

# *Ficus Racemosa* Linn. - A Review on Experimental Lead Approach

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**Abstracts:** India is considered as Golden bird in terms of rich diversity of medicinal plants it possesses. Since ages, hundreds of tribals residing in and around forests have acquired valuable information of the plants of healing property or value to human health. These also include knowledge on plant parts such as barks, roots, leaves, flowers and fruits possessing individualistic and high medicinal properties. One such versatile vital plant *Ficus racemosa* Linn. include two main leucoanthocyanins, leucocyanidin-3-O- $\beta$ -glucopyranoside, leucopelarogonidin-3-O- $\alpha$ -L-rhamnopyranoside,  $\beta$ -sitosterol, long chain ketones, ceryl behenate, lupeol, lupeol acetate,  $\alpha$ -amyrin acetate, glauanol, hentriacontane, tiglic acid, esters of taraxasterol, friedelin, phytosterol, tetracyclic triterpenes glauanol acetate. The present review is an effort to concisely describe the properties and explored potential to the medicinal world, of this imperative plant.

## INTRODUCTION

A number of Indian traditional systems of medicines occur in India, of which prominent is Ayurveda. It's in existence for around 3000 years. Ayurvedic preparations have been successfully used for the treatment of various ailments from treating snake bites, to wound healing, with skin ointments protecting from infections, controlling anxiety, increasing memory and sharpening the overall beauty of a person. But, the wide spread acceptance and growth of second degree system of medicine, has been under few setbacks, of which are, lack of proper guidelines, regarding growing, preserving, storing, managing, and isolating the vital constituents to be incorporated into dosage forms for prospective use. Evidence-based studies on the efficacy and safety of traditional system of medicines are limited. The essential ingredient in most formulations does not follow standard protocol, due to scarcity of proper guidelines plus regulating body. [1] Among the hundreds of prominent medicinal plants of value, the plant *Ficus racemosa* Linn. holds traditional significance in vedic texts i.e. 'Atharva veda'. It is considered as means for acquiring prosperity and vanquishing foes. In Sanskrit it's known as 'udumbara tree'. In buddhism its being mentioned in Mahayana Buddhist text, in chapter 2 and 27 of lotus sutra. [2]

## *FICUS RACEMOSA* LINN. (MORACEAE)

Moraceae family consist large taxa of over fifty genera and nearly, 1400 species, including some important groups like Artocarpus, Morus and Ficus.

*Ficus* has around 850 species world over, includes woody trees, shrubs, vines, epiphytes, and hemiepiphytes belonging to the family Moraceae. It's a native of semi-warm temperate zone, viz. southwest Asia and Mediterranean regions, from Afghanistan to Portugal.

The genre has famous trees, as follows, [3-10]

- Ashvatha: The holy tree of Hindus *F. religiosa*
- Bodhi tree: *F. religiosa*
- Charybdis Fig Tree of the Odyssey, *F. carica*
- Curtain Fig tree: *F. virens*
- Ficus Ruminalis: *F. carica*
- Plaska: *F. religiosa* and *F. infectoria*

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- Santa Barbara's Moretan Bay Fig tree: *F. macrophylla*
- Sri Maha Bodhi: Another *F. religiosa* planted in 288 BC
- The Great Banyan: *F. benghalensis*
- Vidurashwatha: Vidura Sacred Fig tree, *F. religiosa*
- Wonder boom: The largest fig tree, in Pretoria, South Africa

*Ficus racemosa* Linn. in Sanskrit called as Udumbara, Sadaphala, Sheetvalka; In English Cluster Fig, Country Fig.

