

# Chapter 5

## *Ficus exasperata* Vahl: sandpaper fig with traditional medicinal uses

Bidhan Chandra Roy<sup>1</sup>, Ghodke Anita Sureshrao<sup>2</sup>, Anju Kumari Thakur<sup>3</sup>, Sanjeet Kumar<sup>4</sup> and Sweta Mishra<sup>4\*</sup>

<sup>1</sup>Department of Botany, Dinabandhu Mahavidyalaya, Bongaon, West Bengal, India

<sup>2</sup>Amaltas Institute of Ayurveda and Amaltas Ayurved Hospital and Research Center, Dewas, Madhya Pradesh, India

<sup>3</sup>Department Biosciences, Division Botany, CPUH Hamirpur, Himachal Pradesh, India

<sup>4</sup>Ambika Prasad Research Foundation, Odisha, India

\*Email-Id: swetamishra.rdwu@gmail.com



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**Abstract:** *Ficus exasperata* Vahl, commonly known as the Sandpaper Fig, is a deciduous, afro-tropical tree renowned for its traditional medicinal applications across Africa. Its leaves, stem bark, and roots are utilized in folk medicine to treat a variety of ailments, including inflammation, ulcers, hypertension, rheumatism, asthma, intestinal pain, and infections. Phytochemical investigations reveal the presence of bioactive compounds such as flavonoids, tannins, saponins, alkaloids, and steroids, which contribute to its pharmacological properties, including anti-inflammatory, antioxidant, antihypertensive, and antimicrobial effects. This review explores the morphological features, traditional uses, phytochemical composition, and pharmacological potential of *F. exasperata*.

**Keywords:** Sandpaper Fig, traditional medicine, bioactive compounds, pharmacological potential, phytochemistry

### Introduction

Plants belonging to the *Ficus* genus, commonly known as "fig plants," belong to the family Moraceae and include nearly 1000 species distributed across

tropical and warm temperate regions, with their greatest diversity found in Southeast Asia, tropical South America, and Australia (Adebayo *et al.*, 2009; Ahmed *et al.*, 2012). *Ficus* species are well-known for their distinctive fruits, milky latex, prominent stipules, and minute unisexual flowers on variously shaped receptacles. These plants hold significant importance in traditional medicine systems such as Ayurveda, Siddha, Unani, and Homoeopathy, with their bark, leaves, fruits, and latex being utilized for treating ailments such as diabetes, skin diseases, ulcers, dysentery, and diarrhea (Enogieru *et al.*, 2015). Among these species, *Ficus exasperata*, also known as the "sandpaper tree" due to its rough leaves, is widely recognized for its medicinal properties (Buniyamin *et al.*, 2007; Odunbaku *et al.*, 2008). It is known as "Ewe ipin" in Yoruba, and it is used in West Africa for treating conditions such as eyesores, stomach pains, ringworm infections, leprosy, bleeding control, and aiding childbirth (Ijeh and Agbor, 2006; Adebayo *et al.*, 2009). Studies have validated its pharmacological activities, including anti-ulcer, antihypertensive, hypoglycemic, lipid-lowering, antimicrobial, anti-inflammatory, and antifungal properties (Ajala *et al.*, 2020). However, toxicity studies in rats have shown potential hepatic and renal toxicity at high doses of ethanol leaf extracts, emphasizing the need for further toxicological evaluations (Adebayo *et al.*, 2009; Ajala *et al.*, 2020). With its widespread distribution in diverse vegetation types, including savannahs, rainforests, and riversides, *Ficus exasperata* remains a valuable plant in traditional medicine and an area of interest for further pharmacological research.

### **Morphology**

*F. exasperata*, commonly known as the sandpaper fig tree or white fig tree, is a terrestrial Afro-tropical small to medium-sized deciduous tree, reaching heights of 15 to 25 meters (49 to 82 feet) with a spreading canopy. The tree

