

A REVIEW ARTICLE ON : SHIVAN PLANT (Gambhari)

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Astract

Gmelina arborea Roxb. is one of the important medicinal plants most widely propagated and cultivated Species of the family Verbenaceae. It is one of the herb mentioned in all ancient literature of Ayurveda in diseases like ulcer, diarrhoea, thirst, anaemia, leprosy, vaginal discharge, piles, fever and varieties of ailments. This article gives you all the info you need about classical literature, a basic overview, and the health benefits of using roots, leaves, flowers, fruit, bark, and the results of recent studies. Phytochemical screening showed The presence of Alkaloids, Carbohydrate, Coumarins, steroids, Tannins. Medicinal uses of Its roots, leaves, flowers, fruit, bark, Pharmacological activity. The tree is a valuable medicinal plant in Indian medicine. People use all parts of the plant for healing purposes. It has many health benefits like helping with digestion, heart health, and relaxation. It helps with digestion, memory, dizziness, and can be beneficial for conditions like burning sensation, fever, thirst, weakness, heart issues, nerve problems, and hemorrhoids. The roots, fruits and the leaves of Gambhari have great medicinal value therefore traditionally it was widely in use as anthelmintic, Antimicrobial, anti-diabetic, anti-aging, analgesic, diuretic, hepatoprotective and antiepileptic agent, Antioxidant activity, Cardioprotective , Antipyretic activity, Immuno modulatory , Wound healing activity. The traditional information provides much faced potential applications as detailed below. It is used as Stomachic, anthelmintic, anti-inflammatory, tonic (root), for abdominal tumors, laxative, to improve appetite, useful in hallucination (bark), to relief headache, ulcer washing (leaf), blood Diseases (flower), diuretic tonic, aphrodisiac, alternative astringent to the bowels, promote growth of hairs, useful in 'vata', thirst, anaemia, leprosy, ulcers, vaginal discharge, in heart disease, Hepatoprotective, antidiabetic (fruits) and in hallucination, piles, abdominal pains, burning sensations, fevers, 'tridosha' and urinary discharge (root).

Keywords: Medicinal Plant, Traditional medicine, Phytochemicals, Pharmacological Activity.

1.Introduction:

Gambhari, also known as *Gmelina arborea Roxb.*, is a plant that belongs to the Verbinaceae family. It can be found in many regions of India, including the Western Ghats and from the base of the North-West Himalayas to Chittagong, across the Deccan Peninsula ^[1]. According to Ayurvedic books, gambhari is known by different names like Kashmiri which a beautiful tree, sriparni means has a beautiful leaves, madhuparnika means has leaves with sweetish taste, pitarohini means has yellow flowers ^[2]. In both live animals and lab studies, it has been found that certain natural components from different parts of plants (like fruits, leaves, and roots) have beneficial effects. Roots have a role in changing the effects of xenobiotics ^[32]. While some herbs might be pharmacologically or clinically effective, they are not necessarily free of toxicity and side effects. Therefore, investigation into the traditionally used medicinal plants is valuable as a source for potential chemotherapeutic drugs and as a safety measure for the continued use of medicinal plants ^[33]. The whole plant is medicinally very important. It promotes digestive power, improve memory, overcomes giddiness and is also used as an antidote for snake bite and scorpion sting. Roots are useful in hallucination, fever,

dyspepsia, hyperdipsia, haemorrhoids, stomachalgia, heart diseases, nervous disorders, piles and burning sensation. Bark is used in fever and dyspepsia. Leaf paste is good for cephalgia and leaf juice is a good wash for foul ulcers and is also used in the treatment of gonorrhoea and cough. Flowers are recommended for leprosy, skin and blood diseases. The fruits are used for promoting the growth of hair and in anaemia, leprosy, ulcers, constipation, leucorrhoea and lung disease [34].

- ❖ Biological Name: *Gmelina Arborea*
- ❖ Family: *Verbinaceae* (*Lamiaceae*)
- ❖ Genus: *Gmelina*
- ❖ Biological source: It is a fast-growing deciduous tree that is native to the tropical and subtropical regions of Southeast Asia

2.Botanical description:

The *G. arborea* plant is around 40 meters tall and has a diameter of about 140 centimeters [31]. The shaped of the tree is decent, with a trunk that is 6 to 9 meters tall and usually crooked. It has a big crown with low branches. The bark is gray in color and thin. The plant leaves are uncomplicated, arranged opposite each other, somewhat heart-shaped, with a length ranging from 10 to 25 cm and a width between 5 and and 18 cm. Brown flowers are grouped in clusters 15-30 cm long. They can be seen after the leaves have fallen. The fruit is also present. The size of a drupe is 2.25 cm long and has 1-4 seeds. 1 kg of drupes contains 700-1400 seeds [4,5].



