

A Comprehensive Review on the Medicinal Properties and Pharmacological Potential of *Ficus racemosa* Linn.

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Abstract: Nowadays, fig (*Ficus carica* L.) fruits are consumed either fresh or dried and used for jam or spirit beverage production. Morphological and pomological diversity of 49 wild edible fig accessions sampled was evaluated. Analysis of variance revealed significant differences among the wild accessions studied using the morphological data recorded. Ripening time ranged from late July to mid-August. Fruit skin ground color showed high variability, including cream–purple (4 accessions), purple–yellow (8), light purple (7), purple (15), dark purple (5), purple–cream (3), and cream (7). The range of fruit-related traits was as follows: fruit length: 12.65–22.60 mm, fruit width: 10.67– 24.18 mm, fruit fresh weight: 2.52–6.13 g, and fruit flesh thickness: 0.85–1.89 mm. Principal component analysis (PCA) showed 10 independent components that could explain 84.11% of total variance. Ward dendrogram created according to the data obtained revealed the variation among the accessions and showed two major clusters. The present results showed that the studied accessions had remarkable phenotypic variation, and among them, some accessions with high-quality fruits in size, color, and taste can be planted and then used in the breeding programs. Information on the current levels of genetic diversity of germplasm is essential for devising strategies for wild forms conservation.

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. 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, antiinflammatory, memory enhancing and gastro-protective agent etc. In this review, emphasis is lead upon research associated to therapeutic properties, phytochemistry and pharmacological profile of *Ficus racemosa* Linn.

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 Subcontinent [1]. *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]. It is unusual in that its figs grow on or close to the tree trunk, termed cauliflory [3]. In India the tree and its fruit are called ‘gular’ in the north and ‘atti’ in the south. The fruits are a favourite staple of the common Indian macaque. In Kerala it is consider as one among nalpamara. It serves as a food plant for the caterpillars of the butterfly the Two-brand Crow (*Euploea sylvester*) of northern Australia [4]. The Ovambo people call the fruit of the Cluster Fig ‘eenghwiyu’ and use it to distill ‘Ombike’, their traditional liquor [5]



FIG.CLUSTER FIG

Ficus racemosa Linn (Moraceae) is an evergreen, moderate to large sized spreading, lactiferous, deciduous tree, without much prominent aerial roots. Tree about 20 m tall often with aerial roots, bark whitish-brown, smooth, Leaves grooved minutely

hairy, lamina ovate-lanceolate to elliptic-lanceolate, tri-ribbed, 8-10 pairs of lateral pairs from broad to narrowly cuneate, oblique base, margin entire, acuminate at apex, glabrous on both sides, stipules triangular-ovate, brown, sub-persistent, cystoliths present only on lower side. Hypanthodia on long peduncles, borne in large clusters from tubercles on the main trunk and main leafless branches, subpyriform-globose, green, subtended by, broadly triangular-ovate brownish brads, bracts, apical orifice sunken, closed by brown bracts without internal bristles. Male flowers are sessile, ostiolar in 2-3 whorls, united, lobes dentate and stamens. Gall flowers pedicellate, dispersed among female. Female flowers are sessile or subsessile, ovary substipitate, glabrous style, stigma simple. Figs depressed subglobose or pyriform, red when ripe usually streaked. Seeds are lenticular 1 mm. Syconus fruit [6, 7]. Udumbara is considered scared to god Dattaguru. All ficus species possess latex-like material within their vasculatures that provide defense and self healing from physical assaults [8]. This plant is universally used in traditional system of medicine for the treatment of numerous disorders. It is one of the herbs mentioned in all ancient scriptures of Ayurveda, Siddha, Unani and Homeopathy. Various plant parts

such as bark, root, leaf, fruits and latex are used as astringent, vermifuge, carminative and anti-dysentery. It is a good medication for excessive appetite. The extract of fruit is used in leucoderma, menorrhagia and diabetes. It is used locally to relieve inflammation of lymphadenitis, fibrositis, skin wounds and in sprains [9].



FIG.CLUSTER FIG

Taxonomic Position of *Ficus Racemosa* Linn.

