Section: Research Paper

A review of the medicinally important plant species from Uttarakhand, Ficus auriculata and Ficus palmata, and their prospective uses

Namrata Singh[1], Rashmi Verma[2*], Devvret Verma[3], Anushka Kala[1], Aayushi Bhakta[1]

[1]Ph.D Scholar, Department of Biotechnology, School of Basic and Applied Sciences, Shri Guru Ram Rai University, Dehradun, Uttarakhand, India.

[2]Assistant Professor, Department of Biotechnology, School of Basic and Applied Sciences, Shri Guru Ram Rai University, Dehradun, Uttarakhand, India.

[3]Assistant Professor, Department of Biotechnology, Graphic Era Deemed to be University, Dehradun, Uttarakhand, India.

***Corresponding Author:**
Dr. Rashmi Verma,
Dept. of Biotechnology,
School of basic and applied sciences,
SGRRU, Patel Nagar, Dehradun, Uttarakhand, India
***E mail: rashverma26@gmail.com**

Abstract

India has a rich history of traditional medicine, which includes such branches as Ayurveda, Siddha, and Unani. In order to find better solutions for healthcare, current scientific methods may be used to investigate Ayurveda and other Indian medical traditions. The oldest type of medicine that humanity is aware of is the usage of herbs, which has been practised throughout history in all communities. The Uttarakhand region is a natural wealth treasure trove, especially when it comes to medicinal and aromatic flora. For many years, Indian traditional healers have employed these plants to cure a variety of illnesses. Investigating the historic advantage of regional medicinal plants for that region is essential, particularly in areas of Uttarakhand where human habitation poses a major danger to the native vegetation. Investigating the medicinal plants of Uttarakhand was the goal about current study. The purpose of the current study was to investigate Uttarakhand's therapeutic plants. Both Ficus auriculata and Ficus palmata are members of the Moraceae family. Due to its enormous leaves, Elephant ear fig tree is another name for the Ficus auriculata species. The plants have significant ethno medicinal value and are used in conventional folk medicine to treat a wide range of human illnesses. There are more than 800 species of the enormous tropical deciduous evergreen tree. This plant's leaves, bark, fruit, root and latex are frequently employed in the analysis of a variety of infection. In contrast to all other fruits, the Ficus palmata, sometimes called Bedu, produces a special quality.

Key words: Ficus auriculata, Ficus palmata, traditional Medicines, antibiotic, infectious diseases.

Introduction

In herbalism, a number of plants are employed, some of which have medicinal capabilities. The term "medicinal plants" is used to describe these plants. The "backbone"

of traditional medicine, medicinal plants is used daily by over 3.3 billion people in developing nations[8]. These healing herbs are recognised as a rich source of ingredients for the synthesis and production of drugs. Additionally, these plants are essential to the growth of human cultures all across the world. Traditional medicine is widely used in nations like India, China, Sri Lanka, Pakistan, Thailand and Japan. In China, traditional tribal remedies make for about 40% of all medical consumption. The family of mulberries includes the genus Ficus (Moraceae). Nutrients, vitamins, minerals, water, and lipids are abundant in fig species. Figs are an outstanding source of calcium with fibre. A quality supply of fibre, calcium, vitamin K, copper, magnesium, manganese, and potassium can be found in dried figs[18]. According to Mission variety data from the USDA and according to a literature assessment, figs are one of the first plants that humans have ever tamed for use, having been cultivated for more than 1100 years[34]. The highly distinctive syconium and lactory latex, frequently called to as "figs," can be used to carefully review the genus. Human utilize ficus plant in a variety of areas in the tropics and subtropics. Plants are the source of food and medicine, and they are also employed to create hedges, enclosures, lac hosts, fuel, and fodder. Different fig types, which have amazing pharmacological properties and are important commercially, exhibit significant hereditary variability. Alkaloids, coumarins, triterpenes, flavonoids, polyphenols, sterols and other secondary metabolites are found in the medicinal plants of the genus Ficus [24]. The potential moderate laxative, antihelminthic, antidiabetic, anti-rheumatic, anti-dysentery, digestive, and anticoagulant activities of these phytochemicals have been researched[5]. According to research, two species of the Ficus genus, Ficus auriculata and Ficus palmata, which are prevalent in Southeast Asia, have a variety of traditional medicinal benefits. In Uttarakhand, F. auriculata is a significant source of tree fodder. The primary winter feed in the Himalayan growing areas for rice rice is paddy straw, however it cannot match the quality of its diet. The plant species Ficus palmata is a perennial herbaceous member of the Moraceae family. It has a highly juicy fruit inside that is used to make jelly, jam and other items like squash. The fruits' main nutrients are sugars and mucilage, and they are mostly consumed as a dietary supplement for various constipation conditions as well as lung and bladder disorders. Infections with fungi, hypoglycemia, tumours, ulcers, and digestive problems are among the ailments that can be treated with Ficus palmata plants. In the past, stem latex was used to extricate spines that were deeply embedded in the skin. Hepatoprotective, nephroprotective, antiulcer, and anticoagulant activity were discovered in the entire plant extract of Ficus palmata. The review also contains information on along with the pharmacological, toxicological and phytochemical profiles of the species, the traditional diet-medicine overlap also exists. In this study, we aim to learn more about the therapeutic applications of Ficus auriculata and Ficus palmata in different diseases and therapeutic features.