Fig 1: *Gmelina arborea* Roxb. Fruits [39]



Fig 2: *Gmelina arborea* Roxb. Flower [38]



Fig 3: *Gmelina arborea* Roxb. Wood [40]



Fig 4: *Gmelina arborea* Roxb. Leaf [37]

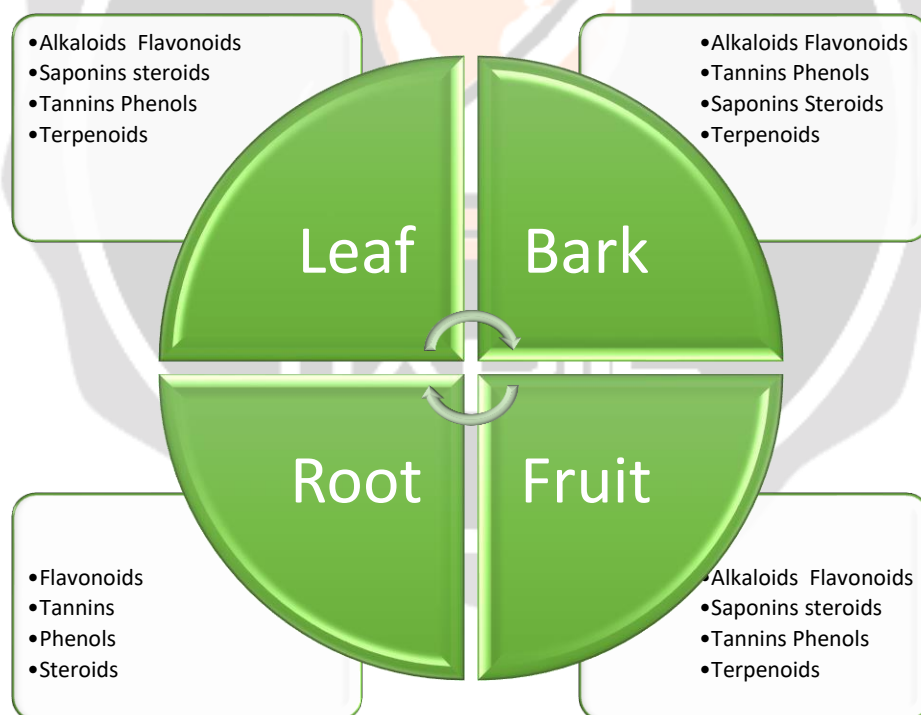
3. Taxonomical Classification:

Taxonomy is the science of systematically naming and organizing organisms in to similar groups. Plant taxonomy is an old science that uses the gross morphology (flower form, leaf shape, fruit form etc.) of plants to separate them in to similar groups. Taxonomical classification of plant *Gmelina arborea* Roxb. (gambhari), is tabulated ^[35].

Table 1: Showing Taxonomical Classification ^[6]

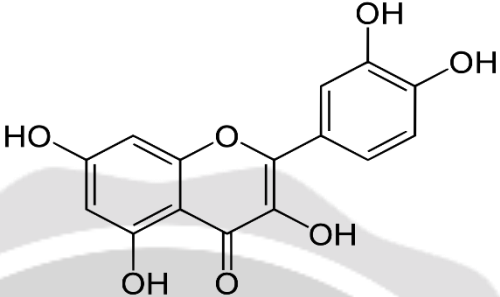
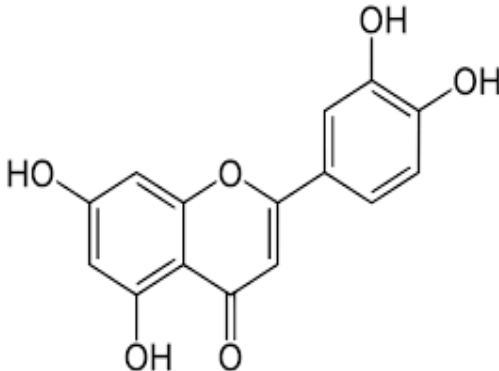
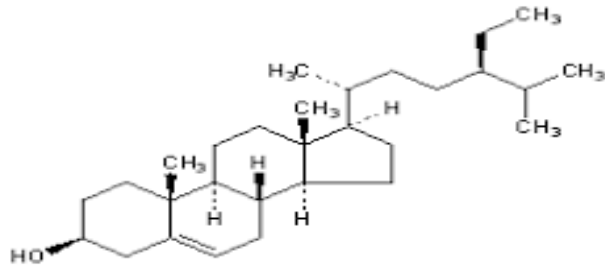
Kingdom	Plantae
Subkingdom	Tracheobionta
Division	Magnoliopsida
Class	Magnoliophyta
Order	Lamiales
Family	Verbenaceae
Genus	Gmelina
Species	Arborea

