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Phytochemical, pharmacognosy and ethnobotanical importance of the *Ficus virens* Aiton

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Abstract

Ficus virens Aiton, commonly known as the white fig, is a plant species found predominantly in Southeast Asia. This review investigates the phytochemical composition, pharmacognosy, and ethnobotanical significance of *F. virens* Aiton. Various bioactive compounds such as flavonoids, tannins, alkaloids, terpenoids, and phenolic compounds have been identified in the plant, exhibiting diverse medicinal properties including antioxidant, anti-inflammatory, antimicrobial, and anticancer activities. The secondary metabolites present in *F. virens* Aiton hold promise for the development of new drugs and therapeutic agents. Traditional medicine systems have utilized this plant for centuries to treat menstrual disorders, skin diseases, blood problems, diabetes and promote wound healing. Scientific studies have also confirmed its pharmacological activities, demonstrating potent antioxidant effects, anti-diabetic properties and anti-inflammatory effects. These findings validate the traditional use of *F. virens* Aiton and highlight its potential as a source of novel therapeutic agents. However, further research is necessary to fully understand the underlying therapeutic mechanisms and explore the untapped potential of *F. virens* Aiton in medicine, cosmeceuticals, and nutraceuticals. A comprehensive understanding of the phytochemical profile, pharmacognosy, and ethnobotanical importance of *F. virens* Aiton will contribute to harnessing its medicinal and economic value, benefiting both traditional and modern healthcare systems.

Keywords: Medicinal plant, *Ficus virens* Aiton, phytochemistry, pharmacognosy, antioxidant & anti-diabetic

Introduction

Ficus, often known as figs, is one of the largest plant genera, with over 800 species of trees, shrubs, and vines found in tropical and subtropical climates across the world (Berg and Corner, 2005; Chaudhary *et al.*, 2012; Chantarasuwan *et al.*, 2013) [7, 10, 9]. Some of the species of genus *Ficus* have been cultivated for thousands of years for their delicious fruit, and they are still an important crop in many regions of the world (Jim & Liu, 2001; McPherson, 2005) [22, 29]. The majority of species in *Ficus* genus are distinguished by their fleshy receptacles, known as syconia, which contain ostioles at the top and mature into numerous fruits with duplets collecting. When mature, the fresh fruits are delicious and juicy, with thin and sensitive skin and meaty walls of various colours. Although some species do not produce fruit, their physical traits are similar and might be difficult to discern. Vein ornamentation and traces in the lamina can help with species identification. *Ficus* trees are distinguished by their auxiliary root systems, which extend from trunks or branches (Murugesu *et al.*, 2021) [34]. The genus *Ficus* is culturally and ecologically significant, and it is still the focus of research in domains ranging from agriculture to ecology and medicine. *Ficus virens* syn. *Ficus infectoria* Roxb., commonly known as Cuvi white fig, White fig, or White-fruited wavy leaf fig tree is an important plant of genus *Ficus*. There are many vernacular names which is shown in the Table 1.

Classification and Morphology

F. virens Aiton is a species that belongs to the subgenus *Urostigma*, section *Urostigma*, and subsection *Urostigma* (Chaudhari *et al.* 2012) [10]. The taxonomical detail of the species is given in Table 2.

Table 1: Vernacular Names of *F. virens*

Language	Vernacular Name	References
Gujarati	Pipli or Pipri	Patel, 1984 ^[42] ; Anonymous, 2010
Sanskrit	Phagu, Phalgu, or Plaksa	MMPND, 1995 ^[31] ; Hanelt <i>et al.</i> , 2001 ^[20] , Ghafoor, 1985 ^[18] ; Wu <i>et al.</i> , 2003 ^[58] ; Mishra and Chandra, 1998 ^[30] ; Krishnen, 2013 ^[25]
Hindi	Kahimal, Kahimmel, Kaim, Keol, Pakur, Pilkahan, Pilkhan, and Ramanjir	
Kannada	Basari, Basarigoli, Juvvimara, Karibasari, Karibasuri, or Matai ichchi	
Kannada & Marathi	Pakur, Bassari, Pakari	
Telugu	Badijuvvi, Banda juvvi, Jati, or Jatijuvvi	
Malayalam	Bakri, Chakkila, Chela, Cherala, Cherla, Chuvannal, Itti, or Jati.	
Tamil	Cuvalai pipal, Itti, Jovi, Kallal, Kurugatti, Kurugu, Matai ichchi, or Suvi	
Urdu	Pakodo	

