



## **FICUS DALHOUSIAE MIQ.: A RARE PLANT SPECIES OF MEDICINAL IMPORTANCE**

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### **Abstract**

Ficus is a genus of about 850 species of woody trees, shrubs, vines, epiphytes, and hemi epiphytes in the family Moraceae, collectively known as Fig trees or Figs. They are native throughout the tropics with the few species extending into the semi warm temperate zone. *Ficus dalhousiae* is an umbrageous tree 9-12 mtrs. having young branches at first softly pubescent and afterwards glabrous. It is traditionally used in treatment of liver and skin diseases. In the present review phyto chemical and pharmacological activities of the plant have been listed. Further isolation and identification of bioactive molecules will surely pave a way for the immense benefit of this plant and also will turn a new leaf in the healthcare society in exploring newer herbal drugs.

**Keywords:** *Ficus dalhousiae*, Phytochemical Screening, Pharmacological activity

### **Introduction**

The use of herbal medicine has become an integral part of life. Plants having the medicinal value in form of chemical substances that produce a definite physiological action on the human body are called phytochemicals. Since the ancient time these phytochemicals are used to cure the disease in herbal and homeopathic medicines. These are non-nutritive substances, have protective or disease preventive property (Kirtikar *et al.*, 1987). The rationale of this review is to provide comprehensive information on *Ficus dalhousiae*, a rare plant species of medicinal importance, highlighting the plant's Phyto-pharmacological profile along with a critical appraisal of its ethnobotanical and traditional uses. Ficus is a genus of about 850 species of woody trees, shrubs, vines, epiphytes, and hemi epiphytes in the family Moraceae. The Moraceae family represents a vital group of plants which have innumerable medicinal properties. *Ficus dalhousiae* is one among the rare species of Ficus belonging to family Moraceae with immense medicinal value.

### **Botanical Description**

#### **Taxonomical Classification**

Domain	:	<i>Eukaryota</i>
Kingdom	:	<i>Plantae</i>
Sub kingdom	:	<i>Viridaplantae</i>
Phyllum	:	<i>Tracheophyta</i>
Sub Phylum	:	<i>Euphylllophytina</i>
Infraphylum	:	<i>Radiotopsida</i>
Class	:	<i>Spermatopsida</i>
Sub Class	:	<i>Rosidae</i>
Order	:	<i>Urticales</i>
Family	:	<i>Moraceae</i>
Tribe	:	<i>Ficeae</i>
Genus	:	<i>Ficus</i>
Specific epithet:		<i>dalhousiae</i> -Miq.

**Synonyms:** *Ficus dalhousiae* Miq. (Synonyms.: *Ficus costigera* Miq. and *Urostigma dalhousiae* Miq.) is one of the rare species belonging to the family Moraceae.

**Vernacular names:** It is locally recognized by different vernacular names as Dalhousiae's Ficus (English) Kallaal (Malyalam); Kal-aal, Pei-aa (Tamil) Soma valka (Sanskrit) and Peddakulamari in (Telugu).

#### **Origin:**

This species is endemic to peninsular area and a very rare species, first described this species as *Urostigma dalhousiae* based on Wights' collection from India and later Miquel named it as *Ficus dalhousiae*. Subsequently recorded this species from the Nilgiri Mountains in the altitudinal range of 605-1370 m. Wherever it grows, its population size is very small and probably that is the reason for its inclusion under the very rare category in the threatened plant list.

**Geographical Distribution:** *Ficus dalhousiae* Miq. is an umbrageous tree 9-12 meters having young branches at first, softly pubescent and afterwards glabrous. Flowering and fruiting period is from December-January. It is mostly found in dry and moist deciduous forest areas in South India. It is found mainly in Andhra Pradesh, Kerala, and Coimbatore. Dundigal, Namkkal, Niligiri, Salem, Theni, Tirunaveli and Vellore districts of Tamil Nadu state in India.