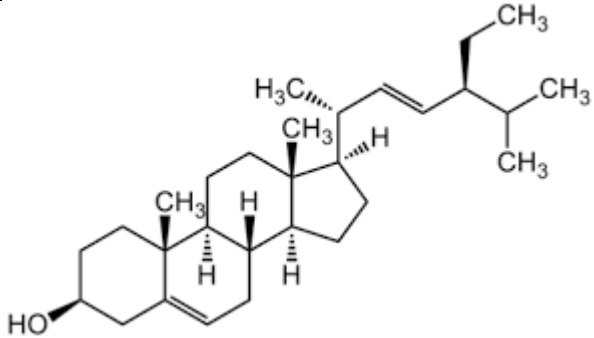
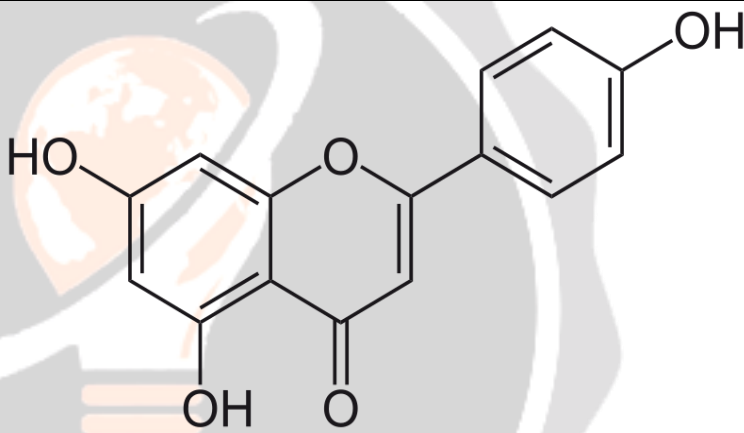
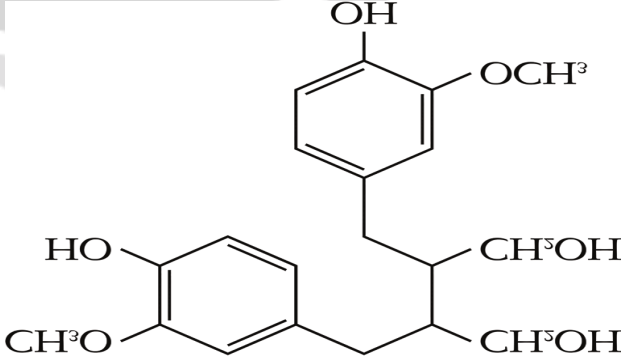
4. Phytochemicals ^[36]:



5. Chemical Constituents^[10,36]:

Table 2:

Part of plant	Chemical constituent	Structure of chief active constitute
Fruits	Butyric acid, tartaric acid, little tannin, cetyl alcohol, arborone, luteolin, apigenin, quercetin.	 <p style="text-align: center;">Quercetin</p>
Bark	luteolin, glycosides of kaempferol, 4-hydroxyseasamin, gummadiol, arborone, apigenin, quercetagenin.	 <p style="text-align: center;">Luteolin</p>
Roots	cluytiferulate, n-octacosanol, gmelinol, arboreol, 2-O-methyl arboreal, 2-O-ethylarboreol, isoarboreol, gmelanone, β -sitosterol, paulownin, 6''-bromoisoarboreol, 4-hydroxysesamin, 4,8-dihydroxysesamin, 1,4-dihydroxysesamin (gummadiol), 2-piperonyl-3-(hydroxymethyl)-4 (α -hydroxy-3,4-methylenedioxybenzyl)-4-	 <p style="text-align: center;">β-sitosterol</p>

