

A Review on Ficus Racemous Plant

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Abstract: *Ficus racemosa* Linn.Syn. *Ficus glomerata*Roxb. (Family - Moraceae) is a large deciduous tree dispersed all over India which is generally known as Gular, Gular fig, Cluster fig or Country fig. It is a sacred tree of Hindus and Buddhists. The common name is 'Audumbar' and 'Umbar' and used in Unani, Ayurveda and Homeopathy. All parts of this plant (leaves, fruits, bark, latex, and sap of the root) are medicinally significant in a variety of treatments such as diabetes, diarrhoea ulcers, stomachache, piles, skin diseases, dysentery and as carminative etc. Among various pharmacological properties, *Ficus Racemosa* Linn imparts vital role as anti-oxidant, anti-cancer, antidiuretic, anti-bacterial, anti-inflammatory, memory enhancing and gastro-protective agent etc

Keywords: Ficus Racemous, Anti-pyretic, Anti-inflammatory, wound healing, Anti- microbial, Stem bark.

I. INTRODUCTION

Ficus racemosa (Linn) is a moderate sized avenue plant, belongs to family- Moraceae which is usually known as the Cluster Fig Tree, Indian Fig Tree or Goolar (Gular) Fig. This plant is native to Australia, Malaysia, South-East Asia and the Indian Subcontinent¹. *Ficus racemosa* grows all over India in several forests and hilly areas. It is frequently available around the water streams and is also cultivated. Found along the river banks and inland forests from plains to 1500 m most frequently in India, Sri Lanka, Pakistan, Queensland and South China to New Guinea. The plant can be grown by vegetative as well as sexual propagation (using seeds)^{2,3}. By isolating the important components from different parts of plant like: roots, stems, leaves, barks, flowers and fruits formulation can be made and used for many diseases like: Roots- hydrophobia, Barks- galactogogue, Fruits- blood disorders, dry cough, burning sensation, leprosy, menorrhagia, Leaves- astringent, bronchitis. The leaf of *F. racemosa* contains Flavonoids, triterpinoids, alkaloid and tannins. The fruit have glauanol acetate, tiglic acid, taraxasterol, lupeol acetate and many more constituents are present in other part of plant⁴.

The stem bark has good therapeutic properties like Anti-inflammatory, Wound- healing, Anti- microbial, Anti-tussive, Anti-oxidant, Anti-bacterial, Anti-fungal, and Hypoglycemic properties^{27,28,29,42,43}.

TAXONOMY: *Ficusglomerata*

Table 1. Taxonomic position of *Ficusracemosa* Linn.

Kingdom	Plantae
Division	Magnoliophyta
Class	Magnolipsida
Order	Urticales
Family	Moraceae
Genus	Ficus
Species	racemosa

Table 2. Phytoconstituents of *Ficus racemosa* Linn.

Leaf	Sterols, tannins and flavonoids, triterpenoids (Lanosterol) and alkaloids. A new tetracyclic triterpeneglauanol acetate which is characterized as 13 α , 14 β , 17 β H, 20 α H-lanosta-8, 22-diene-3 β acetate and racemosic acid were isolated from the leaves ⁵ .
Stem-Bark	Tannin, wax, saponingluanol acetate, β -sitosterol, leucocyanidin- 3 - O - β - D - glucopyranoside, leucopelargonidin - 3 - O - β - D - glucopyranoside, leucopelargonidin - 3 - O - α - L - rhamnopyranoside, lupeol, cerylbehenate, lupeol acetate, α -amyrin acetate, leucoanthocyanidin, and leucoanthocyanin from trunk bark, lauanol acetate, lupeol, β -sitosterol and stigmasterol were isolated from stem bark, Upenol, β -sistosterol and stigmasterol ⁶ .
Fruit	Glauanol, glauanol acetate, hentriacontane, β sitosterol, glauanolacetate, glucose, tiglic acid, esters of taraxasterol, lupeolacetate, friedelin, higherhydrocarbons and other phytosterol ⁷ .
Root	Cycloartenol, euphorbol and its hexacosanoate, taraxerone, tinyatoxin; bark euphorbol and its hexacosanate, ingenol and its triacetate, taraxerone ⁸ .
Latex	a-amyrin, β -sitosterol, cycloartenol, cyclo euphordenol, 4-deoxyphorbol and its esters, euphol, euphorbinol, isoeuphorbol, palmitic acid, taraxerol, tinyatoxin, tirucalol, trimethylellagic acid ⁹ .

