

A Pharmacological Review on *Simarouba glauca* DC

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ABSTRACT

Simarouba glauca is a medium sized ever green tree with tap root system and cylindrical stem commonly known as paradise tree belonging to Simaroubaceae family; it has a long history in herbal medicine in many countries. All the parts of plant is used as some way to another. Which is used to cure a variety of diseases such as amoebiasis, malaria, cancer and ulcer. They also exhibited antibacterial, antifungal antioxidant and hepatoprotective activities, also to treat snake bites. This review article explores the phytoconstituents present in it and pharmacological profile of this particular plant and importance of Simaroubaceae family.

Keywords: *Simarouba glauca*, simaroubaceae family, medicinal properties, phytoconstituents

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INTRODUCTION

Nature has blessed us abundantly with many herbs and we are using those in our daily life without knowing their medicinal importance. Phytochemicals obtained from these medicinal plants are also important for pharmacological research and drug development.

Simarouba glauca also known as paradise tree has a long history of herbal medicine in many countries and belongs to the family *Simaroubaceae*. The *Simaroubaceae* family includes 32 genera and more than 170 species of trees and bushes of pan tropical distribution. [1] It was widely used for treatment of cancer hence it is known as tree of solace of cancer. [2,3]

SYNONYMS: King Oil Seed Tree, Dysentery-bark.

OTHER NAMES:

Hindi: Ainta, Bilchuli, Hartho

English: ParadiseTree, Bitterwood

Malayalam: Lakshmitaru

Tamil: Shorgummaram

FAMILY: Simaroubaceae

DISTRIBUTION:

The main distribution hot spots are located at tropical areas of America, Africa,

Madagascar and Australia, Cuba, Brazil, Mexico, Peru, India. [4]

CULTIVATION:

Its cultivation depends upon the rainfall distribution, water holding capacity of the soil and possible sub-soil moisture and a temperature range of 10-50°C. *Simarouba glauca* can be cultivated in tropical regions all over the world. [4]

DESCRIPTION:

It is a medium sized evergreen tree (height 12-15 m) with tap root system and cylindrical stem. Stem is up to 9m height with 40-50 cm in diameter. It has finely cracked and grey colored outer bark while inner bark is creamy in colour. It produces bright green leaves 20 to 50 cm in length, small white flowers, and small red fruits. The drupelets are blackish purple in **Kaali** genotypes and yellowish green in **Gauri** genotypes and they are ready for harvesting by April/May. [5]

CHEMICAL CONSTITUENTS:

Simarouba glauca has 11 medicinally important quassinoids, the active principles in the tree. *Simarouba glauca* extract reported for the presence of alkaloids,

flavanoids, cardinolides, glycosides, phenolic compounds, saponins and fixed oils.

The main active constituents in *Simarouba glauca* include: ailanthinone, benzoquinone, canthin, dehydroglau-carubinone, glaucarubine, glaucarubolone, glaucarubinone, holacanthone, melianone, simaroubidin, simarolide, simarubin, simarubolide, sitosterol, and tirucalla etc. [6]

MEDICINAL USES:

All the parts of the tree are useful in some way or the other.

ANTIAMOEBIAC ACTIVITY:

In vitro studies showed that *Simarouba glauca* was active against *Entamoeba histolytica* due to presence of crystalline glycosides glaucarubin isolated from *Simarouba glauca* and exhibited amoebicidal properties in *in vitro* studies. [7]

ANTIBACTERIAL ACTIVITY:

Simarouba glauca leaves extract has potential antibacterial activity against both Gram positive and Gram negative bacteria. Fresh and dried leaves of *Simarouba glauca* extract inhibits the microorganisms such as *Bacillus subtilis*, *Escherichia coli*, *Pseudomonasaeruginosa* and *Staphylococcus aureus*. [8]

ANTICANCER ACTIVITY:

Simarouba glauca leaves are believed to aid in the battle against cancer. The decoction of leaves is used in treatment of cancer by traditional medical practitioners. The anticancer property of the extract can cure cancer of first and second stages, whereas the quality of life improves a lot, in case of patients with third and fourth stages. [2]

Simarouba glauca contain chemicals having cancer killing properties. Four quassinoids namely ailanthinone, glaucarubinone, dehydroglaucarubinone and holacanthone attributed to the anti-leukemic and anti-cancer activity of this herb. [9] Another study demonstrated that antitumorous activity of glaucarubinone which is an active constituent present in *Simarouba glauca* is active against solid tumors (human and mouse cell lines), multi-drug-resistant mammary tumors in mice, and antileukemic activity against leukemia in mice. [10]

ANTIMALARIAL ACTIVITY:

Studies demonstrated that three potent quassinoids present in *Simarouba glauca* were effective against malaria *in vitro* as well as *in vivo*. Some quassinoids present in *Simarouba glauca* have shown potent inhibitory activity of a chloroquine-resistant *Plasmodium falciparum* strain. [11]