Botanical Description:

Due to its large leaves, F. auriculata is also frequently referred to as the elephant earfig tree. Fresh leaves begin with a bright red colour before changing to a more green hue as they grow in size. The tree is an enormous evergreen that is 4 to 10 metres tall. Its enormous spreading limbs are supported by aerial roots, which subsequently develop into

auxiliary trunks that cover a significant region. The bark has a rough texture and is a brownish brown colour. Simple, ovate to oblong, oval leaves are 5-8 cm long and 5-12.5 centimeters wide. Petioles are 1.2–5 centimeters long and stipules are 1.5–2 centimeters long. The fruits are shaped like pears and have a fleshy pericarp, 8–12 distinct longitudinal ridges, and embedded achenes. Ripe fruit is dark red in colour[33]. A deciduous tree with a height range of 6 to 10 metres is called Ficus palmata (30 feet approx). The broad, ovate, membranous, alternating leaves range in width from12.92 to 14.16 centimetres. Monoecious, monosexual greenish-white and extremely small blooms that can be either male or female yet grow on the same plant. Fruit: Syconoid, averaging 2.5 cm in diameter, 6 g in weight, and ranging in colour from deep violet to black. Numerous, rounded and tiny seeds. Although it may thrive in nutrient-poor soil, medium (loamy), heavy (clay) and light (sandy), soils are preferred. A well-drained soil was also necessary. The plant prefers basic (alkaline), neutral, and acidic soils. In the shade, it cannot grow. It can withstand drought and needs dry or wet soil[22,7].

Habit and Habitat

Ficus auriculata	**Ficus palmate**
It is native to Bhutan, China, Sikkim, Nepal, Thailand, Myanmar, and Vietnam in the Himalayan area of India. It was also introduced to and farmed elsewhere[16].	It originates from Afghanistan, Arabian Peninsula, Nepal, Pakistan, Somalia, Iran, Sudan, Ethiopia, India and South Egypt[10].
Between 1800 and 2600 meters or more above sea level, these plants are primarily found in temperate, tropical, and subtropical regions.	1,000m or more above sea level. These plants can be found[10].
Asia more especially China, Bhutan, Pakistan, Myanmar, India, Thailand, Nepal, Vietnam, Malaysia, and other nations in that continent is where it originated.	Ficus palmata, a widespread wild fig, thrives in northwest India's Kashmir, Uttarakhand, and Punjab on hot, arid hillsides in clay-loam soils[10].
Tropical and subtropical woods are its natural habitat. From the sub-Himalayan region to the Deccan and the South Indian deciduous woodlands, India is widely distributed[33].	A 6 to 10 m tall, moderately large, deciduous tree with immature, tomatoes' branches that frequently becomes glabrous. Bark that is easily removed by hand is smooth, dull, and ash grey[10].

Figure

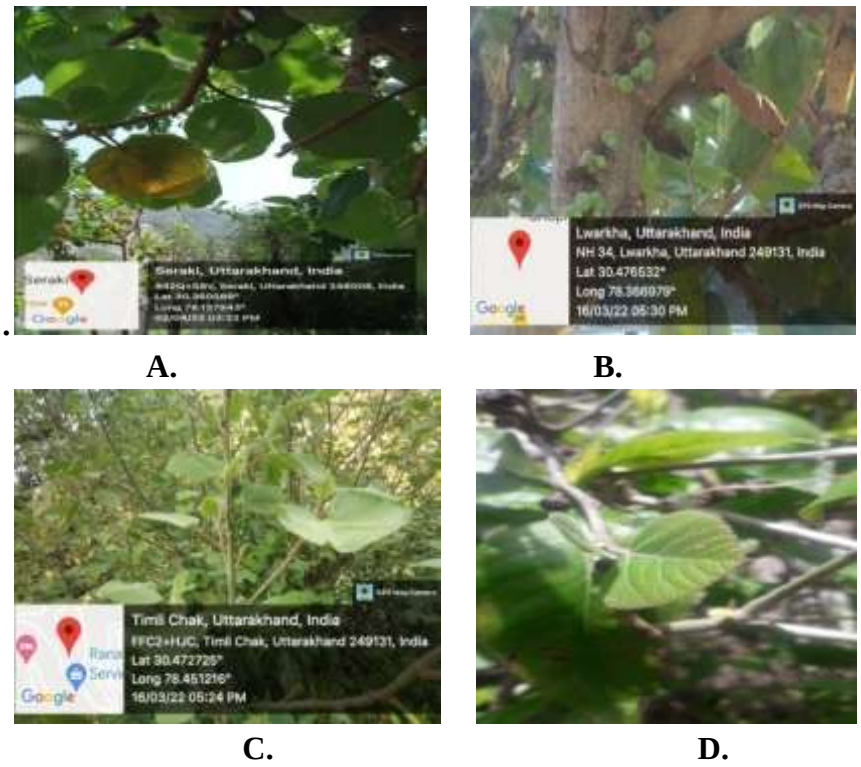


Fig. A: Showing leaf of Ficus auriculata , B: Showing fruits of Ficus auriculata, C: Showing tree of Ficus palmata, D: Showing fruits and leaves of Ficus palmata

Phytochemical properties

The Folin-Ciocalteu method and the colorimetric approach using aluminium chloride, respectively, were used to quantify the total flavonoid and phenolic content of methanolic extract of Ficus auriculata leaf[26]. Gallic acid was employed as the standard in both techniques. At 760 nm, the absorbance was measured for the total phenolic content method and at 510 nm for the flavonoid content method the Ficus auriculata Lour alcohol extracts. Ficus auriculata Lour's leaves and fruits were extracted with alcohol, and the extracts were divided into fractions with petroleum ether, chloroform, and ethyl acetate. These fractions contained compounds such as beta-sitosterol-3-O-beta-D-glucopyranoside, scopoletin, stigmasterol, bergapten, myricetin, and quercetin[1]. Following phytochemical screening, cardiac glycosides, alkaloids, tannins, flavonoids, terpenoids, and Ficus palmata plant extracts were discovered[6]. Several chromatographic methods, including liquid-liquid fractionation, were used to separate trans-psoralenoside, psoralene and bergapten, two furanocoumarins, vanillic acid, and the flavone glycoside rutin from the aerial portions of Ficus palmata, together with a novel isomer of psoralenoside, one triterpene, one aromatic acid, germanicol acetate[4].