Synonyms :

Covelliaglomerata (Roxb.)Miq., *Ficus glomerata* Roxb., *Ficus vesca* F.Muell. exMiq., and *Ficus semicostata* F.M.Bailey¹⁰.

Common names :

Gular fig, cluster fig, country fig and redwood fig¹¹.

Geographical source:

This is commonly found in Australia, Malaysia, Southeast Asia and the Indian subcontinent. It is cultivated all over India and countries near to it. It grows wild in many forests and hills. It is distributed widely from the outer Himalayan ranges, Punjab, Khasia Mountain, Chota Nagpur, Bihar, Orissa, West Bengal, Rajasthan, Deccan, and is common in South India².

Morphology :

F. racemosa is an evergreen, moderate to large, spreading, lactiferous, deciduous tree (Figure 1), 15-18 m high, without prominent aerial roots (Varier, 1995). Young shoots are glabrous, pubescent or scaberulous, leaves are dark green colored, 7.5-15 by 3.2-6.3 cm, ovate oblong, or elliptic-lanceolate, tapering to a bluntish point at the apex, with entire margins, glabrous on both surfaces when mature, base acute or rounded, 3-nerved; lateral main nerves 4-6 pairs; petioles 1.3-3.8cm long, glabrous; stipules 2cm long, ovate-lanceolate, scarious, pubescent; fruit receptacles 2-5 cm in diameter, subglobose or pyriform, found in large clusters on short leafless branches arising from main trunk or large branches (Figure2).



Figure 1. ficusRaemous Tree

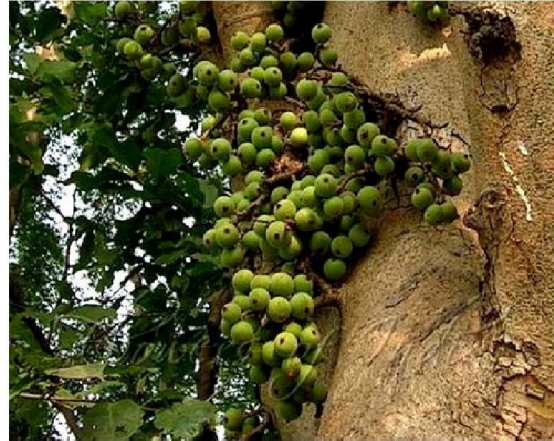


Figure 2. Unripe fruits of Ficusracemosa.

Figs are smooth or pubescent and rarely covered with minute soft hairs. When ripe, they are orange, dull reddish or dark crimson (Figure 3) with depressed umbilicus (edible but usually full of worms); basal bracts 3, ovate-triangular; male, female, and gall flowers together in one receptacle, the male flowers forming a layer near the walls of the receptacle, and the gall flowers a more internal layer; male flowers sessile; sepals 3-4, membranous, inflated, enveloping the 2 elongate ovate anthers; filaments connate; gall flowers pedicellate; perianthgamophyllous, irregularly toothed, covering only the base of the rough ovoid ovary; style lateral, elongate; stigma clavate; fertile flowers subsessile; perianthgamophyllus, with 4 or 5 long lanceolate teeth enveloping the small minutely tuberculate achene; style sub-terminal; stigma clavate¹².



Figure 3. Ripe fruits of Ficusracemosa.

II. TRADITIONAL USES

Ficusracemosa Linn has been extensively used in traditional medicine for a wide range of ailments. Its bark, fruits, leaves, roots, latex and seeds are medicinally used in different forms, sometimes in combination other herbs¹³.

Bark :

Bark is highly efficacious in threatened abortion and also recommended in urological disorders, diabetes, hiccough, leprosy, dysentery and piles^{14, 15, 16, 17}.

Leaves :

The leaves are good wash for wounds and ulcers. They are useful in dysentery and diarrhoea. The infusion of bark and leaves is also employed as mouth wash to spongy gums and internally in dysentery, menorrhagia, effective remedy in glandular swelling, abscess, chronic wounds, cervical adenitis and haemoptysis^{16, 17, 18}.

Fruits :

The fruits are astringent, stomachic, refrigerant, dry cough, loss of voice, disease of kidney and spleen, astringent to bowel, styptic, tonic, useful in the treatment of leucorrhoea, blood disorder, burning sensation, fatigue, urinary discharges, leprosy, intestinal worms and carminative. They are useful in miscarriage, menorrhagia, spermatorrhoea, cancer, scabies, haemoptysis and visceral obstructions^{17, 19, 20}.

Roots :

Roots are used in dysentery, pectoral complaints and diabetes, applied in mumps, other inflammatory glandular enlargements and hydrophobia^{15, 16, 17}.