ANTIFUNGAL ACTIVITY:

Methanol and ethanol extract of *Simarouba glauca* exhibited antifungal activity against *Fusarium oxysporum* and *Aspergillus parasiticus*. Ethanolic extracts of fresh leaves were found to be more effective as compared to the methanolic extracts of the fresh leaves against the growth of the fungi by agar well diffusion method. [12]

ANTIOXIDANT ACTIVITY:

Leaves of *Simarouba glauca* leaves extract were reported to carry antioxidant activity. Chloroform extract of *Simarouba glauca* were capable of scavenging H₂O₂ in a concentration dependent manner. Extracts were highly effective in scavenging free radicals such as DPPH and chelating ferrous iron. The extracts also exhibited potential antioxidant activity. [13]

ANTIULCER ACTIVITY:

Chloroform extract of *Simarouba glauca* showed dose dependent on inhibition of ethanol induced gastric lesions in albino rats, causing 82.63% protection at 400mg/kg, and 53.48 % protection at 200 mg/kg, Chloroform extract of *Simarouba glauca* also showed dose dependent inhibition of indomethacin induced gastric lesions in albino rats, causing 62.65 % protection at 400 mg/kg and 54.86 % protection at 200 mg/kg, Chloroform Extract of the leaves of *Simarouba glauca* decreased the acidity and increased the mucosal secretions, thus *Simarouba glauca* exhibiting antiulcer activity. [14]

REDUCING PATCHY SKIN PIGMENTATION:

Simarouba glauca extract contains constituents having ability to reducing patchy skin pigmentation (US Patent Issued on October 14, 1997), whereby its water extract was found to increase skin keratinocyte differentiation and to improve skin hydration and moisturization. [6]

HEPATOPROTECTIVE ACIVITY:

Chloroform and ethanolic extracts of *Simarouba glauca* possess the hepatoprotective activity. Some studies reveals that *Simarouba glauca* leaf extract can be used for the development of a new remedy of hepatoprotective activity. [15]

OTHER USES:

The seeds extracted in alcohol are used against snake bites. An infusion of the leaves or bark is considered to be astringent and used as a digestion and menstrual stimulant; Rheumatoid arthritis can be effectively cured by consumption of a decoction made from leaves and bark of the tree.

The oil obtained from this plant largely used in the preparation of bakery products, it can be used in the manufacture of vanaspati and vegetable oil. The oil is free from bad cholesterol. It can be also used for industrial purposes in the manufacture of biofuels, soaps, detergents, lubricants, varnishes, cosmetics, pharmaceuticals etc. Wood is light and generally insect resistant, hence useful in making light furniture, toys, packing material, pulp (for paper industry) and matches, plywood core, veneer, wood chips and lumber. During the flowering season, flowers are visited by

swarms of bees and considered an important honey plant. [40]

Poison: The residual cake left after processing the crude fat from the seed contains a toxin. It contains two new toxic quassinoid glucosides (agroforest data base) 15-*O*- β -D-glucopyranosyl glaucarubolone 3 and 15-*O*- β -D-glucopyranosyl glaucarubol are identified in *Simarouba glauca* seeds. [41]



Figure 1: *Simarouba glauca* DC

Table 1: Some genera of the simaroubaceae family and its medicinal value

S. No	GENUS	PART	CHEMICAL CONSTITUENTS	ACTIVITY
1	<i>Quassia amara</i>	Leaves	Simalikalactones-D Quassin 2-methoxycanthin-6-one	Antimalarial [15] Antimicrobial [16,17] Antiulcerogenic [18]
2	<i>Brucea javanica</i>	Leaves Fruit	Bruceoside A Brusatol Quassinoids	Anti leukemic [19] Antitumor [20-23] Antimalarial [24]
3	<i>Picrasma excelsa</i>	Leaves Stem	Quassin Neoquassin	Antifertility [25] Antimalarial [26]
4	<i>Ailanthus altissima</i>	Leaves Root	Ailanthone Shinjulactone O	Anticancer [27-29] Anticancer [30]
5	<i>Samadera indica</i>	Leaves Leaves Root	Samaderin E Simarinolide Samaderin B	Antileukemic [31] Antimalarial [32] Antifeedent [33]
6	<i>Simarouba amara</i>	Root Fruit	Alkaloids Amarolide Glaucarubin	Hepatoprotective [34] Antimalarial [35,36] Anticancer [37]
7	<i>Simaba mulxiflora</i>	Leaves Stem	Karinolide Cleomiscosin	Anticancer [38] Anticancer [39]

CONCLUSION

In recent years ethnobotanical studies plays an important role in prevention and treatment of disease in living organism, there are numerous known and unknown medicinal compounds obtain from plant origin. Review of pharmacological screening of *Simarouba glauca* revealed its medicinal potential and is having several medicinal properties.

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