Chemical Composition of both plants

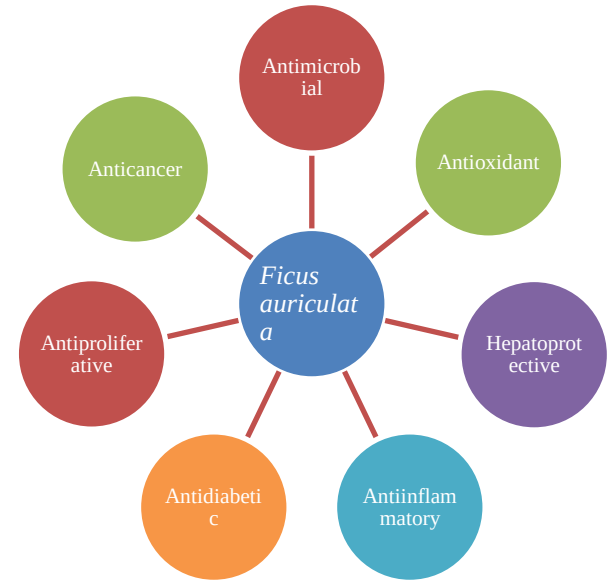
Fruit from the Ficus auriculata has 7.5% total soluble solids and 87.1% moisture. Total sugar content is 6.15%, reducing sugar content is 6.12%, non-reducing sugar content is 0.03%, and pectin content is 0.48%. The fruit only contains 3.35mg of vitamin C per 100g. The fruit has a protein content of 0.59%. As shown by its ash, the fully ripe fruit has a total mineral content of 1.068%. Magnesium, Phosphorus, potassium, calcium and iron

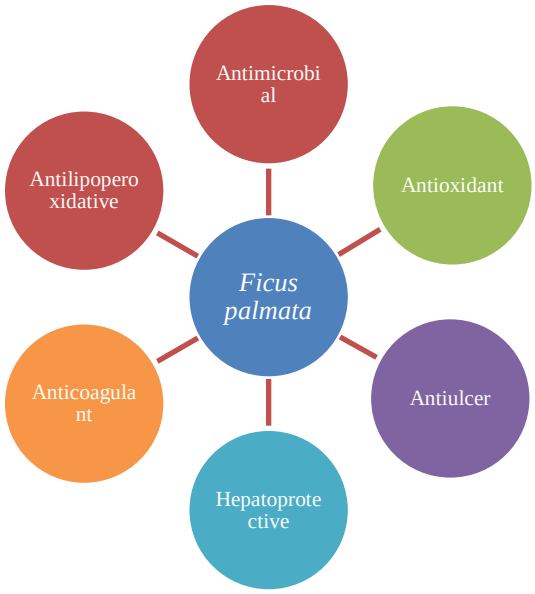
make up the fruit's mineral content in the following proportions: 0.039, 0.331, 0.039, 0.045, and 0.003, respectively[21]. Ficus palmata fruits are delicious and contain 80.5% moisture and 45.2% extractable juice. 12.1% of the juice is made up of soluble solids overall. The fruit juice has a total sugar content of roughly 6%. The fruit has a 0.2% pectin concentration. 100 gram of pulp only contain 3.3 milligram of vitamin C, fruits don't have the highest vitamin C content. The fruit has a 1.7% protein level and a 0.9% ash content. Calcium, phosphorus, potassium, magnesium, iron, and other minerals were discovered to be present in amounts of 0.034, 0.296, 0.071, 0.076, and 0.004%, respectively.

Traditional uses

Ficus auriculata	**Ficus palmate**
Crushed F. auriculata leaf material is applied to wounds as a paste. They are also used to treat dysentery and diarrhoea.	The seeds and the entire fruit are edible.
The juice of its stem bark is useful for treating cuts, wounds, and diarrhoea. For diarrhoea and dysentery, roasted figs are used as a remedy.	Fruit is delicious when eaten raw. White latex under the epicarp gives it a mild astringency that makes it delicious and juicy[11].
For the treatment of cholera, vomiting, mumps, and diarrhoea, root latex is employed. Jaundice is treated by combining bark from Oroxylum indicum and the root powder of F. auriculata[17].	The astringency of the fruits can be reduced by immersing them in water for 10 to 15 minutes before eating[12].
Ethnic communities use F. auriculata as a food and medicine plant in the Kharagchari Hill District[15].	The overall quality of the fruit is outstanding.
Fruits from Ficus auriculata are delicious. On wounds, a leaf paste is applied for healing[17].	The young growth and unripe fruits are cooked and consumed like a vegetable.
A range of oxidative stress-related illnesses, including hepatic and neurological conditions, can be prevented and treated with the help of flavonoids and other polyphenolic substances that are abundant in this species. These substances also have powerful antioxidant properties.	They are boiled, and then squeezed to remove the excess water before being fried[3,1].

Medicinal uses





Pharmacological properties of both plants

Antibacterial activity

Fruit extract in ethanol F.Auriculata exhibit notable antifungal and antibacterial action against Escherichia coli, Shigella flexneri, and Staphylococcus epidermidis for food poisoning pathogens at 14. 1 mm, 13. 1 mm, and 12. 1 mm, respectively. Shigella flexneri was the species with the highest overall antibacterial activity, followed by Escherichia coli and Staphylococcus epidermidis[29].According to Ahlam El-Fishawy et al; (2011), the petroleum ether, chloroform, and ethyl acetate fractions of the alcoholic extracts of the Ficus auriculata Lour leaves and fruits contained eight recognised chemicals. These substances included myricetin, -sitosterol-3-O-D-glucopyranoside, scopoletin, bergapten, lupeol, stigmasterol, and quercetin-3-O-D. Various spectroscopic approaches were used to deduce the structures of these substances. This is the first study on the extraction of

chemicals from Ficus auriculata Lour . Staphylococcus aureus, Bacillus aureus, and Bacillus subtilis were all susceptible to both of the extracts' effects on gram-positive and gramme-negative microorganisms (Escherichia coli and Pseudomonas aeruginosa), as well as a small amount of hepatoprotective and anti-diabetic properties, using the agar well diffusion method[1].