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

Sanskrit	Yajnayoga, Sadaphalah, Brahanvrkisha, Shitavalkah, Sutah, Udumbara, Gular, Mashakin, Jantukaphalah, Jantuphalah, Krmiphalah, Vasudrumah, Saumya, Hemadugdhaka, Jantumati, Yagniyah, Audumbara
Hindi	Pushp-hina, Pani Bhuj, Dumar, Goolar, Umari, Yajnyadumbur, Udumbara, Jantu Phal, Dharma Patra, Goolar
English	Gular fig, Cluster Fig, Country Fig
Bengali	Udumbara
Telugu	Brahmamamidi, Atti, Bodda
Gujrati	Goolar, Umbaro
Manipuri	Malayalam
Marathi	Umbar, Udumbar
Malayalam	Atthi, Atthi Al, Aththi, Atthi-al, Udumbaram, Jantuphalam
Kannada	Atti, Atti Mara
Urdu	Dumar
Oriya	Dimri
Konkani	Rhumbud

Table 2: Vernacular names of *Ficus racemosa* Linn

Morphology of Cluster Fig (*Ficus racemosa*)

Ficus racemosa, commonly known as the cluster fig, is a large deciduous tree that typically grows up to 15–20 meters in height. The tree has a dense canopy with broad leaves that are ovate to elliptic, measuring approximately 7–14 cm in length. The leaves are leathery and have a rough texture with a prominent

midrib and a few lateral veins. The characteristic feature of this species is its cauliflorous fruiting habit, where figs emerge directly from the trunk and main branches in large clusters. The fruits, technically known as syconia, are globose to pyriform, turning from green to red as they ripen. They serve as an important food source for various animals and birds, contributing to seed dispersal. The bark of the tree is

generally smooth, grayish-brown, and releases a milky latex when cut. This species is commonly found in tropical regions and plays a significant ecological role. [13,14]

Geographical Distribution of *Ficus racemosa* (Cluster Fig):

Ficus racemosa is widely distributed across tropical and subtropical regions. It is native to India, Southeast Asia, China, Malaysia, and Australia. In India, it is commonly found in forests, alongside riverbanks, and in semi-arid regions. The species thrives in diverse ecological zones, from lowland tropical forests to open grasslands and cultivated lands. Due to its adaptability, *Ficus racemosa* has been introduced and cultivated in several tropical countries worldwide, including parts of Africa and the Pacific Islands. Its ecological importance is evident in its role as a keystone species, providing food and shelter to a variety of wildlife. [13,15]

Pharmacological Activities

1. Antipyretic Activity

Ficus racemosa has been traditionally used to treat fever, particularly in infectious conditions. The plant's antipyretic effect is mainly due to its ability to modulate the inflammatory response. It helps reduce fever by inhibiting the synthesis of prostaglandins, which are responsible for raising body temperature during infections. This action helps restore normal body temperature and provides relief from fever-related discomfort.

Phytochemicals such as flavonoids, alkaloids, and tannins found in *Ficus racemosa* contribute to its anti-inflammatory and fever-reducing effects. Studies on animal models have confirmed the antipyretic activity of the plant's extracts from the bark, leaves, and fruits, showing significant fever reduction when induced by pyrogens. These findings support the plant's traditional use in managing febrile conditions [16][17][18]

2. Anti-inflammatory and Antioxidant Activity

The bark and leaves of *Ficus racemosa* exhibit strong anti-inflammatory and antioxidant properties. The plant's flavonoids, tannins, and polyphenolic compounds contribute to reducing inflammation and oxidative damage. These properties make it effective in managing inflammatory conditions such as arthritis. The plant's antioxidant activity also helps protect against oxidative stress, preventing cellular damage caused by free radicals [17][18].

3. Antidiabetic Activity

Ficus racemosa has demonstrated potential as an antidiabetic agent. Its extracts help lower blood glucose levels, improve insulin sensitivity, and protect pancreatic beta-cells from damage. This activity is attributed to its polyphenolic and flavonoid compounds, which regulate glucose metabolism and insulin production [19].