#### **Morphological Characters:**

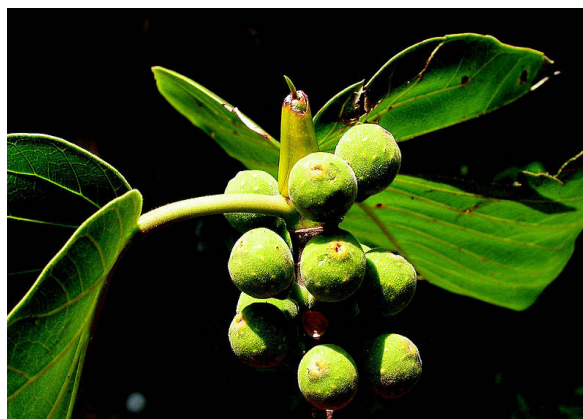
Trees to 10 m high, sometimes epiphyte; bark brown, fairly smooth; blaze creamy-pink; exudation milky; aerial roots absent; young shoots softly pubescent. Leaves simple, alternate; stipules to 3 cm long, lateral, ovate-lanceolate, puberulous; petiole 4-10 cm long, stout, not articulated, pubescent; lamina 25-30 x 12-18 cm, ovate or ovate-oblong, base deeply cordate, apex acute or acuminate, margin entire, coriaceous, glabrous above and minutely pubescent beneath; 3-7-ribbed from base, lateral nerves 10-13 pairs, pinnate, prominent; intercostae reticulate, obscure. Flowers unisexual; inflorescence a syconia, in axillary pairs, 1 x 0.8 cm, obovoid, with 3 broad triangular apicular scales, densely pubescent; bracts 3, spreading, broad, triangular, sometimes bifid; peduncle 8 mm long, pubescent; flowers of 4 kinds; male flowers very few, only near the apex of receptacle, sessile, globose; sepals 3, concave, round; stamen 1,

connective wide; filament thick, adnate; female flower sessile; perianth gamophyllous; ovary ovoid; style long, lateral; stigma cylindrical; gall flowers on thick pedicels, ovary obovoid, smooth; style short. Syconium yellow when ripe (Tiwari Sudhanshu, 2008; Singh *et al.*, 2003)

#### Traditional Uses

It is widely used in Ayurveda, Siddha, Unani and folk medicine. The whole plant and its parts like leaf, stem, stem-

bark, root, root-bark, flowers, fruits and seeds are well known to have medicinal properties and have a long history of use by indigenous communities in India. The medicinal value of this plant is mainly for the treatment of a large number of human ailments. The leaves and the stem bark of the plant are used in liver and skin diseases. Bark paste is used in the treatment of leprosy. Fruits are used as cardio tonic (Khare 2004; Flora of Presidency of Madras, 1957)



**Fig. 1 :** Ficus Dalhousiae Plant twigs and fruits

**Phytochemical Constituents:** Phytochemical screening of Ficus Dalhousiae different plant parts shows the presence of various phytoconstituents responsible for its medicinal value. The pharmacological activities of medicinal plants are due to the presence of secondary metabolites such as flavanoids, sterols, alkaloids, phenols, glycosides, saponins etc. As the plant contains tannins, flavanoids and phenolic compounds, there is possibility of antioxidant property in the plant. The medicinal properties of plants have been explored

all over the world due to their antioxidant activity, economic viability and side effects. These phytochemicals play a vital role in preventing renal diseases, cholesterol and carcinomas. The phytochemical screening reports can suggest possible pharmacological activity of the plant in relation with the chemical constituents in the plant to the known group of constituents. The results of phytochemical screening are depicted in the following table (Table 1).

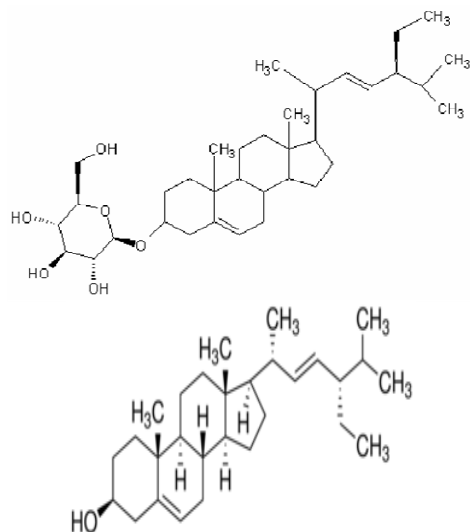
**Table 1 :** Phytochemical Screening results of *Ficus dalhousiae* Leaf, Stem Bark and Root Extract