Initially growing as a hemi-epiphyte, *F. virens* eventually establishes itself as a tree that can reach up to 35 m in height, although it may also grow independently (Yeo *et al.*, 2011)^[60]. The leaves of this deciduous species are spirally-arranged, hairless, and have entire laminae that can be egg-shaped, oblong or elliptical. The petioles are yellowish green and range from 2 to 4.5 cm in length, while the pink stipules can be up to 1.5 cm long, with a maximum length of 8 cm on shoots with flushing leaves (Berg and Corner, 2005; Shu, 2003; Prathap, 2005; Shah 1978; Oza and Rajput, 2006; Lansky and Paavilainen, 2011)^[7, 49, 45, 47, 41, 28].

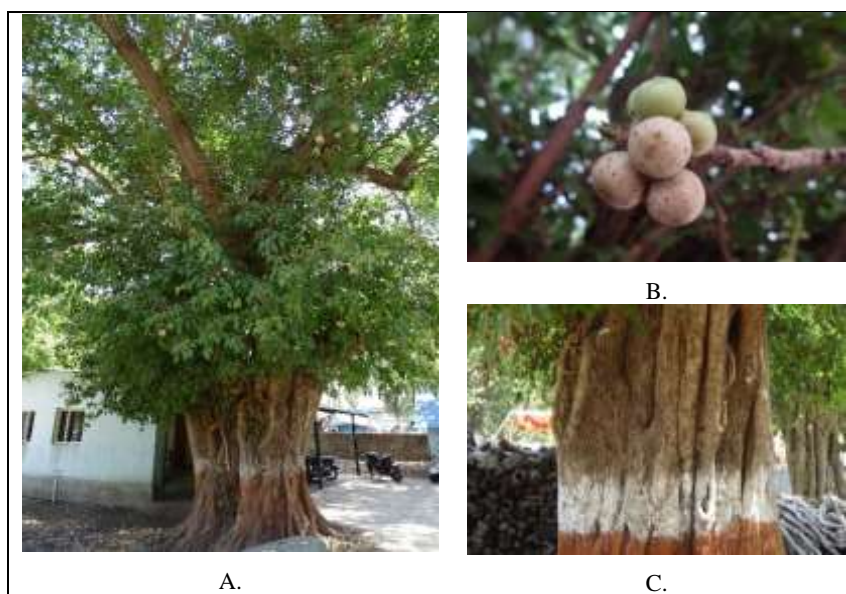
F. virens intermittently sheds all its leaves, and during the period of new leaf growth that lasts a few days, the stipules

are also shed (Ng *et al.*, 2005)^[37]. Following these leaf flushes, more syconia are produced (McPherson, 2005)^[29]. The Photograph of *F. virens* shown in Fig 1.

Table 2: Taxonomical Classification

Kingdom	Plantae
Phylum	Tracheophyta
Class	Magnoliopsida
Order	Rosales
Family	Moraceae
Genus	<i>Ficus</i>
Species	<i>Ficus virens</i> Aiton

(<https://indiabiodiversity.org/species/show/31361>)

**Fig 1:** *Ficus virens* A. Tree B. Fruits C. Bark

Distribution

F. virens is a versatile species that can be found in various habitats including coastal, monsoon, savannah, and secondary rainforests (Berg & Corner, 2005)^[7], as well as in lowland and hill forests (Turner, 1995)^[56]. It is globally natural distribution in Sri Lanka to southern China, across Southeast Asia to northern Australia. In India it is distributed in plains or lower hills of India in Sikkim, Bengal, Assam, West peninsula. It is found in Sub-Himalayan belt in the monsoon, occasional in deciduous to moist deciduous forest of Western Ghats and deccan plateau; not in common in wild but frequently planted near villages and along the roads (Jim & Liu, 2001; Berg & Corner, 2005; McPherson, 2005; Anonymous, 2010; Krishnen, 2013; Neginhal, 2022)^[22, 7, 29, 25, 36].