thrives in evergreen and secondary forest habitats. Its trunk is straight with grayish-brown, smooth bark that is 5–6 mm thick, punctuated with lenticels and fibrous texture. The blaze is creamy white, and the tree exudes a watery sap (Ahmed *et al.*, 2012; Olaoluwa *et al.*, 2022; Plate 1). The leaves are simple, alternate, and distichous, measuring between 5.5 and 20 cm in length and 3 to 12 cm in width. Their shape varies from ovate to elliptic or oblong-lanceolate, characterized by a leathery texture that ranges from subcoriaceous to coriaceous. The bases of the leaves can be acute or obtuse, while the apices are shortly acuminate. The upper surface presents a dark green hue, with a scabrous and rough texture akin to sandpaper, whereas the underside is lighter and adorned with fine white hairs. The petiole is slender, ranging from 0.5 to 6.5 cm in length, and the stipules are paired, lateral, and caducous, measuring between 0.2 and 0.5 cm. The leaf margins may be denticulate, sinuate-crenate, or serrate, featuring 3 to 6 pairs of prominent lateral veins along with scalariform intercostae. The basal pair of veins is branched, extending to the margin above the midpoint of the lamina. It is noteworthy that saplings and coppice shoots may display lobed leaves (Ahmed *et al.*, 2012; Olaoluwa *et al.*, 2022). The flowers are unisexual and borne in syconia that are axillary, solitary, and harshly scabrid. The syconia are ellipsoid to subglobose, measuring 0.7–1.5 cm, and turn yellow or purple when ripe. Male flowers, found in 1–2 rings near the ostiole, have 3–6 oblong-spathulate tepals, a single stamen, and parallel oblong anthers. Female flowers, sessile with 4–7 linear-spathulate tepals, have a superior obovoid ovary with a lateral puberulous style and clavate stigma. Gall flowers, either sessile or pedicellate, have 4–6 lanceolate tepals, a white ovary, a terminal puberulous style, and a dilated stigma. The fruits, or syconia, contain small oblong achenes that are slightly keeled and reticulate in texture (Ahmed *et al.*, 2012; Olaoluwa *et al.*, 2022). *F. exasperata* is a versatile tree with leaves, bark, and fruits that exhibit rough

textures and distinct morphological features, contributing to its identification and its role in traditional medicine and ecological systems (Ahmed *et al.*, 2012; Olaoluwa *et al.*, 2022).

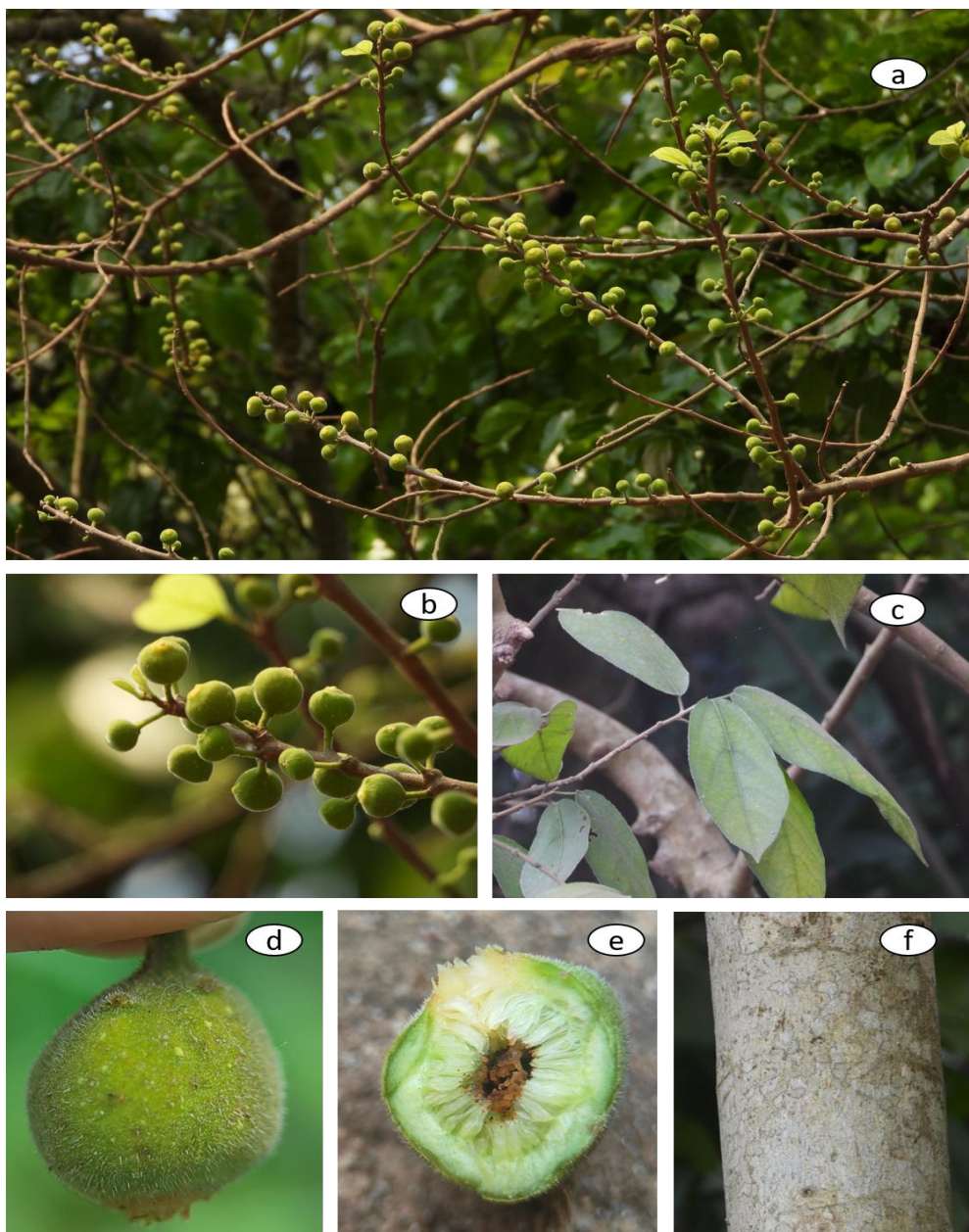


Plate 1: Vegetative parts of *F. exasperata* a) canopy, b) fruits, c) leaves, d) fruit, e) cross section of fruit, f) bark