Latex :

Latex is aphrodisiac and administered in haemorrhoids, diarrhoea, diabetes, boils, traumatic swelling, toothache and vaginal disorders²¹.

Root sap :

Root sap is used for treating diabetes³³. The sap of this plant is a popular remedy for mumps and other inflammatory enlargements^{22, 23, 24}.

III. PHARMACOLOGICAL USES

Hypoglycemic activity:

Ficus racemosa shows hypoglycemic activity, to evaluate the study of hypoglycemia activity ethanol extract is used (250mg/kg/day, p.o.) lowering of blood glucose level was determined in 2 weeks. Alloxan diabetic albino rats they conform hypoglycemic activity. Methanolic extract of stem bark also show glucose lowering activity at dose 200-400mg/kg, p.o. this test is done on normal and alloxan induced diabetic rats. Whereas, this activity was compared with standard antidiabetic agent glibenclamide at dose 10mg/kg it shows antidiabetic activity. B-sitosterol isolated from stem bark it is more potent when compared with other isolated compound. Methanol extract of fruit given in 1,2,3, and 4g/kg it lowers the blood glucose level in normal and alloxan induced diabetic rabbits. α -amyrin acetate is important constituent isolated from fruits and the dose is given at 100mg/kg which lowers the blood glucose level in 5 to 24hrs gives result at 18.4% and 17.0% in sucrose when compared with streptozotocin induced diabetic rat model²⁵.

Antioxidant activity:

The 1,1-diphenyl-2-picrylhydrazyl radical (DPPH) used to evaluate antioxidant activity by free radical scavenging method. DPPH free radical reduced when hydrazine react with hydrogen donors, it forms stable DPPH molecules through donation of hydrogen. Due to this method it is easy to determine antiradical power of an antioxidant activity by decrease in absorbance of DPPH at 519nm. Color change from purple to yellow, there is discolorations of DPPH when absorbance of methanolic extract of stem and leaves was measured at 517nm. The extract of stem and leaves was compared with standard butylatedhydroxytoluene (BHT) by free radical scavenging method the extract show antioxidant activity²⁶.

Hepatoprotective activity:

The leaves extract and stem bark extract shows hepatoprotective activity in rats by inducing chronic liver damage by subcutaneous injection of 50% v/v carbon tetrachloride in liquid paraffin at dose of 3ml/kg, it is given in alternate days for 4 weeks. Stem bark extract dose given in 250 and 500mg/kg, all biochemical parameters like SGOP, SGPT, serum bilirubin and alkaline phosphate was evaluated and it is compared with standard silymarin²⁷.

Antitussive activity:

Methanol extract (200mg/kg) was compared with standard codeine phosphate (10mg) that is evaluated in sulfur dioxide gas-induced cough in mice. Maximum activity was seen at 90 min after administration of the bark extract, maximum inhibition is 56.9%²⁸.

Antiulcer activity:

50% of ethanolic extract of fruit used as antiulcer and reduce oxidative damage at mucosal lining of stomach. The studies are done on animal models of rats at dose 50, 100 and 200mg/kg, twice a day for 5 days. For evaluating the antiulcer activity the models are used like ethanol, pylorus ligation and cold strain-induced ulcer²⁹.

Wound healing activity:

Ointment was prepared by using powder of *F. racemosa* with petroleum jelly 15%w/w. The study was done on Charles Foster strain rats by using 8mm of full-thickness punch wound model. It heals highly significant generation of tissue DNA, RNA and total protein was observed by using ointment³⁰.

Anthelmintic activity:

Earthworms lost their activity when it comes in contact with ethanolic bark extract at 5, 10, and 50 mg/ml given dose-dependently. There is loss of mortality and cause death. The higher concentration of bark extract shows paralytic effect and death time is shorter and it is compared with standard piperazine citrate 3% within 90 min³¹.

Antidiuretic activity:

Decoction of *Ficus racemosa* bark given at dose at 250, 500 or 1000 mg/kg body weight it is given for 5 hrs at 1 hr of interval. It shows reduction in Na⁺ level and Na⁺/K⁺ ratio and increase urinary osmolarity³².

Antidiarrheal activity:

Ethanol extract of stem bark was studied on different experimental models of diarrhea in rats. The inhibitory activity was observed against castor oil induced diarrhea, PGE₂ induced enteropooling and charcoal meal tests this was done in rats. By using this extract on rats it shows antidiarrheal activity³².