	<p>hydroxy tetrahydrofuran (1), 4-epigummadiol-4-O-glucoside, 1,4-dihydroxy-2,6-dipiperonyl-3,7-dioxabicyclo [3,3,0]-octane, gmelanone, palmitic, oleic and linoleic acids, stigmasterol, stigmasterol, stigmasterol, campesterol, α-2-sitosterol, butulinol.</p>	 <p style="text-align: center;">Stigmasterol</p>
Leaf	<p>luteolin, apigenin, quercetin, hentriacontanol, βsitosterol, quercetogenin and other flavons.</p>	 <p style="text-align: center;">Apigenin</p>
Stem	<p>Lignans</p>	 <p style="text-align: center;">Lignans</p>

6. Pharmacological Activity:

1. Antioxidant activity
2. Antihelmintic activity
3. Antimicrobial activity
4. Diuretics activity
5. Cardioprotective
6. Antipyretic activity
7. Antidibetic activity
8. Immuno modulatory
9. Wound healing activity.

Antioxidant activity ^[7]:

The study looked at how the antioxidant properties of methanolic extracts from the stem bark of *Gmelina arborea* Roxb. (MEGA) can impact health. In different lab tests, it was found that the free radical scavenging activity was 85.20%. This activity could be consistent across all tests. The concentration of the substance was comparable to regular ascorbic acid, which was 89.58%. This is because it has the ability to donate protons and can act as a blocker or remover of free radicals.

Antihelmintic activity ^[7]:

Alcoholic and water-based leaf extracts of *Gmelina arborea* Roxb. Showed worm-killing effects in different amounts. Pheretima is more effective at causing paralysis and death quickly than piperazine citrate, especially when used at a concentration of 100mg/ml. Posthuma and *Ascaridia galii* worms increase the flow of chloride ions through the muscle membrane, causing hyperpolarization and reducing. Being easily excited can cause muscles to relax and become weak, leading to flaccid paralysis.

Antimicrobial activity ^[7]:

The raw extracts from the leaves and stems of *Gmelina arborea* Roxb. Were found to have strong antimicrobial effects against Gram positive and Gram negative organisms. Gram positive and Gram negative organisms may exhibit different activity levels due to the presence of bioactive compounds like alkaloids, saponins, carbohydrates, phenolics, and tannins. The leaf has anthraquinone but does not contain cardiac glycosides, while the stem bark has alkaloids, saponins, carbohydrates, tannins, and anthraquinone, but does not have phenolics. An experiment conducted in a lab showed that extracts from the stem bark and leaves were effective against *E. coli* and *K. pneumoniae*. Some of the bacteria that can cause infections include *pneumoniae*, *P. dysenteriae*, and *S. typhi*.

Diuretics activity ^[8]:

The methanolic extract from *Gmelina arborea* Roxb. Has been found to have a strong diuretic effect on albino rats. The researchers provided doses of 250mg/kg and 500mg/kg body weight to the subjects. Levels of sodium (Na⁺), potassium (K⁺), and chloride (Cl⁻) in urine were significantly higher when compared to the levels found in normal saline. The diuretic effect of *Gmelina arborea* Roxb. Extract is caused by the combined action of (HCO₃⁻ - By stopping the reabsorption process in the kidney tubules, the substance blocks the (Cl⁻), (HCO₃⁻/H⁺) exchangers, and the (Na⁺/H⁺) antiporter. The presence of water and certain anions can lead to increased urine production. This occurs when the concentration ratio rises. After taking the methanolic extract of *Gmelina arborea* Roxb., the body released sodium and potassium ions.

Cardioprotective ^[7]:

The ethanol extract from *Gmelina arborea* Roxb. Has the potential to protect against damage caused by doxorubicin (DOX). Cardiotoxicity can be detected by observing higher levels of cardiac markers in the blood. The rise in these markers indicates potential harm to the heart. Special blood tests like SGOT, SGPT, and ALP are used to check the levels of certain enzymes in the blood of patients taking DOX. Rats treated with (20mg/kg) may be more likely to

experience damage to their heart cell membranes from isoproterenol, leading to an increase in the release of certain substances. A diagnostic marker enzyme is released into the bloodstream.