### Traditional medicinal uses

**Leaves:** Decoction of leaves is used in French Guinea for stomach disorders. It is also used as a folk medicine for treating malaria and hemorrhoids. Aqueous extract of leaves is administered orally (macerated in 1 L of water is consumed for four days) as a traditional medicine for diarrhea. Dried leaves and their infusion are also used for stomach-ache. Leaves are mixed with lemon juice to treat asthma, bronchitis, tuberculosis, and emphysema. Dried leaves are for eruptive skin disease and leaf paste is used externally for eczema. Leaf infusion is used for hypertension, rheumatism, arthritis, epilepsy, and wounds. Infusion of leaf is used for stimulating contractions, hastening childbirth, and placenta expulsion. Leaves boiled, and steam inhaled for chest pain (Ahmed *et al.*, 2012; Nworu *et al.*, 2012).

**Roots:** Root is used to treat asthma, dyspnea, and venereal diseases. Root bark decoction used for asthma in Tanzania. Root paste is used for eczema. Leaves and roots are used as poultices for wounds and arthritic joints (Ijeh and Agbor, 2006; Adebayo *et al.*, 2009).

**Sap:** Sap is used externally for hemostatic purposes and to relieve itching and inflammation. Sap is also used for bleeding control (Adebayo *et al.*, 2009; Ahmed *et al.*, 2012).

### Bioactive compounds

*F. exasperata* is rich in bioactive compounds that contribute to its diverse medicinal properties. The plant contains a variety of secondary metabolites, including flavonoids, tannins, saponins, alkaloids, steroids, phlobatannins, and cardiac glycosides, which are found in its leaves, stem bark, and roots. These compounds exhibit significant pharmacological activities, such as anti-inflammatory, antioxidant, antimicrobial, antihypertensive, and antidiabetic

effects. Studies have also identified an acylglucosylsterol and unusual fatty acids in its leaves, along with other phytochemicals that enhance its therapeutic potential. The presence of these bioactive constituents supports its traditional uses in managing inflammation, ulcers, hypertension, infections, and other health conditions, and highlights its potential for further exploration in drug development (Adebayo *et al.*, 2009; Ahmed *et al.*, 2012; Enogieru *et al.*, 2015; Ajala *et al.*, 2020).

### Pharmacological potential

*F. exasperata* shows significant pharmacological activities (Figure 1).

**Anti-inflammatory activity:** The leaves of *F. exasperata* have demonstrated anti-inflammatory properties in various studies, potentially attributed to compounds such as flavonoids and tannins. This property makes it useful in treating inflammatory conditions such as arthritis, rheumatism, and topical skin inflammation (Oyewole *et al.*, 2017).

**Anti-ulcer and gastroprotective effects:** Studies have highlighted the anti-ulcer properties of *F. exasperata* with the plant's leaf extracts showing promising results in preventing and healing gastric ulcers in animal models. The protective effects are likely due to the plant's ability to enhance mucosal defense, reduce acid secretion, and promote healing through antioxidant properties (Odutuga *et al.*, 2014).

**Antioxidant potential:** Compounds such as flavonoids, tannins, and phenolic acids in *F. exasperata* contribute to its antioxidant activities. These compounds scavenge free radicals, protecting cells from oxidative damage. It plays a significant role in preventing chronic diseases associated with oxidative stress, such as cancer, cardiovascular diseases, and neurodegenerative disorders (Abubakar *et al.*, 2007; Ajeigbe *et al.*, 2022).



**Antihypertensive effects:** *F. exasperata* has been shown to lower blood pressure in animal models, possibly by blocking the effects of certain receptors or by promoting vasodilation. This makes the plant a potential natural remedy for hypertension. Traditional uses include the administration of leaf extracts for managing high blood pressure ([Adewole \*et al.\*, 2011](#)).

**Antimicrobial and antifungal activity:** *F. exasperata* has exhibited antibacterial, antifungal, and antiviral properties in several studies, with the leaf extract showing activity against common pathogens. The plant is used to treat a variety of infections, including respiratory and skin infections, and may be a useful candidate in the development of natural antimicrobial agents ([Omoya and Ogunleye, 2018](#); [Ajala \*et al.\*, 2020](#)).