Ethnobotanical Uses

Fruits and young sprouts are used as food, same leaf as a fodder and the trees are used in the Agri-Horticulture shade tree in coffee plantations; ornamental tree along avenues; host tree for lac insects (Ghafoor 1985, Hanelt *et al.* 2001)^[18, 20]. In addition to being a source of edible syconia, the new foliage of *Ficus virens* can be consumed as a vegetable and pickle (Siwakoti *et al.*, 1997)^[51]. Furthermore, the leaves contain antioxidants and exhibit free-radical scavenging activity, making them potentially useful in the prevention and treatment of human diseases (Abdel-Hameed, 2009)^[11]. The species also has the potential to be used for phytoremediation of metals, and individual trees are capable of intercepting heavy metal pollutants from the atmosphere (Yeo & Tan, 2011)^[60]. The Ethnomedicinal uses suggested by various authors has been presented in Table 3.

Table 3: Ethnobotanical uses of *F. virens*

Part	Ethnomedicinal use	References
Leaves	Diabetes, Poultice, Estrogenic, Hepaprotective, Intrinsic haemorrhage, Erysipelas and wound	Khan <i>et al.</i> , 2011 [23]; Devi <i>et al.</i> , 2022 [16]; Murugan <i>et al.</i> , 2013 [33]; Khare, 2007 [24]; Pattar <i>et al.</i> , 2013 [43]; Anonymous, 2005 [4]
Bark	Gargle, Wash of ulcers, Blood diseases, Menstrual disorders, Leucorrhoea, Diabetes, Diarrhoea, Menorrhoea, Nervous disorder, Vaginal diseases, Soreness in the mouth, Hyperlipidemia, Uterus, Burning sensation, Hallucination, Dysentery, Rheumatism, Bone fracture, Vertigo, Delirium	Murugan <i>et al.</i> , 2013 [33]; Kumar <i>et al.</i> , 2012 [26]; Khare, 2007 [24]; Khan <i>et al.</i> , 2011 [23]; Nadkarni, 1954 [35]; Aiyer & Kolammal, 1957 [2]; Mooss, 1976 [32]; Kurup <i>et al.</i> , 1979 [27]; Warriar, 1994 [57]; Iqbal <i>et al.</i> , 2015 [21]; Anandjiwala <i>et al.</i> , 2008 [3]; Swami <i>et al.</i> , 1996 [53]; Anonymous, 2005 [4]
Fruits	Diabetes, Menstrual Disorders, Edible fruits	Khare, 2007 [24]; Khan <i>et al.</i> , 2011 [23]; Chopra <i>et al.</i> , 1986 [14]
Tender shoots	Preparations of curries	Fasciola, 1998 [17]

Phytochemical Constitutes

Phytochemicals found in *Ficus virens* include phenolics, flavonoids, tannins, terpenoids, alkaloids, and glycosides. These chemicals have been demonstrated to exhibit a wide range of biological actions, including antioxidant, anti-inflammatory, antibacterial, anti-diabetic, and anticancer characteristics. Quercetin, kaempferol, luteolin, myricetin, catechin, epicatechin, rutin, gallic acid, ellagic acid, betulinic

acid, -sitosterol, stigmasterol, and lupeol are some of the particular phytochemical elements found in *F. virens* (Chandira *et al.*, 2010; Shi *et al.*, 2011) [8, 48]. These compounds have been researched for their potential therapeutic uses and are known to exhibit a wide spectrum of biological functions. The phytochemicals reported in various parts of *F. virens* is shown in Table 4.