Studies by Sarla Saklani and Subash Chandra from 2011 have the in vitro antibacterial and antifungal activity of Ficus palmata extracts in petroleum ether, chloroform, methanolic, ethanolic, ethyl acetate, and water against ten bacterial strains and three fungus strains was examined using the disc diffusion method. Staphylococcus aureus was very active (18 mm) against the ethanolic Ficus palmata bark extracts. The initial test for phytochemical analysis findings showed that the substance contained resin, alkaloids, flavonoids, saponins, flavonoids, carbohydrates, and glycosides[27].

Sarla Saklani et al; (2012) showed the antifungal, antibacterial, nutritive, and phytochemical effects of Ficus auriculata were investigated. The edible fruit of this plant contains nutrients like crude fibre (16.96%), crude protein (5.32%), carbohydrates (27.09%) and ash content (3.7%), as well as minerals like magnesium, potassium, calcium, and phosphorus (0.90, 2.11, 1.35, and 0.28 mg/100gm, respectively). The Shigella flexneri, Escherichia coli, and Staphylococcus epidermidis food poisoning bacteria were significantly inhibited by the ethanolic fruit extracts of Ficus auriculata, as were phytochemical screenings for the presence of phenols, resin glycosides, flavonoids, and tannins at 1411mm, 1311mm, and 1211mm, respectively. Alkaloids, on the other hand, were not present. The fruits had a higher fat, protein, fibre, and mineral content than the farmed apple and mango fruits, according to the investigation. Fruit consumption may improve overall health and well-being while also lowering the risk of chronic diseases[28].

CC Qi and colleagues (2018) looked into The roots of Ficus auriculata were used to isolate a novel isoflavone called 5, 7, 4′-trihydroxy-3′ hydroxymethyl isoflavone (1) as well as three other isoflavones known as ficuisoflavone (3), alpinumisoflavone (4), and 3′-formyl-5, 4′-dihydroxy-7-methoxyisoflavone (2).1 is an uncommon isoflavone with a carbon skeleton made up of 16 carbon atoms. The structure of **1** was elucidated by extensive spectroscopic methods. Five terrestrial pathogenic bacteria were used as the in vitro test population for the antibacterial activity of all compounds. With MIC values ranging from 1.30 to 39.93 M, compounds 1-4 demonstrated substantial antibacterial activity against a variety of terrestrial pathogenic bacteria[23].

Anti inflammatory activity:

The ability of F. auriculata extracts to reduce inflammation was examined using a model of rat hind paw edoema brought on by carrageenan. Carrageenan in distilled water was subcutaneously injected into the footpads of all rats to cause edoema in the left hind paw. The extract was discovered to have strong anti-inflammatory properties in the studied experimental model[26].

Anticancer activity

According to Abdul Ghani R (Ph.D.) et al, (2017), F. auriculata (fig) inhibits the proliferation of cancer cells. This study looked into how exposure to it affected the cell cycle profile. Finally, we used a flow cytometer to identify the cell death type and the

process that caused it. The model for the investigation was the human lung cancer cell line A549. This shows a considerable reduction in A549 cells in a simultaneous buildup of cells in the G2/M phase and the G0/G1 phase. F. auriculata dramatically boosted late apoptosis through a caspase-independent mechanism, according to analysis of cell death (fig)[14.]

Antioxidant activity

The F. auriculata ethanolic extract's antioxidant capacity auriculata was discovered utilising the DPPH radical technique and the reducing power assay method[34]. Using ferric reduction and free radical scavenging activities, the antioxidant properties of the Ficus palmata fruit were assessed. There are two compounds called 2,2'-azinobis-3-ethylbenzothiazoline-6-sulphonic acid and 2,2-diphenyl-1-picrylhydrazyl (DPPH) (ABTS). The free radical scavenging activities were assessed using cation radical scavenging assays[1, 6] M. Shahinuzzaman et al; (2021) evaluated Response surface approach was used to adjust the extraction parameters to enhance the antioxidant activity and total phenolic content. The Ultrasonic aided extraction technique was used for the purpose of extraction. The experimental findings of antioxidant activity and total phenolic content were adequately fitted by a second-order polynomial model, demonstrating a significant connection between the observed and anticipated value [19]. Isolated gallic acid, which may be found in a range of plants, is a well-known antioxidant with a number of health benefits, according to TN Baite et al; (2021). In this study, ultrasonic aided extraction was used to extract gallic acid from Ficus auriculata leaves, and the process variables were adjusted. We looked at how the extraction of gallic acid affected the following variables: duration (5 to 60 minutes), temperature (30 to 75 degrees Celsius), sonication strength (30 to 70%), as well as solid to solvent ratio (1:5–1:40 gram/mL). After 30 minutes of 50% sonication, 1:10 gram/mL solid-to-solvent ratio, and 8 pH at 50°C, the maximum extraction was completed. The highest reported extraction occurred in 50% methanol, followed by 50% ethanol and 50% alkaline water, with gallic acid contents of 329.46 mg/L, 284.16 mg/L, and 183.74 mg/L, respectively, in the extracts. The sonication bath outperformed probe sonication in terms of extracting and maintaining extracted gallic acid. Investigation of the extraction kinetics revealed that the Peleg model had the best connection and the highest R2 value (0.99). Reverse osmosis and HPLC were used to purify the isolated gallic acid [36].

