



A REVIEW ON *CHLOROXYLON SWIETENIA*

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ABSTRACT

Chloroxylon swietenia is a moderate sized deciduous tree, belonging to the family rutaceae. *Chloroxylon swietenia* is the sole species in the genus *Chloroxylon*. Distributed in India, Sri Lanka and Malaysia. In India it is distributed in Kerala, Tamilnadu, Andhra Pradesh, Madhya Pradesh and Karnataka. Researches on *Chloroxylon swietenia* gives the evidence that it contains chemical constituents like alkaloids, lignans, mono and sesquiterpenes, phenolics, coumarins, sugars and their derivatives and fatty alcohols. However, the researchers also prove that it is used as anti-oxidants, anti-fungal, anti-microbial and anti-inflammatory. This article collates the phytochemicals and pharmacological activities of *Chloroxylon swietenia*.

KEY WORDS

Chloroxylon swietenia, Phyto chemicals, Pharmacological properties.

INTRODUCTION:

Chloroxylon swietenia is the sole species in the genus *Chloroxylon*, belonging to the family Rutaceae and is commonly known as bherul in Sanskrit and satinwood in English. *Chloroxylon swietenia* provides a decorative timber, used for furniture, pattern making, interior trim, cabinet work, flooring, boxes, crates, interior joinery, carvings, toys, musical instruments and luxury goods [1]. *Chloroxylon swietenia* is considered as a medicinal plant having several medicinal uses. Leaves paste is used to treat wounds, snakebites and rheumatism. Bark extract is used to treat chest pain and asthma. In friction it is used to treat bruises and painful joints. To treat impotence root bark in milk is drunk in Sri Lanka [2].

Vernacular Names: in different areas different names are used by the people. It is commonly called as bherul in Sanskrit and satinwood in English [1].

Synonyms: Satinwood, East Indian satinwood, Ceylon Satinwood.

Language	Name
Hindi	Bhirra, Bhivia, Dhoura, Giryā
English	Satinwood, Ceylon Satinwood
Kanada	Bittulla, Huragalu, Hurihulli, Masula

Tamil	Vaaimaram or Porasu, Porinja maram
Telugu	Billu, Billydu, Billudu, Bella
Sanskrit	Bhillotaka, bherul

Habitat and distribution:

C. swietenia is a small to medium-sized tree, distributed in India, Sri Lanka and Malaysia. In India it is distributed in Orissa, Madhya Pradesh, Andhra Pradesh, Karnataka, Kerala and Tamilnadu. It is commonly grown in poor literate soils and also occurs in tropical dry evergreen forests. It is moderate sized tree with glaucous pinnate leaves and a straight cylindrical stem generally attaining a girth of 3-4 feet [3-4].

Morphology:

C. swietenia is a moderate size tree of 9-15 meters in height and 1.0-1.0 meter in girth. The bark is thick, corky, rough, pale yellow or light grey. Leaves are pinnate, 12.5-22.5 cm long, aromatic and leaflets up to 10-20 pairs, 2.5cm long. Flowers are small, white or cream with 5 petals. Ovary is pubescent, 3 lobed and 3 celled, style is short. Stigma carries 8 ovules in each cell. Fruit is oblong capsule, seeds winged [5].

Phenology:

The tree is usually leaf less from February to April or May, flowers appearing during March-April; the fruits generally ripen during May-August.

PHYTOCHEMICAL PROPERTIES: Phytochemical research is important in developing the herbal medicines form ancient time. Chemical constituents like mono and

sesquiterpenes, phenolics, coumarins, alkaloids, lignans, sugars and their derivatives and fatty alcohols are isolated from various parts of *C. swietenia*. these constituents include Terpenes Phenols (coumarins, lignans, other phenols), sugars and other compounds [6].

Table 1: Phytochemical constituents reported in different parts of plant *C. swietenia* by various authors.

SNO	PLANT PART	CHEMICAL CONSTITUENTS	AUTHOR AND YEAR	References
1	Leaves	Geraniol, geranyl acetate, limonene, linalool, α -terpinene, α -terpineol, α -pinene, α -phellandrene.	Telang et al., 2003, Kiran et al., 2006	7
2	Leaves	Myrcene, alloocimene, Cis- β -ocimene, β -pinenes	Srivastava et al., 1998	8
3	Stems and leaves	Copaene, β -caryophyllene oxide	Telang et al., 2003	9
4	Stems and leaves	α -Humulene, Germacerene-D	Kiran et al., 2006	10
5	Leaves	Xylotenin, Xanthoxyletin, 7-Demethyl-suberosin, luvangetin,	King et al., 1954	11
6	Heart wood and bark	Aesculetin Dimethyl ether, Nodakenetin	Vorkoc and Sedmera 1972	12
7	Heart wood and bark	Swietenol, Alloxanthoxyletin	Majumdhara et al., 1977	13
8	Heart wood and bark	Tert-Butylketoles, Swietenone	Majumdhara et al., 1975	14
9	Heart wood and bark	Rutamarin	Kalyanaram and pai 1972	15
10	Leaves	Isopimpinellin, Bergapten, heliottin	Talaptra et al., 1968	16
11	Bark	Swietenocoumarin A, B, C, D, E and Swietenocoumarin F	Bhide et al., 1977	17
12	Bark	Chalpein, Suberosin	Ramarao et al., 1980	18
13	Leaves	Coumarindiol	Rao et al., 2009	19
14	Bark	Hinokinin, Savinin, Collinusin, Syringaresinol	Bhide et al., 1977	17
15	Heart wood	2,4-dihydroxy-5-prenyl cinnamic acid	Majumdhara et al., 1977	13
16	Leaves	Isoquercetrin	Rao et al., 2009	19
17	Bark	Skimmianine, γ -Fagarine	Verkoc et al., 1972, Majumdhara et al., 1977	12 13
18	Bark	Switenidin A, Switenidin B	Bhide et al., 1977	17

PHARMACOLOGICAL ACTIVITIES:

As *C. swietenia* is believed to possess medicinal properties, it has been used as anti-oxidant from the ancient time. This belief led to many invivo and invitro investigations by various methods and shown positive results for various activities. Few of the pharmacological that are shown by *C. swietenia* are as follows.