Antipyretic and analgesic activity ^[7]:

Researchers tested the bark extract of *Gmelina arborea* Roxb. And discovered that both the ethanolic and aqueous extracts helped to decrease the. Hyperthermia was reduced by 420mg/kg of body weight one hour after administration, with a similar effect to a standard fever-reducing drug, paracetamol, at a dose of 50mg/kg. Chloroform and benzene extracts lowered body temperature 3 hours after being given. The ethanolic and aqueous extracts showed stronger pain-relieving effects on the acetic acid test compared to the tail flick test. When compared to regular diclofenac sodium given at a dose of 25mg/kg, it seems that the test compounds mostly block the peripheral pain mechanism.

Antidibetic activity ^[7]:

At a dose of 420mg/kg, the bark of *Gmelina arborea* Roxb. And a dose of 200mg/kg of chlorpropamide showed significant effects ($p < 0.05$). It was discovered that GSH (Glutathione) helped lower blood sugar levels in diabetic rats treated with 50mg/kg of streptozotocin. This shows that GSH plays an important role in managing diabetes. Free radical scavengers help repair damage caused by free radicals in the body.

Immuno Modulatory Activity ^[7]:

Researchers have discovered that the methanolic extract of *Gmelina arborea* Roxb. And the ethyl acetate fraction of the methanolic extract have positive effects. Cyclophosphamide, a type of drug that can lower the total white blood cell count, can be reversed to increase the count. The study showed that *Gmelina arborea* Roxb. Helps to balance the levels of neutrophils and lymphocytes in the body. This medication can boost the bone marrow's function. It can also help decrease bone marrow activity. Cyclophosphamide can cause toxicity, but it can also be helpful in treating cancer.

Wound healing activity ^[7]:

The alcohol extract from the powdered leaves of *G. arborea* is used in different types of wound models, such as incision, excision, and dead space wounds. Rats play an important role in improving the healing process of wounds by increasing the speed of contraction, making the skin stronger, and aiding in the formation of granuloma. Researchers noticed a decrease in the time it took for wounds to heal, as well as an increase in strength, hydroxyproline content, and weight of dry granulomas.

7. Propagation and Cultivation ^[1,29,30]:

Gmelina arborea Roxb. is becoming a popular plant for planting because it grows quickly and has great medicinal and wood qualities. root of the plant is considered the most powerful and commonly used for medicinal purposes. The entire plant is being destroyed. *Gmelina arborea* Roxb. naturally reproduces during the rainy season right after the. To make seeds sprout, drupes need to drop to the ground and experience a mix of warmth and water. Artificial reproduction can be done by planting seeds directly or by moving plant parts to grow new plants. In order to grow healthy *Gmelina arborea* Roxb. offspring, specific weather conditions that help the plant thrive must be present. The plant needs to be grown in moist, fertile soil that drains well. It prefers to be in a place with lots of sunlight and doesn't do well in shady areas. It thrives in places that get between 750-4500mm of rain or more. It doesn't do well in soil that doesn't drain well and stays small in size. Dry, sandy, or poor soils can cause a plant to become shrubby when there is also a drought. These conditions are important for the plant's growth. To successfully cultivate and grow *Gmelina arborea* Roxb., it is important to meet its requirements and ensure the plant thrives in these conditions.



Fig 5. *Gmelina arborea* Roxb. Seedlings in polybags

Three types of propagation:

7.1. Seed Propagation:

seed propagation is the easiest and most effective way to grow new plants. This method is used for many different types of plants, including *Gmelina arborea*. Roxb., gathers ripe brown fruits from the ground, making sure to only pick the ones that are brown and not green or black. These fruits are then piled up under or The olives are buried in a hole for about four to five days and then washed to get rid of the pulp. They are left to decay by placing them in a trench filled with water. Seeds are soaked in water, then taken out and dried in the sun. Rotten fruit can be fed to cows, and stones collected from animal waste can be cleaned, washed, and dried in the sun before soaking. depth of two cm after soaking in water for forty eight hours to improve germination rates. In order to ensure proper drainage of water, it is recommended to space the raised seed beds 7.5x7.5 cm apart. It is also important to cover them with a layer of hay. To help seeds grow, heat and moisture are used in turns to encourage germination. It usually takes around twenty days for germination to happen.

7.2. Vegetative Propagation:

You can separate the root suckers growing near the mature plants and plant them in a different spot.