**Analgesic and antipyretic effects:** Studies have suggested that *F. exasperata* possesses analgesic properties, helping to reduce pain by modulating pain receptors or pathways. The plant also has antipyretic properties particularly in the context of malaria and other febrile diseases ([Amonkan \*et al.\*, 2022](#)).

**Antidiabetic activity:** The leaves of *F. exasperata* have demonstrated hypoglycemic effects, which may be attributed to their ability to enhance insulin sensitivity, reduce glucose absorption, or stimulate insulin secretion ([Adewole \*et al.\*, 2011](#)).

**Anticancer properties:** Preliminary studies have suggested that *F. exasperata* may have anticancer effects, possibly through the inhibition of tumor growth, suppression of cancer cell proliferation, and induction of apoptosis in cancer cells. Flavonoids, saponins, and tannins are believed to contribute to the anticancer effects, although more research is needed to understand the full scope of its anticancer potential ([Abubakar \*et al.\*, 2007](#); [Ajeigbe \*et al.\*, 2022](#)).

**Anticonvulsant and anxiolytic affects:** Extracts of *F. exasperata* have shown potential anticonvulsant properties in animal models, indicating that the plant could be useful in managing seizures and epilepsy. Some studies also suggest that the plant may have calming effects, making it useful in managing anxiety disorders (Olaoluwa *et al.*, 2022).

**Toxicity and safety considerations:** While many pharmacological properties are promising, some toxicity studies have raised concerns about the potential hepatotoxicity and nephrotoxicity of high doses of certain extracts. Further research is needed to better understand the safety margins and therapeutic properties of *F. exasperata* in humans, ensuring that its medicinal uses do not pose significant health risks (Diatta *et al.*, 2022).

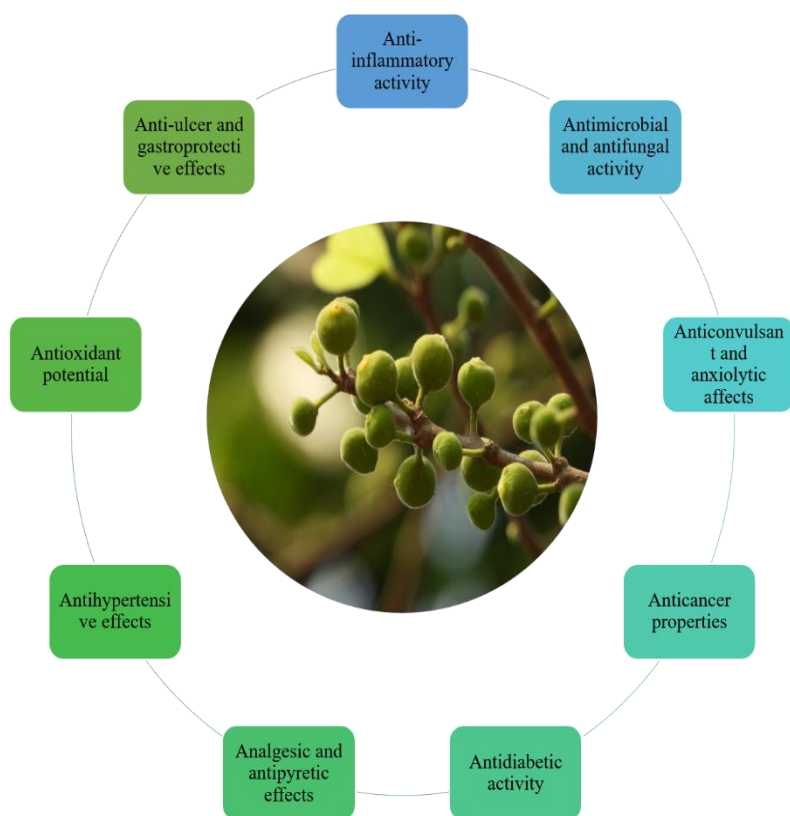


Figure 1: Pharmacological values of *F. exasperata*



## Conclusion

*Ficus exasperata* is a versatile medicinal plant with a rich history of traditional use in treating a wide range of health conditions. Its phytochemical composition, characterized by the presence of bioactive compounds like flavonoids, tannins, saponins, and alkaloids, underscores its pharmacological potential. Scientific studies have validated some of its traditional uses, such as anti-inflammatory, antihypertensive, and antioxidant effects, further supporting its relevance in alternative medicine. However, comprehensive research is essential to isolate and characterize its active components, determine their mechanisms of action, and evaluate their safety and efficacy. The therapeutic potential of *F. exasperata* makes it a promising plant for the development of novel herbal formulations and pharmaceutical agents. Despite its long-standing use in traditional medicine, more in-depth studies are necessary to fully characterize its bioactive constituents and establish its therapeutic efficacy in modern medicine.

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