used in daily life and is employed for public health. The medicinal uses of the plants are numerous. A medical professional who treats illnesses. Different plant parts have pharmacological extracts, including leaves, latex, fruits, and bark. Antibacterial, antifungal, anti-hypoglycemic, hypolipidemic, anti-inflammatory, antidiarrheal, antidiabetic, anti-diuretic, anticancer, and antiulcer properties are among the important compounds found in plants that have been identified and used for treatment a wide range of illnesses. Similar to homeopathy, unani, ayurveda, and Siddha, it belongs to a popular indigenous medicinal system. It has a crucial role in the conventional system. The study looks at plant potential and emphasizes how important it is to the pharmaceutical sector. In India, the plant is abundantly accessible. It contains antibiotic, antioxidant, and antibacterial qualities.

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