7.3. Clonal Propagation:

Clonal propagation is the best method to grow a lot of *Gmelina arborea* Roxb. trees quickly and effectively. In this process, we use the top parts of fully grown *Gmelina arborea* Roxb. trees. Once the shoot apexes are sterilized, they need to be placed in a test tube with benzyl amino purine (BAP) for culture growth. amount of auxin at the tip. Having a higher amount of specific buds or new buds can help to encourage the growth of plant shoots, making them longer and allowing for better root development from these newly grown shoots. newly formed plantlets need to be moved to pots filled with soil. The plantlets that were moved to pots were allowed to grow in a special box in a greenhouse for a month to adjust. Once they were established, they were then planted in the field.

8. Ayurvedic Properties And Pharmacological Effect

According to Ayurvedic literature, Gambhari is ^[10]

• Rasa	Tikta(bitter), Kasaya (astringent), Madhur (sweet)
• Guna	Guru (heavy)
• Virya	Usna (hot)
• Vipaka	Katu (pungent)
• Karma	Vata-pittahara, Bhedana, Sothahara, Dipanapacana,
• Rogagnatha	Brama, Shosh, Trisha, Ama, Shula, Arsha

8.1. Properties of fruit ^[11]:

• Rasa	Kashayamla, Madhura
• Guna	Snigdha (unctuous), Guru
• Veerya	Sheetha (cold)
• Vipaka	Madhura
• Doshakarma	Kaphapitta shaamaka, Vata vardhaka

8.1. Properties of flowers ^[12]:

• Rasa	Kashaya, Madhura, Tikta
• Veerya	Sheetha
• Vipaka	Madhura
• Doshakarma	Pittahara

10. Traditional Uses:

10.1. Wood-

- ✓ Wood has a yellowish color and is used for making paneling, planking, carriages, furniture, and carpentry work. It has specific purposes for various construction and design projects. Gravity ranges from 0.42 to 0.64, and it has a high calorific value of around 4400 to 4800 Kcal per kg. ^[13]
- ✓ The wood is commonly used to carve images, make canoes, produce matches, create packing cases, and do ornamental work. It is also utilized to make toys and picture frames.
- ✓ Timber is handy for making paper, shaping, building furniture, working with wood inside homes, constructing ships, creating plywood, and more ^[14].
- ✓ G. arboea wood is commonly used to make cellulose ^[15], firewood ^[16], polewood ^[17], and particle board ^[18]. The board is commonly used for making furniture, veneer, and other structural purposes ^[19].

10.2. Leaves and fruits-

- ✓ In India, people use the leaves and fruits of G. arborea as food for animals. Reported findings suggest that the fruits and leaves of this plant contain various chemicals that are beneficial for health ^[20].
- ✓ Applying a paste made from leaves on the forehead can help relieve headaches, especially during a fever. It assists in bringing down a high temperature back to normal.
- ✓ The fruit of this plant is known to be a helpful natural remedy for bleeding problems. is utilized to enhance brain function and treat various conditions such as nosebleeds and heavy menstrual periods. comes with the ability to enhance intelligence.

- ✓ A useful plant that can help with digestion and the body's ability to absorb nutrients. This herb can help reduce pain and swelling. It also has anti-aging properties. An agent that boosts the body's natural strength.
- ✓ A natural substance that helps slow down aging and boosts strength. The body possesses qualities of a potent aphrodisiac. It has diuretic properties. It is one of the helpful herbs. Includes characteristics that help boost milk production in breastfeeding mothers ^[21,22].
- ✓ If you have a headache, you can apply leaf paste for relief. Also, you can use juice to wash ulcers. According to tradition, if a feverish patient's body temperature rises too much, it can lead to severe consequences. To alleviate a headache, you can apply a paste made from Gambhari leaves on your forehead ^[23].
- ✓ Fruits help with pitta dosa and have qualities that are heavy and oily. They are used to treat heart diseases, leprosy, vomiting, and burning sensations. The fruits of this plant are said to have qualities that can help with hair loss, anemia, urinary issues, dehydration, and women's health problems. Some traditional healers recommend them for these conditions.
- ✓ A specialist content writer recommends consuming ripe fruit extract twice a day for 10 to 15 days to treat conditions such as Tuberculosis (coughing up blood). This remedy can help cure blood disorders and diseases. To make a nutritious drink, boil a handful of ripe fruits with a glass of milk and a glass of water. In the past, people used to boil half a glass of fruit extract for fetal development.
- ✓ Take one handful of gambhari fruits and mix them with 20 grams of honey. Add two glasses of milk and two glasses of water, and simmer the mixture until it becomes one glass. You can drink this half glass preparation twice a day. On an empty stomach in the morning and at night ^[28].