4. Antimicrobial and Antifungal Properties

The plant exhibits broad-spectrum antimicrobial and antifungal activities. It has been shown to be effective against bacterial pathogens such as *Staphylococcus aureus* and *Escherichia coli*, as well as fungal pathogens like *Candida albicans*. This makes *Ficus racemosa* useful for treating various infections, including skin infections, gastrointestinal problems, and respiratory conditions [20].

5. Hepatoprotective Effects

Ficus racemosa has hepatoprotective properties, protecting the liver from damage caused by toxins, drugs, and alcohol. Its antioxidant compounds help reduce oxidative stress in the liver, improve liver function, and support liver regeneration. This makes *Ficus racemosa* a promising agent for liver health [21].

6. Antidiarrheal Activity

The bark, roots, and fruits of *Ficus racemosa* are traditionally used to treat diarrhea. The plant's antidiarrheal properties are attributed to its astringent compounds, which help reduce gastrointestinal motility and control fluid loss. This makes it an effective remedy for conditions such as diarrhea and dysentery [22].

7. Wound Healing

Ficus racemosa is known for its wound-healing properties. The latex and bark of the plant are used to promote faster tissue regeneration and reduce inflammation at the wound site. The antimicrobial properties of the plant also help prevent infections, supporting the healing process [23].

8. Anticancer Potential

Preliminary studies suggest that *Ficus racemosa* may have anticancer properties, with extracts showing cytotoxic effects against various cancer cell lines. These extracts may induce apoptosis (programmed cell death) in cancer cells and inhibit tumor growth. Though further research is necessary, *Ficus racemosa* shows promise as a natural anticancer agent [24].

9. Other Pharmacological Activities

- **Antispasmodic Activity:** *Ficus racemosa* has antispasmodic effects, which help alleviate muscle spasms, particularly in the gastrointestinal tract. This can help relieve abdominal cramps and discomfort.
- **Diuretic Effects:** The plant exhibits diuretic properties, which help increase urine output and reduce fluid retention. This is beneficial in treating conditions such as edema and hypertension.
- **Cardioprotective Effects:** Some studies suggest that *Ficus racemosa* may offer cardioprotective benefits by reducing oxidative damage and lowering blood cholesterol levels, thus supporting overall heart health [17][19].

Chemical Constituents of *Ficus racemosa*

Ficus racemosa contains a wide range of bioactive compounds across its different parts (bark, leaves, fruits, and roots) that contribute to its pharmacological properties. The major chemical constituents include:

1. **Flavonoids:** These are powerful antioxidants and anti-inflammatory agents. Common flavonoids identified in *Ficus racemosa* include quercetin, kaempferol, and rutin [16].
2. **Tannins:** These polyphenolic compounds have astringent properties and contribute to the plant's antimicrobial, antidiarrheal, and antioxidant activities [17].
3. **Alkaloids:** These nitrogen-containing compounds show a variety of biological effects, including antipyretic and analgesic properties. Specific alkaloids found in *Ficus racemosa* include indole alkaloids [18].
4. **Saponins:** Known for their soap-like properties, saponins exhibit antidiabetic, cholesterol-lowering, and anticancer activities [19].
5. **Terpenoids:** These compounds contribute to the anti-inflammatory and antimicrobial activities of the plant. They also have hepatoprotective and anticancer properties [17].
6. **Phenolic Acids:** Compounds such as gallic acid and caffeic acid exhibit antioxidant, anti-inflammatory, and antidiabetic effects [16][18].
7. **Sterols:** These include beta-sitosterol and stigmasterol, which are known for their anti-inflammatory, antioxidant, and cholesterol-lowering properties [19].
8. **Glycosides:** These compounds are involved in the plant's medicinal effects, including blood sugar regulation and cardiovascular protection [20].

CONCLUSION

Ficus racemosa is a valuable medicinal plant with a rich history of traditional use and diverse pharmacological properties. Its potential to address multiple health challenges, including metabolic, inflammatory, and oxidative stress-related disorders, underscores its significance in both traditional and modern medicine. Continued research is essential to standardize its formulations, validate its therapeutic efficacy, and promote its integration into modern pharmacological practices. By bridging traditional knowledge with scientific advancements, *Ficus racemosa* can serve as a cornerstone in the development of safe, effective, and affordable natural remedies.

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