## TRADITIONAL USES

In Ayurveda the plant parts such as roots are used for hydrophobia; bark for acrid, cooling, galactagogue; considered excellent for gynecological disorders. Fruits are astringent to bowels, styptic, tonic and useful in the treatment of leucorrhoea, blood disorders, burning sensation, fatigue, urinary discharges, leprosy, menorrhagia, epistaxis, and intestinal worms. While in unani system of medicines, leaves are used as astringent, in bronchitis; fruits are useful in treatment of dry cough, loss of voice, diseases of kidney and spleen. Bark is useful in Asthma and piles. Latex is applied externally on chronic infected wounds to alleviate edema, pain and to promote the healing. The leaf buds have been in application to skin, to improve complexion. [11]

## BOTANICAL CLASSIFICATION

### MORPHOLOGY

- Field Tips: Bark grey-reddish-brown. Wood grayish-brown and soft. Glandular at nerve axils. Leaf gall present.
- Flower: A fig, thick, soft, purplish red when ripe.
- Fruit: An acne, lenticular, Fruiting from March-June
- Leaf Apices: Acute
- Leaf arrangement: Alternate
- Leaf base: Rounded
- Leaf margins: Entire
- Leaf shapes: Oblanceolate
- L Habit: A large deciduous tree with few and short aerial roots.
- Leaf types: Simple  
Small tree or taller strangling climber, with wide-spreading branches, semi-fully deciduous in monsoon climates. [12]

## CHEMICAL ANALYSIS

Following phytoconstituents have been found to contain in

Table 1: Scientific Classification of *Ficus racemosa*

<b>Kingdom</b>	Plantae	<b>Phylum/Division</b>	Magnoliophyta	<b>Class</b>	Magnoliatae
<b>Order</b>	Urticales	<b>Family</b>	Moraceae	<b>Species</b>	Racemosa

Table 2: Phytoconstituent Detection Tests [13]

Carbohydrates	Glycosides	Fixed oils/fats	Proteins and Amino acids
Molish's test Fehling's test	Legal's test Borntrager's test Baljet test	Spot test Saponification test	Millon's test Ninhydrin test Biuret test
Positive	Positive	Positive	Positive

Table 3: Phytoconstituents Detected

Phenolics & Tannins	Phytosterol	Alkaloids	Flavonoids
FeCl <sub>3</sub> test Gelatin test Lead acetate test	Salkowski test Libermannburchard test	Dragendorff's test	Aqueous NaOH test Conc. H <sub>2</sub> SO <sub>4</sub> test
Positive	Positive	Positive	Positive

Table 4: Selective Phytoconstituents Solvent Extraction

Water	Ethanol	Methanol	Chloroform	Ether	Acetone
Anthocyanins	Tannins	Anthocyanins	Terpenoids	Alkaloids	Phenol
Starches	Polyphenols	Terpenoids	Flavonoids	Terpenoids	Flavonols
Tannins	Polyacetylenes	Saponins		Coumarins	
Saponins	Flavonol	Tannins		Fatty acids	
Terpenoids	Terpenoids	Xanthoxyllines			
Polypeptides	Sterols	Flavones			
Lectins	Alkaloids	Polyphenols			

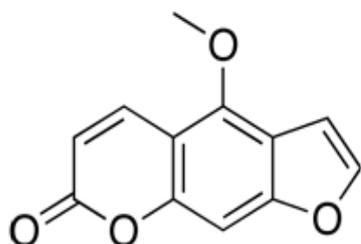


Figure 1: Bergapten

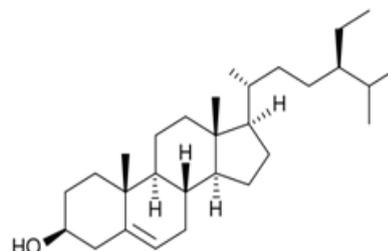
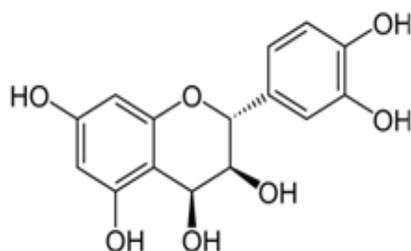
Figure 2:  $\beta$  - Stigmasterol