Hepatoprotective activity

The extracts of F.auriculata show hepatoprotective features. Animals given a hazardous dosage of carbon tetrachloride developed hepatotoxicity and had significantly higher serum levels of AST and ALT than normal mice. The blood enzyme levels of the raw F. auriculata Lour leaf and fruit extracts were nearly identical to those of the toxic control[13]. After CCl4 injection, the levels of the enzymes alkaline phosphatase (ALP), aspartate aminotransferase (AST), alanine aminotransferase (ALT), gamma glutamyl transpeptidase (GGT) and total bilirubin rise, indicating liver damage. Ficus palmata whole extract treatment resulted in dose-dependent decreases in all of the tested parameters. Additionally, a histopathological analysis of liver cells was done[2]. According to Saleh et al., (2013), a novel isomer of psoralenoside was found when the phytochemical

composition of Ficus palmata's aerial parts was examined using liquid-liquid fractionation and several chromatographic techniques.Additionally, a histopathological analysis of kidney and liver cells was carried out. The antiulcer activity of ethanol was investigated by monitoring stomach ulcers following therapy. The extract's capacity to stop whole blood from clotting was assessed (CT). Ascorbic acid was utilised as a reference to employing the DPPH method, the antioxidant activity of the whole extract and plant fractions[30].

Antidiabetic activity

The F. auriculata extracts exhibit antidiabetic properties. Methanolic extracts of F. indica were used to treat streptozotocin-induced diabetic mice. Blood glucose levels were dramatically lowered with auriculata. In streptozotocin-induced diabetic mice, Ficus auriculata Lour considerably boost the lipid profile by lowering triglycerides, total cholesterol, LDL, with VLDL while significantly raising HDL cholesterol [16, 17].

Antiproliferative activities

Danish Iqbal et al; (2014) studies Atherosclerosis, one of the leading causes of death worldwide, has been significantly linked to oxidative stress brought on by hypercholesterolemia. The HMG-CoA reductase (EC 1.1.1.34), antilipoperoxidative, and antioxidant inhibitory properties of the traditional medicinal herb Ficus palmata Forsk are finally explained by an antilipoperoxidative analysis. The FPLM (Ficus palmata leaves methanolic extract) and FPBA (Ficus palmata bark aqueous extract) extracts significantly outperformed the other sequentially extracted fractions of Ficus palmata Forsk in terms of their capacity to scavenge free radicals (DPPH and Superoxide) and act as antioxidants due to their higher phenolic content (FRAP). Additionally, FPBA extract significantly outperformed other extracts at inhibiting lipid peroxidation[13].

AntiulcerActivity

Through observation of stomach ulcers following ethanol administration, antiulcer activity was investigated. Whole-plant extract from Ficus palmata offered dose-dependent protection against ulcers that was statistically very significant[2]. According to Saleh et al; psoralenoside was extracted from Ficus palmata's aerial parts utilising liquid-liquid fractionation and several chromatographic techniques; (2013). Additionally, a histopathological analysis of kidney and liver cells was carried out. The antiulcer activity of ethanol was investigated by monitoring stomach ulcers following therapy. The extract's ability to prevent clotting of whole blood was evaluated (CT). The DPPH method knew to evaluate the antioxidant activity of the whole extract and plant fractions, using ascorbic acid as a reference[30].

AnticoagulantActivity

Using the total blood clotting time, the extract's anticoagulant activity was determined (CT). Warfarin was used as the standard in the clotting time experiment for the entire extract and all fractions of Ficus palmata. Measures of the prothrombin time with activated partial thromboplastin time were used to assess the result of the methanolic extract of F. auriculata leaves on hemostasis (APTT). F. auriculata ethyl acetate fraction had the longest prothrombin time (24.0 1.5 s). We assessed the effects of F. auriculata

leaves of methanolic extract on hemostasis using activated partial thromboplastin time and APTT values[5].

Thermodynamic activity

Ficus auriculata leaves (FALP) were used in a batch approach to extract hexavalent chromium from aqueous solutions, based on S Rangabhashiyam et al (2015), the biosorbent was examined using scanning electron microscopy, Fourier-transform infrared spectroscopy, energy-dispersive X-ray spectroscopy, and surface area analysis. Adsorption was influenced by the following factors: temperature, beginning Cr (VI) ion concentration, amount of FALP, and agitation rate. The elimination of hexavalent chromium from wastewaters in this study could perhaps use FALP as a biosorbent[25]

Ethnobotanical and Nutritional Activity

These three significant edible figs were examined in terms of ethnobotany and nutritional status by M. J. M. Khatun et al. in 2016. According to this finding, Ficus auriculata had the highest protein and fat contents, whilst Ficus semicordata and Ficus carica had the lowest. Ficus carica and Ficus auriculata had the greatest and lowest starch levels, respectively. Ficus auriculata had the highest levels of B-carotene and minerals, whereas Ficus semicordata had the highest levels of vitamin C and Ficus carica had the lowest levels. Its extracts have been suggested for the creation of herbal remedies that could lessen diarrhoea and dysentery as well as prevent the growth of cancer[15].

Green synthesis of nano particles

In a 2011 work by Vinay Kumar et al; AgNPs (silver nanoparticles) were produced from Ficus auriculata fruit extract. SEM, FT-IR, and UV-Visible spectroscopy (UV-vis) techniques were then used to evaluate them. The maximal absorbance of the reaction fluid containing AgNPs was demonstrated using UV-visible absorption spectra to be at 435 nm. Silver nanoparticles made in green have antibacterial action against E.coli DH5 strain was put to the test against plant extract with kanamycin (25 g/mL), an antibiotic, as a control. We found that the synthetic AgNPs greatly outperformed kanamycin in terms of antibacterial activity. onsequently, the produced AgNPs could be used for monitoring and regulating bacterial growth as well as other therapeutic purposes[37.] Metal nanoparticles (AgNPs and ZnONPs) were produced utilising green technology by Satish C Sati et al; in 2020. They used natural fibres as supports and a reducing agent made from an extract of the Bedu (Ficus palmata) tree's green foliage. F. palmata extracts demonstrated remarkably strong activity for the corresponding AgNPs and ZnONPs strains. Silver nanoparticles created by synthetic means have been reported to have anti-diabetic effect by inhibiting -amylases and -glucosidases in vitro[31].