S. No.	Phytoconstituents	Solvent Extract					
		Pet Ether	n-Hexane	Acetone	Chloroform	Ethanol	Methanol
1.	Alkaloids	++	++	++	++	++	++
2.	Glycosides	+	+	+	+	+	+
3.	Carbohydrates	++	++	+	++	++	++
4.	Tannins	++	++	++	++	++	++
5.	Steroids	++	++	++	++	++	++
6.	Terpenoids	++	++	++	++	++	++
7.	Flavonoids	++	++	++	++	++	++
8.	Saponins	+	+	++	++	++	++
9.	Anthraquinones	-	-	+	+	++	++
10.	Coumarins	-	-	-	-	-	-
11.	Proteins and Amino acids	-	-	+	+	+	++
12.	Resins	+	++	++	++	++	++
13.	Gums and Mucilage	-	-	-	-	-	-
14.	Fats and Oils	++	++	++	++	++	++
15.	Reducing sugars	++	++	++	++	++	++
17.	Quinones	-	-	-	-	-	-
18.	Anthocyanins	+	+	+	+	+	++

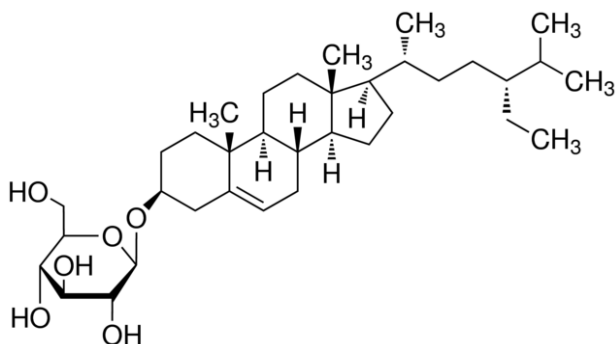
In conclusion it can be said that the plant parts like root and leaves have got chemical constituents in a larger amount than in the stem bark. The results of macroscopic analysis

can be considered as characteristic features of the plant and can provide help in differentiating this plant from the other species.

**Isolated constituents:** Sitosterols, Stigmasterol and Stigmasterol-D-glucoside



**Fig. 2 :** Beta-Sitosterol (AUCP-1) Fig.No:3 Stigmasterol (AUCP-2)



**Fig. 4 :** Stigmasterol-D-Glucoside (AUCP-3)

## Pharmacological And Biological Activities

### Analgesic and Antipyretic

The crude ethanolic extract of *Ficus dalhousiae* Miq. leaves (FDLEE) was tested for analgesic activity using hotplate and acetic acid induced writhing model, and antipyretic activity using yeast induced pyrexia model at a dose of 100 mg/kg, 200 mg/kg, 400 mg/kg. The leaf extract showed analgesic effect in hotplate and acetic acid induced writhing method, whereas the extract at the same dose showed weak antipyretic activity when compared with the control (Ghori *et al.*, 2014).

### Anti-inflammatory

The crude ethanolic extract of leaf was tested for antiinflammatory activity using carrageenan and formalin induced paw oedema model using two different doses 100 and 200 mg/kg body weight in albino wistar rats. The crude ethanolic extract of leaves was found to inhibit 85 % and 90% of inflammation at a dose of 100 mg/kg and 200mg/kg respectively in both the models. The extract contains antiinflammatory principles which may have the potential for treatment of both acute and chronic inflammatory conditions (Ghori *et al.*, 2015)

### Anticonvulsant

The ethanolic extract of *Ficus dalhousiae* roots was studied for anticonvulsant activity by two experimental models viz maximal electroshock and pentylene tetrazole

induced convulsions in rats and mice at a dose of 200 and 500 mg/kg body weight orally. The Ethanolic extract at dose of 500 mg/kg has shown a significant decrease in the duration of hind limb extensor phase in MES and it showed a delayed onset of myoclonic spasm and reduced the duration of convulsions in the PTZ induced convulsions. In the case of ethanolic extract at a dose of 200 mg/kg b.w.p.o there was less significant delay in the onset of myoclonic spasm as well as in the duration of convulsions in PTZ induced convulsions. The chemical constituents present in the extract might be responsible for the anticonvulsant effect.