Figure 3: Leucocyanidin

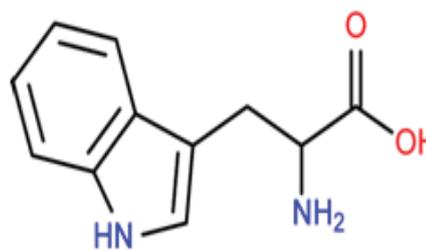


Figure 4: Tryptophan

plant; bergapten, bergaptol, lanosterol,  $\beta$ -Sitosterol, Stigmasterol, lupen-3-one,  $\beta$ -sitosterol-d-glucoside (phytosterolin), vitamin k<sub>1</sub>. [14-17] The bark contains tannin, wax, saponin,  $\beta$ -sitosterol, leucocyanidin-3-O- $\alpha$ -L-rhamnopyranoside, lupeol, ceryl behenate, lupeol acetate,  $\alpha$ -amyrin acetate, leucocyanidin and leucoanthocyanin. [18]

Leaves yield campesterol, stigmasterol, isofucosterol,  $\alpha$ -amyrin, lupeol, tannic acid, arginine, serine, aspartic acid,

glycine, threonine, alanine, proline, tryptophan, tyrosine, methionine, valine, isoleucine, leucine, n-nonacosane, n-hentricontanen, hexa-cosanol, and n-octacosan. [19-21] The fruit of *F. religiosa* contains asgaragine, tyrosine, undecane, tridecane, tetradecane, (e)- $\beta$ -ocimene,  $\alpha$ -thujene,  $\alpha$ -pinene,  $\beta$ -pinene,  $\alpha$ -terpinene, limonene, dendrolasine, dendrolasine  $\alpha$ -ylangene,  $\alpha$ -copaene,  $\beta$ -bourbonen,  $\beta$ -caryophyllene,  $\alpha$ -trans bergamotene, aromdendrene,  $\alpha$ -

humulene, alloaromadendrene, germacrene, bicyclogermacrene,  $\gamma$ -cadinene and  $\delta$ -cadinene.<sup>[22]</sup>

Chemical analysis carried out by (Arunachalam *et al.*, 2010) in the methanolic extract of the plant, found the presence of extracts shown in Table 4.

## PHYTOCONSTITUENTS AND SOLVENT RELATIONSHIP PHARMACOLOGICAL UPDATE

### Antibacterial Activity

(Mandal *et al.*, 2000) studied the antibacterial potency of petroleum ether extract of *Ficus racemosa* Linn. leaves against bacterias E.coli ATCC 10536, *Bacillus pumilis* ATCC 14884, *Bacillus subtilis* ATCC 6633, *Pseudomonas aeruginosa* ATCC 25619, and *Staphylococcus aureus* ATCC 29737. The results were significant comparable to standard Chloramphenicol. It could be inferred that ether extract consist of alkaloids, terpenoids, coumarins, and fatty acids.

The antibacterial activities are attributes of terpenoids, alkaloids thus the *Ficus racemosa* has confirmed antibacterial activity in all sorts of conditions and can be actively incorporated into ointments for infectious conditions.<sup>[24]</sup>

### Anti-inflammatory Activity

(Li *et al.*, 2004) carried out bio-assay of the ethanolic fraction of the plant, and found out racemosic acid as potent inhibitor of COX-1 and 5-LOX in vitro with IC<sub>50</sub> values of 90 and 18  $\mu$ M. The researcher also carried out a comparative in-vitro study on 33 ethanolic extracts from *Ficus racemosa*, *Clematis pickeringii* stem, *Acacia adsurgens* leaves, *Tinospora smilacina* stem, and *Morinda citrifolia* and found the plants effective with *Ficus* showing inhibitory effect on COX-1 with the IC<sub>50</sub> values of 100.<sup>[25]</sup>

(Mandal *et al.*, 2000) investigated anti-inflammatory activity in *Ficus racemosa* on carrageenin, serotonin, histamine, and dextran-induced rat hind paw oedema models. The extract showed anti-inflammatory activity at doses of 200 and 400 mg/kg and found the results to be significant comparable to phenylbutazone.<sup>[26]</sup>