Antilipoperoxidative activity

Studies by Danish Iqbal et al., from 2014 Atherosclerosis, one of the leading causes of death worldwide, has been significantly linked to oxidative stress brought on by hypercholesterolemia. Ficus palmata Forsk's anti-oxidant, anti-lipoperoxidative, and inhibitory effects on HMG-CoA reductase (EC 1.1.1.34) a traditional medicinal herb, are now explained for the first time by antilipoperoxidative study. The FPLM (Ficus palmata leaves methanolic extract) and FPBA (Ficus palmata bark aqueous extract) extracts

significantly outperformed the other sequentially extracted fractions of Ficus palmata Forsk in terms of their capacity to scavenge free radicals (DPPH and Superoxide) and act as antioxidants due to their higher phenolic content (FRAP)[13]. Devesh Tewari et al; (2021) evaluated for the first time the fruit extract (FPFE) of the Ficus palmata L. plant's analgesic capabilities on various analgesic rat models and in silico investigations of some of the principal plant components. Additionally to in silico docking studies against the COX-2 protein active site and mu-opioid receptors, in vivo pain models were also examined. The analgesic impact of FPFE was found to be significant (p 0.05), as well as when compared to diclofenac and morphinan antagonist (X-ligand), rutin has an excellent posture and score, and psoralen has a binding affinity that is about as high as diclofenac but lower than rutin. The findings have demonstrated that fruits from the F. palmata family may help ease uncomfortable symptoms[35].

Toxicity activity:

The methanol-based Ficus auriculata leaf extract underwent an acute toxicity test. After receiving injections of methanolic leaf extract at doses of 1000, 2000, and 3000 mg/kg, behavioural abnormalities, mortality, or toxicity were not seen in mice. The LD50 of 3000 mg/kg after oral administration of the methanol leaf extract revealed mild toxicity[9]. Overall, it was discovered that the auriculata aqueous extract exceeded the F's LD50 value of 2000 mg/kg body weight.

Some critical review

According to T M Shao et al. (2013), the components were extracted and purified using silica gel, preparative TLC, and Sephadex LH-20 column chromatography. Physiochemical characteristics and spectral information were used to determine their structures. There are fourteen different compounds, including stigmast-4-ene-6-l-3-one (1), stigmast-4-ene-3-one (3), stigmast-5-ene-3-ol-7-one (4), stigmast-4-ene-3, 6-dione (5), ergosterol peroxide (6), (20S)-3-oxo-hydroxytaraxastane (7), anabellamide (8), and aurantiamide acetate (14)[32]. Vekasheni Paramanandam et al; (2021) performed F. auriculata fruits properties were compared after drying technologies. Sun drying, hot-air oven drying, and microwave drying techniques were used in this investigation. The microwave dried fig fruit showed higher activity. HPLC-DAD analysis used to quantify phenolic content in dried fruits. Microstructures were examined to observe the effects of drying technology. It can be consumed fresh or cooked, and is used in curries, jams, and juice. Nutracuticles can be preserved through the heat processing of fleshy fruits to dry them out. This investigation looks at how drying techniques using the sun, hot air ovens, and microwaves affect the polyphenol content of the fruit Ficus auriculata [20]. Isolated gallic acid, which is present in a range of plants, is a well-known antioxidant that has been linked to numerous positive health effects, according to TN Baite et al. (2021). In this study, gallic acid was recovered from Ficus auriculata leaves using ultrasonic assisted extraction with adjusted process variables. The effects of gallic acid extraction on duration (5to60 minutes), temperature (30to75 degrees Celsius), sonication intensity (30to70%), and solid to solvent ratio (1:5–1:40 gram/mL) were examined. The largest amount of material was extracted after 30 minutes of extraction using a 1:10 g/mL solid-to-solvent ratio, 50% sonication, and PH 8 at 50°C. The extracts from the highest reported

extraction had gallic acid levels of respectively 329.46 mg/L, 284.16 mg/L, and 183.74 mg/L. They were prepared in 50% methanol, followed by 50% ethanol and 50% alkaline water. The sonication bath outperformed probe sonication in terms of extracting and maintaining extracted gallic acid. The Peleg model exhibited the strongest connection and the greatest R2 score, according to analysis of the extraction kinetics (0.99). Using reverse osmosis and HPLC, the obtained gallic acid was purified [36].

Comparative studies of both plants

Ficus auriculata	Ficus palmate
1. After crushing the leaves, the paste is applied about the injuries in India and Nepal. [1] 2. Diarrhea and dysentery are also treated with leaves and roasted figs. [36] 3. Cuts and wounds can be treated with stem bark juice.[7] 4. In traditional medicine, mature fruit acts as a diuretic and laxative as well as having the ability to regulate digestion.[9] 5. Bark produces a coarse fibre that is used to make hydrophobia medications.[37] 6. Cuts and wounds are treated with stem latex. 7. The fig fruit's fibre aids with weight loss.[32] 8. The high fibre content of fig fruit helps to encourage normal, healthy bowel movements and prevents constipation.[7] 9. Soak a few figs in milk over night and consume them the next morning to increase sexual power.[32] 10. Rich in calcium and phosphorus, figs help to strengthen bones. 11. The high potassium content of figs helps to stop the loss of	1. The extract of Ficus palmata show anti-diabetic features.[35] 2. It shows antimicrobial properties. 3. It ensures good cardiac condition.[4] 4. The burning sensation of skin and cuts, warts gets subsidized when fruit milky sap is applied.[35] 5. Leaf of this plant is applied in snake bite. 6. It shows maintain high blood pressure.[2] 7. It shows hepatoprotective effects. It shows useful in jaundice problem. 8. It shows pain relief.[13] 9. The fruit has laxative, poultice demulcent, emollient, and properties.[30] 10. It is used as part of a diet to treat bladder and lung disorders as well as constipation. 11. Treatment of warts in used sap. 12. The plant's latex is used to remove spines that have been deeply embedded in the flesh. 13. The plant serves as the common fig's rootstock (Ficus carica).[22] 14. Although the malleable wood

calcium through the urine.[1] 12. In Malaysia, a leaf infusion is used to treat high blood pressure and diabetes.[28] 13. Fruit portions are said to have antibacterial, antioxidant and anti-inflammatory properties.[7] 14. Cuts, wounds, and diarrhea are commonly treated using stem latex.[28] 15. The leaves are traditionally used to cure diabetes in Himachal Pradesh and Northeastern India, particularly in Manipur. 16. Jaundice is treated using a mixture of bark from Oroxylum indicum and root powder from F. auriculata. [33]	has little value, it has been used to create ornaments, garlands, hoops, and more. The sturdy wood is used to make kitchenware.[27] 15. The plant serves as the common fig's rootstock (Ficus carica). 16. Wood is used for fuel.[22]

