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Review Article

A Review on Beneficial Properties of *Gliricidian sepium* Plant

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ABSTRACT

A large proportion of the world's population, especially in developing countries, relies on traditional systems of medicine. Humans have learned to seek therapy from the bark, leaves, fruits, flowers, and other parts of plants as a result of many years of struggle against illnesses. Gliricidia sepium (Jacq.) Kunth ex Walp. is one of the most important medicinal plants in pharmacognosy and medical fields because it serves as a reservoir of potent bioactive compounds. These include saponins, flavonoids, volatile oils, and other phytochemical constituents extracted from various parts of the plant. Gliricidia sepium shows numerous traditional applications, including the treatment of coughs, asthma, urticaria, skin rashes, burns, scabies, and dermatitis. It also acts as an antipruritic agent on the skin and is used in treating bacterial and protozoal infections. Over time, many medicinal properties of Gliricidia sepium have been reported, such as cytotoxic, antimicrobial, antibacterial, anti-inflammatory, antioxidant, thrombolytic, anti-sickling, wound healing, mosquitocidal, and anthelmintic activities.

INTRODUCTION

Medicinal plants have a long history of use, and their utilization is widespread in both developing and developed countries. According to reports of the World Health Organization (WHO), about 80% of the world's population relies mainly on traditional therapies that involve the use of plant extracts or their active substances [1]. India is a country rich in natural resources and possesses a wide variety of medicinal plants.

In contrast to synthetic drugs, herbal drugs offer several advantages such as lower toxicity, better compatibility with the biological system, and affordability for all classes of people. In recent decades, herbs and medicinal plants have been extensively used as sources of therapeutic compounds in traditional medicinal systems. Medicinal plants play an important role not only in traditional health-care systems but also in international herbal and pharmaceutical markets. The most important bioactive constituents of

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plants include alkaloids, tannins, flavonoids, and phenolic compounds, which produce definite physiological actions on the human body.

Gliricidia sepium (Jacq.) Kunth ex Walp. is a multipurpose legume plant belonging to the family Fabaceae, which is a commercially and medicinally important family of flowering plants recognized by its fruit (legume). The Fabaceae family contains more than 700 genera and approximately 20,000 species, making it the third largest plant family after Orchidaceae and Asteraceae [2].

Gliricidia sepium (Leguminosae family) is a medium-sized tree introduced into India from the American continent. In Mexico, this tree is used as a shade plant for cocoa and coffee plantations and is therefore known as “Madrecacao” (mother of cocoa). It is also used as a hedge plant, and its flowers are consumed as food in some regions of Mexico [3].

In Panama, leaf decoctions of Gliricidia sepium are used to treat urticaria, skin rashes, burns, and erysipelas [4]. In Guatemala and Costa Rica, bark decoctions are used against bacterial and protozoal infections [5]. The branches of Gliricidia sepium are used to reduce fever in both children and adults. It has also been reported to treat infections caused by Microsporum canis, Trichophyton mentagrophytes, and Neisseria gonorrhoeae [6]. Sharma and Qadry investigated the larvicidal activity of Gliricidia sepium.

The larvicidal activity of the crude ethanol extract of Gliricidia sepium bark and leaves has also been reported [7]. Various phytochemicals such as flavonoids [8], triterpenoids, saponins [9], stigmasterol glucoside [10], rhamnogalactoside of kaempferol [11], coumarin, coumaric acid, and melilotic acid [12] have been isolated and characterized from different parts of this plant. Allelochemicals present in the leaves of Gliricidia sepium were extracted, identified, and quantified using High Performance Liquid Chromatography (HPLC) [13].

2. RATIONALE OF WORK

2.1 Aim

To explore the potential medicinal properties, ecological benefits, and practical uses of Gliricidia sepium, a herbal plant. The study also focuses on the phytochemical constituents present in various parts of Gliricidia sepium.

2.2 Objectives

To evaluate and summarize existing literature on the medicinal uses, potential health benefits, and reported therapeutic properties of Gliricidia sepium.

Phytochemical Composition: To examine the chemical constituents of Gliricidia sepium and identify bioactive compounds contributing to its medicinal value.

Traditional Knowledge: To explore traditional uses and indigenous knowledge associated with Gliricidia sepium, providing insight into cultural practices and historical applications.