10.3. Flower-

- ✓ The flowers have a sweet, cooling, bitter, sharp, and drying taste. They can be helpful in treating leprosy and blood disorders ^[24].

10.4. Bark-

- ✓ Root and bark are helpful natural remedies for hallucinations, piles, stomach pain, and burning sensations. Fever, diseases related to the three body humors, and urinary infections are common health issues that many people face ^[21,22].
- ✓ The bark of Gmelina arborea helps with stomach problems, increases milk production, acts as a laxative, and fights against worms in the body.
- ✓ It also boosts appetite, relieves hallucinations, treats piles, eases stomach pains, reduces burning sensations, lowers fevers, balances 'tridosha', and aids in urinary discharge. Applying leaf paste can help with headaches, while using the juice as a wash can treat ulcers.
- ✓ According to tradition, it can also boost digestion and enhance overall health. Memory is improved by this plant, which also helps with fever, heart issues, anxiety, and hemorrhoids.
- ✓ The bark is commonly used to treat snake and scorpion bites. It has also been discovered that it can help stop pregnancies from being terminated in the beginning ^[23].
- ✓ The inner bark and center of the tree have a property that helps lower blood sugar levels. People from the past used to treat headaches caused by convulsions and weakness, as well as dizziness, by drinking half a glass of tree bark extract. Boil 20 grams of bark in a glass of water ^[24].

10.5. Root-

- ✓ Have a variety of flavors and properties such as bitter, sweet, spicy, soothing, nourishing, cooling, digestive, milk-producing, and cleansing. To reduce vata and kapha, herbs with warm potency and heavy qualities are used.
- ✓ They are effective for treating illnesses like anthrax, digestive issues, insect bites, blood disorders, cholera, stomach pain, seizures, loose stools, and swelling. Experts say that the root decoction is commonly used in folk medicine for conditions like epilepsy, fever, gout, headache, intoxication, rheumatism, sore throat, burning sensations, and snakebite. Treatment for abdominal tumors.
- ✓ The roots can help with hallucinations, hemorrhoids, stomach aches, fevers, imbalances in the body's three doshas, and urinary problems. Many people rely on traditional methods to help with post-delivery weakness.

They often drink half a glass of boiled root extract for relief. To make the extract, you need to boil the roots in one glass of water until the liquid reduces to half a glass ^[26,27].

- ✓ A root decoction is used to treat abdominal tumors and helps with thirst and vata. Disorderly wounds and extreme thinness ^[21,22].

Conclusion:

This review shows that Gmelina arborea is a very important traditional medicinal plant. plays a significant role in popular Ayurvedic remedies. This plant can help lower blood sugar levels, fight off harmful substances in the body, and reduce inflammation. The secondary chemicals in G. arborea are produced by living organisms. Various activities have been recognized. Different parts of G. Arborea showed antidiabetic effects in test tubes and living organisms, and it was able to help regrow β -cells in the pancreas of rats. Luteolin, kaempferol, isoquercetin, rutin, β -sitosterol, apigenin, and quercetin have shown promise in treating diabetes. Chemicals found in the plant. Since this plant is growing quickly and has many uses for medicine, it is important to stop using fake versions of it by growing more of the real thing on a big scale. Special techniques are used for this purpose. This plant contains alkaloids, flavonoids, lignans, tannins, Iridioid glycoside, and saponins. These are the substances found in the plant. Compounds like flavonoids and tannins have the potential to act as antioxidants. Their antioxidant activity comes from these compounds. Phenolic compounds can help fight off harmful free radicals in the body. They also play a role in preventing mutations, cancer, and fighting off bacteria. Tannins stop a lot of fungal and bacterial pathogens from growing. Studies have found that tannins can help with pain relief and reduce inflammation. Plants contain saponins which also have beneficial effects. Lignans and iridoid glycosides are recommended for their anti-inflammatory properties and as potential anti-cancer agents. Most of the chemical components present show promise and suggest that the species has healing properties.

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