Table 4: Phytochemical properties of *F. virens*

Plant parts	Phytoconstituents	References
Stem Bark	Tyrosinase, Alkaloids, Phenolics, Flavonoids, Glycosides, n-octadecanyl-O- α -D-glucopyranosyl (6' \rightarrow 1'')-O- α -D-glucopyranoside, Methyl ricinolate, Caffeic acid, Bergenin, β -sitosterol, Lanosterol, Carbohydrate, Tannins, Steroids/terpenoids, Proanthocyanidins, Amino acids, Phytosterols	Chen <i>et al.</i> , 2014 [11]; Swathi <i>et al.</i> , 2023 [35]; Sultana <i>et al.</i> , 2017 [52]; Niranjana and Gard, 2012 [38]; Iqbal <i>et al.</i> , 2015 [21]; Anonymous, 2005 [4]; Cragg <i>et al.</i> , 1997 [15]; Anandjiwala <i>et al.</i> , 2008 [3]; Chen <i>et al.</i> , 2017 [13]
Fruit	Tyrosinase, Proanthocyanidins	Chen <i>et al.</i> , 2014 [11]; Chen <i>et al.</i> , 2017 [13]
Leaf	Phenolic, Flavonoids, Tyrosinase, Lipid, Carotenoids, Quercetin, Kaempferol, Glycosides & Tannins	Chen <i>et al.</i> , 2013 [12]; Chen <i>et al.</i> , 2014 [11]; Pattar <i>et al.</i> , 2018 [44]; Orabi and Orabi, 2016 [40]; Swathi <i>et al.</i> , 1989 [62]; Swathi <i>et al.</i> , 1996; Hammed 2009 [1]

Pharmacological activity

There is limited research available on the pharmacological activities of *Ficus virens*. However, some studies have investigated its potential medicinal properties. *F. virens* leaves exhibited antioxidant and anti-inflammatory and hepatoprotective effects activities (Yao *et al.*, 2015) [59]. *Ficus virens* bark extract showed analgesic and anti-inflammatory

activities in mice (Singh *et al.*, 2015) [50]. *Ficus virens* extract also had significant antidiabetic effects in diabetic rats. The extract was found to lower blood glucose levels and improve insulin sensitivity (Nugraha *et al.*, 2018) [39]. Some of the available information in Pharmacological properties of *Ficus virens* is presented in Table 2.

Table 5: Pharmacological properties of *F. virens*

Plant parts	Pharmacological Activities	References
Bark	Anti-inflammatory & Anticancer	Hafeez <i>et al.</i> , 2013 [19]
	Antibacterial	Chen <i>et al.</i> , 2013 [12]
	Antifungal	Ramadevi <i>et al.</i> , 2014 [46]; Swami <i>et al.</i> , 1996 [53]
Latex	Antioxidant & Antidiabetic	Orabi and Orabi, 2016 [40]
Leaf	Antioxidant	Chen <i>et al.</i> , 2013 [12]; Pattar <i>et al.</i> , 2018 [44]; Pattar <i>et al.</i> , 2013 [43]; Iqbal <i>et al.</i> , 2015 [1]
	Antiviral	Abdel-Hameed, 2009 [1]; Orabi and Orabi, 2016 [40]

Conclusion

In conclusion, *Ficus virens* is a valuable plant species that has traditionally been utilized for a variety of medical uses. The plant contains several phytochemicals, including flavonoids, phenolics, terpenoids, and alkaloids, all of which have been shown to have important pharmacological activities. Several studies have suggested that it may be useful as an anti-diabetic, antioxidant, anti-cancer, and anti-inflammatory agent, among other things. Despite the promising accomplishments, further research is needed to thoroughly investigate the plant's chemical composition and pharmacological capacities, as well as its potential utilization in therapeutic applications. Overall, *Ficus virens* has plenty of potential as a natural chemical source for the development of new curative medicines.

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