### Antidiabetic

*Ficus dalhousiae* leaf ethanolic extract was studied for antidiabetic effect in alloxan induced diabetic rats. The significant and consistent antidiabetic effect of FDLEE in alloxan induced diabetic rats may also be due to enhanced glucose utilization by peripheral tissues. Hyperglycaemia is a main cause for elevated free radical levels followed by production of ROS, which can lead to increased lipid peroxidation and altered antioxidant defence and further leads to impairment of glucose metabolism in biological system. Hypercholesterolemia has been reported earlier in alloxan-induced diabetic rats. The result of this study reveals that the dose of 400 mg/kg lowered serum cholesterol significantly. The possible mechanism through which FDLEE exert anti-hyperlipidaemic effect might be due to change in activity of cholesterol biosynthesis enzymes or due to change in of lipolysis which are under the control of insulin. Blood glucose level and body weight have been commonly measured to monitor the glycaemic control mechanism. In the present study, diabetic rats had lower body weight, high blood sugar levels as compared to normal rats. However, orally administered FDLEE significantly decreased the body weight and the blood glucose level. This could be due to potentiation of the effect of insulin by increasing the pancreatic secretion of insulin from existing  $\beta$ -cells of islets of Langerhans or its release from bound insulin (Ghori *et al.*, 2014).

### Gastroprotective

*Ficus dalhousiae* roots ethanolic extract was screened for gastroprotective activity in Albino wistar Rats using Indomethacin and cold restraint stress induced ulcer models. Three doses 100, 200 and 400 mg /kg were chosen for the study. The extract showed significant gastroprotective effect in both the ulcer models at the dose of 200 and 400 mg/kg which was evident by the results of gastric parameters and biochemical assays of Glutathione and Malondialdehyde. A significant lowering of the elevated levels of free acidity, total acidity, volume of gastric juice and malondialdehyde was observed when compared with the negative control group where as levels of Glutathione were increased in the test groups. The gastroprotective effect of *Ficus dalhousiae* root ethanolic extract was due to decrease in gastric acid secretion and MDA levels with resultant increased antioxidant activity through decreased free radical formation (Ghori *et al.*, 2014).

### Hepatoprotective

Ethanolic extract of *Ficus dalhousiae* leaves was screened for Hepatoprotective activity using Paracetamol and carbon tetrachloride-induced hepatotoxicity in Albino Wistar rats. Biochemical parameters like SGPT, SGOT, serum

albumin, alkaline phosphatase, total bilirubin, direct bilirubin and total protein were estimated. Oral treatment with the extract 250 and 500 mg/kg, significantly altered all the serum marker levels to the normal in both the experimental models. The activity of the extract was comparable to that of standard drug silymarin (25mg/kg, p.o.). Histopathological observations also demonstrated hepatoprotective effect of the test extracts against the inducers. The hepatoprotective activity of *F. dalhousiae* was due to the free radical scavenging mechanisms exhibited by the flavonoids and terpenoids present in the leaves extract (Ghori *et al.*, 2014).

### Wound healing

*Ficus dalhousiae* stem bark ethanolic extract was evaluated for wound healing potential. Phenolic compounds and Flavonoids are known to decrease lipid peroxidation by improving vascularity and by preventing or slowing down the progress of cell necrosis thereby increasing the viability of collagen fibres by increasing the circulation and the strength of collagen fibres, and also by encouraging the DNA synthesis and preventing the cell damage. Flavonoids are also known to enhance the wound healing process primarily due to their antimicrobial and astringent properties, which appears to be responsible for wound contraction and elevated rate of epithelization thereby exerting the effect on the proliferation phase of wound healing (Ghori *et al.*, 2015).

### Nephroprotective

*Ficus dalhousiae* leaf methanolic extract was screened for nephroprotective effect in Albino wistar Rats. The nephrotoxicity was induced by Gentamicin and Acetaminophen. The nephroprotective effect of the extract was evident by significant decrease in elevated levels of serum markers such as urea, uric acid and creatinine in both the experimental models (Ghori *et al.*, 2016).