Future Prospectus of review

This study set out to investigate the ethnobotanical investigation, recognition, issues, and future prospects of wild edible plants in Uttarakhand. Wild edible fruits have long been utilized as food, medicine, and in the creation of wine and pickles. The locals favour the economically significant species. Both Ficus auriculata and Ficus palmata have been found to have medicinal properties. The utilisation of wild medicinal herbs aided in the discovery and development of drugs. Eating wild edible fruits satisfies the needs of the region's poor rural residents for protein, carbohydrates, fat, vitamins, and minerals. Not just as potential sources of money for the residents, but also as sources of additional food, nutritionally balanced diets, medications, fodder, and fuel in this region. Study on Ficus auriculata and Ficus palmata could be explore more on different diseases such as skin diseases, dental problems, pain relief etc. Further studies on molecular basis could be targeting these plants as important therapeutic agent. Study on its different parts of these plants and comparative study of both will be helpful in describing their common role in different relatable disease and their treatment.

Conclusion

As a result of this succinct review, it was determined that Ficus auriculata and Ficus palmata have a broad range of therapeutic potential for treating various illnesses or disorders. Therefore, more study in the disciplines of therapeutics and medicine into these understudied disorders can benefit the healthcare system in yet another aspect. Cuts, wounds, diarrhoea, and dysentery are just a few of the diseases that the herb has historically been used to treat.

References

1. Ahlam El Fishawy., Rawia., Zayed and Sherif Afifi, Phytochemical and Pharmacological studies of Ficus auriculata Lour, Journal of Natural Products, **4,** 184-195 **(2011)**
2. Alqasoumi SI, Basudan OA., Al-Rehaily AJ. & Abdel-Kader MS., Phytochemical and pharmacological study of Ficus palmate growing in Saudi Arabia. Saudi Pharmaceutical Journal. In Press; http://www.sciencedirect.com/science/article/pii/S1319016413001217
3. Al-Musayeib., N. M. Mothana., R. A. Matheeussen., A Cos. P., & Maes L., In vitro antiplasmodial, antileishmanial and antitrypanosomal activities of selected medicinal plants used in the traditional Arabian Peninsular region. BMC Complementary and Alternative Medicine, **12(1)**, 1-7 **(2012)**
4. Alqasoumi S. I., Basudan O. A., Al-Rehaily, A. J., & Abdel-Kader. M. S., Phytochemical and pharmacological study of Ficus palmata growing in Saudi Arabia. Saudi Pharmaceutical Journal, 22(5), 460-471 **(2014)**
5. Ambreen S., Tariq M., Masoud MS., Ali I., Qasim M., Mushtaq A., Ahmed M. & Asghar R., Anticoagulant potential and total phenoliccontent of six species of the genus Ficus from Azad Kashmir,Pakistan. Trop J Pharm Res , **18(6)**,1245-1251 **(2019)**
6. Chauhan P.K., Sharma S., Chandrika Harsh., Manisha., & Mansi., Evaluation of Phytochemical and In-vitro antioxidant and antibacterial activities of wild plant species of Bauhinia and Ficus of HP. World Journal of Pharmacy and Pharmaceutical Sciences **3 (4)**, 659- 668 **(2014)**
7. Chopra R. N., Nayar S. L. and Chopra I. C., Glossary of Indian Medicinal Plants (Including the Supplement). Council of Scientific and Industrial Research, New Delhi, **1986**.
8. Davidson-Hunt I., Ecological ethno botany: stumbling toward new practices and paradigms. MASA J. ,**16**,1–13 **(2000)**
9. Doley B. K. and Kakoti B.B., Hepatoprotective potential of Ficus auriculata and Sarcochlamys pulcherrima, two ethnomedicinal plants used by the mishing community of assam. World J Pharm Pharm Sci , **15(7)**, 913-922 **(2018)**
10. Gair B.P., Lamichhan R., Sunar C.B. Shilpaka.r., A. Neupane., S. Panta., Phytochemical screening and analysis of antibacterial and antioxidant activity of Ficus auriculata (Lour.) stem bark. Pharmacog J **3(21)**, 49-55 **(2011)**
11. Georg M., Joseph. L., & Paul. M. N., Ficus auriculata; a pharmacological update. Int J Curr Res Acad. Rev, **4**, 26-31 **(2016)**
12. Hedrick U. P., Sturtevant's Edible Plants of the. World. New York: Dover Publications ,**(1972)**
13. Iqbal D., Khan M. S., Khan A., Khan M., Ahmad S., Srivastava A. K. & Bagga P., In vitro screening for β-hydroxy-β-methylglutaryl-coa reductase inhibitory and antioxidant activity of sequentially extracted fractions of Ficus palmata Forsk. BioMed Research International, (**2014)**