Anti-inflammatory activity

Kumar et al., 2006 reported the anti-inflammatory activity of the chloroform extract of the leaves in carrageenan, histamine and serotonin induced paw edema and cotton pellet induced granuloma models in rats. The extract exhibited significant anti-inflammatory response at various doses of 50, 100 and 200 mg/kg, when administered orally [20].

Analgesic activity

Senthil raja et al., 2003 reported the analgesic activity of the petroleum ether, ethyl acetate and methanolic extracts of the leaves of *C. swietenia* in both chemical and thermal induced methods in mice. Methanolic extract exhibited good analgesic activity in both the methods than petroleum ether and ethyl acetate extracts [21].

Antioxidant activity

The ethanolic extract of the whole plant was reported to possess antioxidant activity on acetaminophen induced rat hepatic injury. The development of hepatotoxicity is promoted by oxidative stress leading to tissue damage and failure of antioxidant defense mechanism to prevent formation of excessive free radicals. This is due to the decrease in enzymatic activity of superoxide dismutase, catalase, glutathione peroxidase, reduced glutathione and glutathione-S-transferase. Treatment with ethanol extract at a dose of 500 mg/kg administered orally significantly reverses these changes [22].

Hepatoprotective activity

The ethanolic extract of the whole plant was reported to possess hepatoprotective activity on acetaminophen induced rat hepatic injury. The hepatic damage resulted in a marked increase in serum SGOT, SGPT and total bilirubin levels. There was restoration of these enzyme

levels on administration of the ethanolic extract in a dose dependent manner commencing at a dose of 25 mg/kg administered by oral gavage [23].

Anthelmintic activity

Different extracts of the roots of *C. swietenia* were investigated for their anthelmintic activity against Indian earthworms (*Pheretima posthuma*). Chloroform and methanol extracts exhibited significant anthelmintic activity at highest concentration of 100 mg/ mL [24].

Mosquitocidal activity

The essential oil and the sesquiterpenes isolated from the leaves of *C. swietenia* were screened for mosquitocidal activity by fumigant toxicity model against three mosquito species, *Anopheles gambiae*, *Culex quinquefasciatus* and *Aedes aegypti*. The essential oil produced mosquitocidal activity for the three-vector species. Among the major sesquiterpenes tested at different doses, germacrene D performed better mosquitocidal activity and proved to be the potent followed by pregeijerene and geijerene. Nevertheless, the oil and the isolated compounds were particularly active against *Anopheles gambiae* [25].

Other activities

The secondary metabolites of *C. swietenia* crude extract and its fractions, such as hexane and n-butanol fractions showed good tyrosinase inhibition activity [31].

Table 2: Pharmacological Activities reported in *C. swietenia* by various authors.

SNO	EXTRACT	PLANT PART	ACTIVITY	AUTHOR AND YEAR	References
1.	Methanol	Leaves	Analgesic activity	Senthilraja <i>et al.</i> , 2003	21
2.	Chloroform	Leaves	Anti-inflammatory	Kumar <i>et al.</i> , 2006	20
3.	Ethyl acetate	Leaves	Insecticidal, antifeedant	Kiran <i>et al.</i> , 2006	26
4.	Different extracts	Leaves	Mosquitocidal	Kiran <i>et al.</i> , 2007	25
5.	Ethanolic extract	Whole plant	Antioxidant	Vijaya Bhaskar reddy, 2008	22
6.	hydro distillation	Leaves and stems	Antimicrobial	Kiran <i>et al.</i> , 2008	27
7.	Ethanolic extract	Whole plant	Hepatoprotective	Palani <i>et al.</i> , 2010	23
8.	Chloroform, methanol	Roots	Anthelmintic	Harwansh <i>et al.</i> , 2010	24
9.	Methanol	Bark	Antidiabetic activity	Jayaprasad,B.; Sharavanan,P.S.; Sivaraj, R. 2015	28
10.	Methanol	Leaves and bark	Anti-influenza (H1N1)	Enkhtaivan, Gansukh; Maria John, K. M.; Ayyanar, Muniappan 2015	29
11.	Hydro distillation	Leaves	Anti-fungal activity	Telang,T.; Awasthy,S.K.; Oswal,P. 2013	30

CONCLUSION:

Chloroxylon swietenia is a medicinal plant, which is traditionally used as antimicrobial, anti-oxidant from the ancient time etc. Researches on this plant are increasing day by day because of its potent pharmacological uses. The various phytochemical researches resulted in isolation of different potent chemical compounds which are basis for its specific pharmacological activities. As this plant is widely spread across India, Sri Lanka and Malaysia. In India it is distributed in Orissa, Madhya Pradesh, Andhra Pradesh, Karnataka, Kerala and Tamilnadu, more research work is still continued. The moto of this review was to collate the research work undertaken by various scientists at different places till date in order to provide a base line for future works

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CONFLICT OF INTERST:

None of the authors of this paper has a financial or personal relationship with other people or organizations that could inappropriately influence or bias the content of the paper.

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