Chemo-preventive activity:

The is treatment given orally to the rats by two methods, incidence tumors in ferric nitrilotriacetate (Fe-NTA) it induced chemotoxicity in rats and potassium bromate- induced nephrotoxicity in rats. *Ficus racemosa* extract (PM Paarakh, 2009) was given at 200 and 400mg/kg BW it results in decrease of xanthin oxidase, γ -glutamyltripeptidase, lipid peroxidation and H₂O₂. It also shows recovery in blood urea nitrogen, serum creatinine, renal OCD activity and DNA synthesis, by evaluating decrease in all this parameters it shows chemopreventive activity³³.

Anticancer activity:

Methanolic extract shows cytotoxic effects on more than one hepatic cancer cell lines like, HL-60, HepG2, NCI-H23 and HEK-293T. Among this evaluation more cytotoxic activity was observed in HL-60 and HepG2 cells at 50% inhibitory concentration (IC₅₀)²⁹.

Antibacterial activity:

Ficus racemosa extract at different solvent used as antibacterial, like stem bark ethanolic extract found active against *Pseudomonas aeruginosa*, *Proteus mirabilis*, *Staphylococcus aureus*, *Bacillus cereus*, *Alcaligenes faecalis* and *Salmonella typhimurium*. Aq. Extract shows activity against *Streptococcus faecalis*. Methanolic extract shows effect against *Bacillus subtilis*. Petroleum ether³⁴ shows effect against *E. coli*, *Bacillus pumilis*, *Bacillus subtilis*, *Pseudomonas aeruginosa* and *Staphylococcus aureus*. Hydro alcoholic³² extract of leaves shows effect against *Actinomyces viscosus* at minimum inhibitory concentration of 0.08mg/ml³³.

Anti-inflammatory activity:

The ethanol extract of bark inhibits COX-1, 5LOX, phospholipase A₂ and biosynthesis of PGE₂. The petroleum ether of leaves at 200-400mg/kg bw it shows activity on carrageenan, serotonin, histamine and dextran-induced at rat hind limb paw edema. Maximum effect was shown at 400mg/kg in chronic test, when it was compared with phenylbutazone and non-steroidal anti-inflammatory agent. Petroleum ether of leaves shows anti-inflammatory activity against

inflammation producing histamine and serotonin. It reduces edema induced by dextran and it is mediated histamine and serotonin.^{33,35}

Memory enhancing activity:

It shows activity on Alzheimer disease which is caused by decrease in acetylcholine level and it is an extrapyramidal disease²⁷.

Hypolipidemic activity:

Ethanol extract of bark was given at dose 100- 500mg/kg bw by inducing alloxan in diabetic rats. It shows hypolipidemic activity when compared with standard glibenclamide and it also shows hypocholesterolemic effect when rats were induced by dietary fibre content fruits in diet. The evaluation results shows increased in fecal extraction of cholesterol and bile acids²⁷.

Renal and testicular protective activity:

Acetone extract of bark was given at 250-500mg/kg it shows effect against doxorubicin induced renal and testicular toxicity. The extract was given at 500mg/kg it shows sperm count and spermatogenesis at higher level when it compared with normal control dose and antioxidant activity also observed at same dose²⁵.

Analgesic activity:

Ethanol extract of bark and leaves was given and analgesic activity was evaluated by using hat plate and tail immersion method. The dose was given at 300mg/kg I.P. The leaf extract shows increase in latency time and giving protection about 40.1% the bark extract shows increase in latency time and giving protection about 35%. The analgesic activity observed due to presences of important constituent. The decoction of leaves of *F. racemosa* gives analgesic activity was evaluated when acetic acid writhing test was done in mouse³⁷. Due to this there is decrease in number of writhes. This extract was given to mice and the result was evaluated by hat plate test the analgesic activity till 3hrs was observed. The ethanol extract of bark and leaves was administered dose dependently the analgesic activity was observed by analgesiometer at 100, 300 & 500mg/ml^{28,34,36}.

Antifungal activity:

The evaluation of antifungal activity different species of fungi were used *Trichophytonmentagrophytas*, *Trichophytonrubrum*, *Trichophytonsoundanense*, *Candida albicans*, *Candida krusei* & *Torulopsisglabrata*. For the evaluation of anti-fungal 50% methylene chloride in hexane flash activity column fraction extract of leaves were used for the examination⁴. The extract inhibits growth of given pathogens like *Curvulariasp*, *Colletotrichumgloeosporioides*, *Alternariasp*, *Corynesporacassiicola* & *Fecariumsp*, due to presences of psoralen in extract²⁸.