14. Jamil E. F, & Abdul Ghani. R., Ficus auriculata (fig) extracts induced cell cycle profile changes and apoptosis through caspase-independent pathway in human lung adenocarcinoma cell line, A549. **16(63)**, 57-67 **(2017).**
15. Khatun M. J. M., Rahman M. M., Rahim M. A., JakariyaM., & Mirdah M. H., Study on the ethnobotany and nutritional status of three edible Ficus species in hill district of Bangladesh. Int J Min Fruits, Med Arom Plants, **2(1)**, 35-40 **(2016)**
16. Khan S. & Balick M. J., Therapeutic plants of Ayurveda: a review of selected clinical and other studies for 166 species. The Journal of Alternative & Complementary Medicine, **7(5)**, 405-515 **(2001)**
17. Kunwar R. M. & Bussmann R. W., Ficus (Fig) species in Nepal: a review of diversity and indigenous uses. Lyonia, **11(1)**, 85-97 **(2006)**
18. Lansky E. P., Paavilainen H.M., Pawlus A. D., Newman R.A., Ficus spp(fig): Ethnobotany and potential as anticancer and anti-inflammatory agents. J Ethnopharmacol, **119(2)**,195-213 **(2008)**
19. M Shahinuzzaman., Parul Akhtar., N. Amin., Yunus Ahmed., Farah Hannan Anuar., H. Misran & Md. Akhtaruzzaman., New insights of phenolic compounds from optimized fruit extract of Ficus auriculata https://www.nature.com/articles/s41598-021-91913 **(2021)**
20. Paramanandam V., Jagadeesan G., Muniyandi K., Manoharan A. L., Nataraj G., Sathyanarayanaz. S & Thangaraj P., Comparative and variability analysis of different drying methods on phytochemical, antioxidant and phenolic contents of Ficus auriculata Lour. Fruit. Phytomedicine Plus, **1(3)**, 100075, **(2021)**
21. Parmar C., & Kaushal M. K., c. Ficus roxburghii. In: Wild Fruits. Kalyani Publishers, New Delhi, India, 35-37 **(1982)**
22. Parmar C. & Kaushal MK. Ficus palmata in Wild Fruits. Kalyani Publishers, New Delhi, India, 31–34 **(1982)**
23. Qi. C. C., Fu. Y. H., Chen W. H., Chen G. Y., Dai C. Y., Song X. P & Han C. R., A new isoflavone from the roots of Ficus auriculata. Natural product research, **32(1)**, 43-47 **(2018)**
24. Ramadan M. A., Ahmad A.S., Nafady A.M. and Mansou A. I. Chemical composition of the stem bark and leaves of Ficus panduratаHance. Nat prods res, **23(13)** 1218-1230 **(2009)**
25. Rangabhashiyam. S., Nakkeeran E., Anu. N & Selvaraju N., Biosorption potential of a novel powder, prepared from Ficus auriculata leaves, for sequestration of hexavalent chromium from aqueous solutions. Research on Chemical Intermediates, **41(11)**, 8405-8424 **(2015)**
26. Rosalind Thinbaijam, Biman Kumar Dutta and Satya B. Paul, Antihyperglycemic and
    Antihyperlipidemic Acivity of Ficus auriculata Lour. Leaf Extract in Streptozotocin Induced Diabetic Mice, World Journal of Pharmacy and Pharmaceutical Sciences, **3 (1)**, 412-427 **(2013)**

27. Saklani. S & Chandra S., Antimicrobial activity, nutritional profile, and quantitative study of different fractions of Ficus palmata. International Research Journal of Plant Science, **2(11)**, 332-337 **(2011)**
28. Saklani S & Chandra S., In vitro antimicrobial activity, nutritional profile and phytochemical screening of wild edible fruit of Garhwal Himalaya (Ficus auriculata). Int J Pharm Sci Rev Res, **12(2)**, 61-64 **(2012)**
29. Salem M. Z., Salem A. Z. M., Camacho L. M & Ali. H. M., Antimicrobial activities and phytochemical composition of extracts of Ficus species: An over view. African Journal of Microbiology Research, **7(33)**, 4207-4219 **(2013)**
30. Saleh Ibrahim., Alqasoumi A., Omer. Ahmed Basudan. a., Adnan Jathlan., Al-Rehaily a., Maged. Saad and Abdel-Kade., Phytochemical and pharmacological study of Ficus palmata growing in Saudi Pharmaceutical Journal **22**, 460-771 **(2014)**
31. Sati S. C., Kour G., Bartwal A. S & Sati M. D., Biosynthesis of metal nanoparticles from leaves of Ficus palmata and evaluation of their anti-inflammatory and anti-diabetic activities. Biochemistry, **59(33)**, 3019-3025 **(2020)**
32. SHAO T. M., Chemical constituents from stems of Ficus auriculata. Chinese Traditional and Herbal Drugs, 2208-2212 **(2013)**
33. Shilpakar A., Gaire B.P., Bahadur S.C., Lamichhane R., Neupane S., Phytochemical Screening and analysis of antibacterial and antioxidant activity of Ficus auriculata,Lour. Stem bark. Ph.D. Thesis, Pokhara University Nepal, http://jddtonline.info/index.php/jddt/article/view/4853 **(2009)**
34. Shi Y., Mon A.M., Fu Y. Zhang., Y Wang. C., Yang X & Wang Y. Thegenus., Ficus (Moraceae) used in diet: Its plant diversity,distribution, traditional uses and ethnopharmacologicalimportance. J Ethnopharmacol ; **226,**185-196 **(2018)**
35. Tewari D., Gupta P., Bawari. S., Sah A. N., Barreca D., Khayatkashani M & Khayat Kashani. H. R., **(2021).**Himalayan Ficus palmata L. Fruit extract showed in vivo central and peripheral analgesic activity involving COX-2 and Mu opioid receptors. Plants, **10(8**), 1685 **(2021).**
36. Thangsei Nengneilhing Baite., Bishnupada Mandal & Mihir Kumar. Purkait., **(2021)** Ultrasound assisted extraction of gallic acid from Ficus auriculata leaves using green solvent. Pages 1-11, **(2021)**
37. Vinay Kumar., Nirmal Kumar., Leirika Ngangom., Kunal Sharma., Manu Pant. and Syed. Mohsin Waheed., Green synthesis and antibacterial activity of silver nanoparticles synthesized using Ficus auriculata fruit extracts Copyright@ EM International ISSN 0971–765X **(2021)**