### Antioxidant Activity

(Li *et al.*, 2004) found antioxidant potential in the racemosic acid by scavenging ABTS free radical cations with an IC<sub>50</sub> values of 19  $\mu$ M.<sup>[25]</sup>

### Angiotensin Converting Enzyme Inhibitor Activity

(Ahmed *et al.*, 2010) studied Angiotensin converting enzyme inhibitory activity of cold and aqueous extract of *Ficus racemosa* (Moraceae) bark stem. The effect was studied using rabbit lung, and partially purified kidney ACE. The results were found to be effective. The application can be used to produce cardioprotective herbal tonics.<sup>[27]</sup>

### Cardioprotective Activity

(Ahmed *et al.*, 2012) investigated the cardioprotective potential of standardized extract of *Ficus racemosa* stem bark against doxorubicin induced toxicity. The extract significantly decreased the (TBARS) i.e. thiobarbituric acid reactive substances & increased glutathione levels in serum

and cardiac tissue.<sup>[28]</sup>

### Diabetic Complications

(Velayutham *et al.*, 2012) studied protective effects of tannins from *Ficus racemosa* on the lipid profile and antioxidant parameters in high fat meal and streptozotocin induced hypercholesteremia associated diabetes model in rats. The administration of tannin fraction from *Ficus racemosa* significantly reversed the increased blood glucose, total cholesterol, triglycerides, low density lipoprotein and also significantly restored the insulin and high density lipoprotein in the serum. In addition, tannins significantly restored the activity of antioxidant enzymes such as superoxide dismutase, catalase, and decreased the, glutathione peroxidase, and glutathione, thereby restoring the antioxidant status of the organs to normal levels.<sup>[29]</sup>

### Hepatoprotective Activity

(Ahmed *et al.*, 2010) investigated hepatoprotective effects of petroleum ether and methanol extract of *Ficus racemosa* Linn. (Moraceae) stem bark. CCl<sub>4</sub> administration induced a significant decrease in serum total protein, albumin, urea and significantly increase in total bilirubin associated with a marked elevation in the activities of aspartate aminotransferase (AST), alanine aminotransferase (ALT) and alkaline phosphatase (ALP). Pretreatment with *Ficus racemosa* petroleum ether extract and *Ficus racemosa* methanolic extract showed significant restoration of total protein and albumin to near normal rats.<sup>[30]</sup>

### Memory Enhancing Activity

(Ahmed *et al.*, 2011) investigated the potency of *Ficus racemosa* bark. It found out that *F.racemosa* had a potential in management of Alzheimer disease.<sup>[31]</sup>

### Protective Renal Oxidative Injury

(Khan *et al.*, 2005) studied the potential beneficial effects of the plant *Ficus racemosa* extract. Treatment of rats with *Ficus racemosa* extract (200 mg/kg body weight and 400 mg/kg body weight) resulted in significant decrease in xanthine oxidase, lipid peroxidation, gamma glutamyl transpeptidase activity. Overall, thus *Ficus racemosa* extract is a potent chemopreventive agent and suppresses potassium bromated mediated nephrotoxicity in rats.<sup>[32]</sup>

### Wound Healing Activity

(Biswas *et al.*, 2003) in his reported review on potential wound healing plants of Indian origin, reported *Ficus racemosa* to possess the potential wound healing potential and practiced in Indian system of medicine for the same.<sup>[33]</sup>

## CONCLUSION

The plant *Ficus racemosa* Linn. holds a vital place in the traditional system of medicines. The current explored potential of the plant signifies its importance to the pharmaceutical industry. Being widely available in India, this plant should be utilized to its maximum potential for developing antibiotic and antiseptic creams and lotions.

The plant holds a great prospective source for developing herbal over-the-counter products and thus a vital source of income in the era of dying blockbuster molecule model for the pharmaceutical industry.

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