### Antimicrobial

The crude methanolic extract was evaluated for antibacterial and antifungal activity against the microorganisms. The isolated compounds AUCP-1, AUCP-2, AUCP-3 from the plant extract were screened using cup plate method against six bacterial species i.e., *Bacillus subtilis*, *Staphylococcus epidermitis*, *Klebsiella pneumonia*, *Staphylococcus aureus*, *Escherichia coli* and *Pseudomonas aeruginosa*. Antifungal activity test were done on three species of fungi namely *Candida albicans*, *Aspergillus niger* and *Aspergillus flavus* using agar diffusion method. In all the three compounds AUCP-1 (Sitosterol), AUCP-2 (Stigmasterol) & AUCP-3 (Stigmasterol-D-glucoside) the in vitro test results shows that the antibacterial as well as the antifungal activities of the isolated compounds were found to be lower than the plant extract which in-turn is lower than to the reference drugs (Ghori *et al.*, 2016)

### Immunomodulatory

*Ficus Dalhousiae* leaves methanolic extract was evaluated for immunomodulatory effect against cyclophosphamide induced immunosuppression in Albino Wistar Rats. The test extracts 250mg/kg & 500mg/kg p.o. were administered for 13 days to albino Wistar Rats and cyclophosphamide (30mg/kg i.p.) was administered on 11th, 12th and 13th days 1 hour after the administration of the respective treatment. On the 14th day blood was collected by retro orbital puncture and the activity was evaluated by determining the RBC, Hb%, Platelet, total WBC and

differential leucocyte count. Methanolic extract of *Ficus Dalhousiae* leaves showed significant effect compared to cyclophosphamide induced reduction in total WBC, DLC, platelet, RBC counts and Hb %. The significant immunostimulant effect of the methanolic extract of *Ficus* leaf on cyclophosphamide induced myelosuppression may be attributed due to the presence of saponins, and tannins in the extract (Ghori *et al.*, 2018).

### Antihelminthic

The extracts of *Ficus dalhousiae* leaves were evaluated for Anthelmintic Activity in Earthworms. The parameters like paralysis time and time of death were determined by using the extracts of methanol, petroleum ether, n-hexane and aqueous solvent at the concentrations of 25 mg/ml, 50 mg/ml and 100mg/ml. The test extracts exhibited significant anthelmintic activity when compared with Albendazole as standard drug (Idrees *et al.*, 2018).

### Antiatherosclerotic

Ethanolic extract of *Ficus dalhousiae* leaves at a dose of 200 mg/kg and 400 mg/kg.p.o. was evaluated for antiatherosclerotic activity in high cholesterol diet model in rats. Serum enzymes SGOT, SGPT and ALP level and the lipid profile (Total cholesterol, HDL, LDL, VLDL and triglyceride levels) and total protein were determined. Biochemical levels of SOD, GSH, MDA were determined. The antiatherosclerotic activity may be due to the antioxidant potential of leaf extracts thus leading to inhibition of the HMG-CoA enzyme pathway, whereby the mechanism needs to be explored (Ganta Supriya *et al.*, 2018)

### Antihyperlipidemic

*Ficus dalhousiae* stem bark methanolic extract (250 and 500 mg/kg b. wt.) was evaluated for antihyperlipidemic activity in Triton WR-1339 and High fat diet-induced hyperlipidemic rats. *F.dalhousiae* extract significantly altered the serum TC, TG, LDL-C and HDL-C levels to near normal in Triton WR-1339 and high fat diet-induced hyperlipidemic rats. The liver total cholesterol and triglycerides were also significantly reduced after treatment with 250 and 500 mg/kg of *F. dalhousiae* (Surendran Surya *et al.*, 2017).

### Conclusion

*Ficus Dalhousiae* Miq. is a rare plant species of immense medicinal value. It's important parts like leaves, stem bark and root are traditionally used in Ayurveda, Siddha and Unani systems of medicine to treat various ailments like leprosy, skin diseases and liver disorders. The plant contains the major phytoconstituents like alkaloids, tannins, phenols, flavonoids, glycosides, carbohydrates, sterols, saponins which are responsible for the plant's pharmacological activities like Analgesic, Antipyretic, Antidiabetic, Anthelmintic, Gastroprotective, Hepatoprotective, Antimicrobial, Antiatherosclerotic, Immunomodulatory, Antiulcer, Antiviral, Anticonvulsant and Wound Healing. A few chemical constituents like sitosterol, stigmasterol and stigmasterol-D-glucoside have been isolated from the leaves of the plant. As it is a rare plant standardization of the extracts, identification and isolation of the active constituents and pharmacological evaluation may be considered for establishing the mechanism of action. Thus activity guided phytochemical and pharmacological studies of *Ficus Dalhousiae* may lead to the development of novel agents for various disorders.

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