Angiotensin converting enzyme inhibitor activity:

Cold aqueous extract (FRC) and hot aqueous extract (FRH) given close dependently & shows inhibition activity against porcine kidney & rabbit lung ACE. As compare to cold aqueous extract hot aqueous extract shows higher angiotensin activity both extract shows higher inhibition on porcine kidney and rabbit lung ACE. FRH lower IC50 values at concentration 1.36 & 1.91 µg/ml for porcine kidney and rabbit lung ACE when compared with FRC at concentration 128 and 291 µg/ml. Angiotensin converting enzyme inhibition studied by radial scavenging activity. The both extract was given dose dependently it shows maximum inhibition about 87% and 75% for both extract FRC and FRH at concentration 25 µg/ml FRH at 10.8 µg/ml shows lower IC50 value compared with 15.8 µg/ml & 16.5µg/ml concentration of FRC and BHT (butylatedhydroxytoluene)²⁸.

Gastroprotective activity:

Ethanol extract of fruits, bark & leaves given dose dependently which shows inhibition of ulcer index in pylorus ligation, ethanol, cold resistant stress induced ulcers, lipid peroxidation, superoxidedismutase, H⁺K⁺ATPase and increase the activity of enzyme catalase it also shows gastric mucosal protection this activity was observed due to

administration of fruit extract gastroprotective activity was evaluate by against acidity ulcer index in aspirin, pylorus ligation-induced gastric ulcer, HCLethanol mixture, water immersion stress-induced ulcer it shows reduction in gastric lesion and gastric mucous protection administration of 50% ethanolic extract of unripe fruit of *Ficus racemosa* at 100, 200, & 300 mg/kg in rats gives gastroprotective effect when compared with ethanol 4 hrs pylorus ligation induced gastric ulcer more effective at dose 300 mg/kg compared with sucralfate 250mg/kg administration of methanolic extract of unripe fruit was given at does 100, 200 & 400 mg/kg. The gastric ulcer was induced by aspirin and cold restraint stress^{38,39}.

Anti-filarial activity:

Alcoholic and aqueous extract of fruit shows inhibition of spontaneous motility of worm and nerve muscle of *Setaria cervi* and increase in amplitude and due to concentration microfilarial causes death at 21 and 35 ng/ml for alcohol extract and 27 and 42 ng/ml at aqueous extract due too in vitro study at LC50 and LC90⁴⁰.

Larvicidal activity:

The hexane, ethyl acetate, petroleum ether, acetone & methanol extracts of leaf & bark for evaluation of toxicity against fourth instar larval of *Culex quinquefasciatus* after 24hrs motility and all extracts shows moderate larvicidal effects the acetone extract of bark shows higher larvicidal activity & also separation & identification of glauanol acetate due to bioassay guided fractionation method it also identify new mosquito larvicidal compound. Antilarvicidal activity against fourth-instar larval of *Aedes aegypti* (LC50 14.55 & LC90 64.99ppm) *Anopheles stephensi* (LC50 28.50 & LC90 106.50 ppm) & *C. quinquefasciatus* (LC50 41.42 & LC90 192.77 ppm) it is observed due to important constituents gluanolacetate⁴¹.

Antipyretic activity:

Methanolic extract of bark was given at dose 200 and 300 mg/kg dose dependently antipyretic effect was observed that body temperature reduces in both induced pyrexia in albino rats the evaluation of antipyretic activity the extract was compared with standard drug i.e. paracetamol the aqueous and petroleum ether extract of leaves shows antipyretic activity when compared with indomethacin against yeast induced pyrexia introduced in rats^{42,43}.

Other uses:

The unripe fruit of *F. racemosa* are used for culinary purpose, pickles, chutney, sambar, curry & sabji.

Side effects:

F. racemosa is coolant tree, precaution is taken while using kapha dominant person with recurrent allergic rhinitis, cough & cold.

Ripe fruit avoided in use of culinary it cause or worsen the intestinal worm infestation.

Safety is taken during pregnancy.

IV. CONCLUSION

A significant group of trees with great medicinal significance belong to the genus *Ficus*. Various body parts, including fruit, leaves, stems, seeds, and latex, have been suggested for a variety of diseases. A wide variety of pharmacological and therapeutic properties were displayed by *Ficus racemosa*. The medicinal potentials of *Ficus racemosa* L. have been discovered to be mostly attributed to bioactive ingredients like β -sistosterol, stigmasterol and gluanol acetate. The hydro-alcoholic extract of stem bark were shows Anti-inflammatory, Wound- healing, Anti- microbial, Anti-tussive, Anti-oxidant, Anti-bacterial, Anti-fungal. The active potentials of the bioactive chemicals present in this plant should be investigated further in clinical and pathological research in order to demonstrate its therapeutic benefits.

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