Future Research Directions: To propose areas for future research to bridge gaps in understanding and unlock the full potential of Gliricidia sepium in various domains.

3. GEOGRAPHICAL SOURCE [14]

Gliricidia sepium is native to tropical dry forests of Mexico and Central America. In addition to its native range, it is cultivated in many tropical and subtropical regions, including the Caribbean, northern parts of South America, Central Africa,

parts of India, Sri Lanka, Myanmar, and Southeast Asia.

4. DESCRIPTION OF PLANT

Leaves

The alternate, pinnate leaves are 15–30 cm (6–12 in) long and show silky pubescence when young. There are 7–17 leaflet pairs and a terminal leaflet. The leaflets are elliptical to lanceolate, 3–6 cm (1.2–2.4 in) long and 1.5–3 cm (0.6–1.2 in) wide, short- to long-pointed at the tip and rounded to short-pointed at the base.

Stem

The plant may have a single or multiple stems with trunk diameters reaching up to 30 cm. The bark is grayish-brown to whitish and may be deeply furrowed in older trees. Leaves are pinnately compound, alternate in arrangement, and 20–30 cm long.

4.1 Traditional Uses

Herbal medicine has long been used in ancient societies and civilizations. Gliricidia sepium is one such plant with several folkloric uses.

In Saint Lucia, leaves are brewed as tea to treat coughs and asthma and are also used for skin infections.

In Mexico, crushed fresh leaves are used as a poultice.

In Panama, a leaf decoction is used to treat urticaria, rashes, and burns.

In the Philippines, leaf juice or decoctions and bark decoctions are used for scabies, dermatitis, and as antipruritic agents; fresh leaves are applied as insect repellents.

In Guatemala and Costa Rica, bark decoctions are used to treat bacterial and protozoal infections.

4.2 Phytochemical Constituents

Various essential phytochemical constituents isolated from Gliricidia sepium include saponins, flavonoids, volatile oils, and other miscellaneous compounds.

a) Saponins

Three saponins were isolated from the fruits:

- Hederagenin-3-O-(4-O-acetyl-β-D-xylopyranosyl)-(1→3)-α-L-rhamnopyranosyl-(1→2)-α-L-arabinopyranoside
- Hederagenin-3-O-(3,4-di-O-acetyl-β-D-xylopyranosyl)-(1→3)-α-L-rhamnopyranosyl-(1→2)-α-L-arabinopyranoside
- Hederagenin-3-O-(3,4-di-O-acetyl-α-L-arabinopyranosyl)-(1→3)-α-L-rhamnopyranosyl-(1→2)-α-L-arabinopyranoside

The heartwood of the stem yielded stigmasterol glucoside, identified using IR, ^{1}H-NMR, and ^{13}C-NMR techniques.

From the leaves and roots, two triterpene saponins (gliricidoside A and B) were isolated. Their structures were elucidated using 1D and 2D NMR techniques.

b) Flavonoids

The insecticidal dichloromethane extract of Gliricidia sepium heartwood contained:

- Isoflavan (7,4′-dihydroxy-3′-methoxyisoflavan)

- Isoflavonoids: isovestitol, formononetin, afrormosin
- Pterocarpan (medicarpin)

Two isoflavones isolated include:

- 2′,3′,7-trihydroxy-4′-methoxyisoflav-3-ene (sepiol)
- 3′,7-dihydroxy-2′,4′-methoxyisoflavone

Table 4: Volatile Oils Content of Gliricidia sepium

Compound Name	Part Used	Reference
Safrole	Leaves	[25]
2′-Hydroxyacetophenone	Leaves	[25]
Pentadecanal	Leaves	[19, 23]
Z-phytol	Leaves	[26]
Methyl linoleate	Leaves	[26]
Nonanal	Leaves	[26]
Propylene glycol	Leaves	[20, 22]
(Z)-3-Hexenol	Leaves	[32]
β-Farnesene	Leaves	[20, 22]
(Z)-2-Hexeno	Leaves	[27]
Thymol	Leaves	[27]
Benzyl alcohol	Leaves	[27]
Caryophyllene	Leaves	[27]
α-Farnesene	Leaves	[27]
Coumarin	Leaves, Flower, Bark	[20, 21, 22, 26, 32]

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