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A REVIEW ON MILLINGTONIA HORTENSIS

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ABSTRACT: Millingtonia hortensis Linn. is cultivated in most parts of India, both in gardens and avenues. Tall and straight, with comparatively few branches, its popularity lies in its ornamental value. It is a fine tree, fast growing, but with brittle wood, liable to be damaged by storms. In favourable positions it can grow to 24 m tall. The ashy bark is cracked and furrowed and the numerous fissures make removal of the cork an easy matter. It is used as an inferior substitute for true cork. From April until the rains and again in November and December, a profusion of silvery-white, delightfully fragrant flowers crown the foliage. Upright open clusters with arching blooms terminate every branchlet. Each flower is a tiny bell-shaped calyx, a long slender tube of palest green dividing into four waxy, white petals and several conspicuous yellow anthered stamens. Many flowers are delicately tinted with rose. As the flowers are short-lived, the flower sprays mostly consist largely of long whitish buds, while the ground below is spangled with innumerable little stars. Between January and March the leaves are shed and renewed during April and May, although the tree is never quite naked. Trees do not seed very easily in India¹.

IMPORTANT TERMS : Millingtonia hortensis , brittle wood, foliage, calyx, stamens.

INTRODUCTION :

Millingtonia hortensis Linn. is an important medicinal plant which belongs to the family Bignoniaceae and it is one of important medicinal plant in Southern Asia, ranging from India, Burma, Thailand and Southern China Commonly known as Cork tree. It is also called as Akash neem, Neem chameli . A very tall tree, Flowers have very rich & pleasant scent. Propagation by Seeds, suckers. Longevity is Perennial. It is a tall deciduous tree. It grows up to 25 meter. The leaves are pinnately compound. Long leaves bear two or three widely spaced pinnae, each with 5-7 smooth leaflets, oval, pointed and slightly round-toothed, 1-3 inches long².

In India about 7300 plant species are used in traditional health care systems. 90% of the medicinal plants which find place in day-to-day uses, many of these, are used as herbal remedies³. Medicinal plants are of great importance to the health of individual and communities. The medicinal value of these plants lies in some chemical active substances that produce a define physiological action on human body. The most important of these chemically active constituents of plants are alkaloids, tannin, flavonoid and phenolic⁴.

A very tall and straight tree with brittle wood and liable to damaged by storms. It can grow up to 25 meter tall and it can reach 80 meter in height. Flowers have very rich and pleasant scent. In Thailand, the flower is called 'peep' and compounds. Many of these indigenous medicinal plants are also used for medicinal purposes . In recent years, use of antimicrobial drugs in the treatment of infectious disease has developed multiple drug resistance and with increase in production of new antibiotics, by pharmaceutical industry, resistance to these drugs has also increased.used for the treatment of asthma, sinusitis and as a cholagogue and tonic. The flowers are also used in rituals and have good antimicrobial properties. The stem has brittle wood and liable to damaged by storms, stem bark is used traditionally as mainly lung tonic, antiasthmatic and antimicrobial properties. Leaves and roots of cork tree used as antiasthmatic and antimicrobial activity. Fruit is very long and narrow, pointed at both ends and contains thin, flat seeds. Trees do not seed very easily in India. Roots can be used for the treatment of tuberculosis and as an antiasthmatic. The leaves of Cork tree are very ornamental and extracts of leaves has good antimicrobial activity. The leaves of Millingtonia hortensis are used as antipyretic, antiasthmatic, sinusitis, cholagogue and tonic in folklore medicine⁵.

PLANT PROFILE :**CLASSIFICATION :**

KINGDOM : Plantae

DIVISION : Magnoliophyta+

CLASS : Magnoliopsida

ORDER : Lamiales

FAMILY : Bignoniaceae

GENUS : MILLINGTONIA

SPECIES : *hortensis*

SYNONYM : Bignonia suberosa Roxb, Millingtonia hortensis L. Bignonia suberosa Roxb., Bignonia azedarachta König & Sims, Bignonia cicutaria K.D. Koenig ex Mart.,

Jasmine, Akash neem, Neem chameli

VERNICULAR NAME :**Hindi :** Neem chameli**Kannada :** Akash mallige, Beratu, Birate mara**Konkani :** Akash nimb**Malayalam :** Katesam**Marathi :** Akash chameli, Buch, Kava Inimb **COMMON NAMES :** tree jasmine, Indian cork tree , Tree**Oriya :** Bakeni, Mach-Mach, Sitahara**Tamil :** Kat-malli**Telugu :** Kavuki**DISTRIBUTION & CULTIVATION :**

MILLINGTONIA *hortensis* is a important medicinal plant in Southern Asia ranging from INDIA , BURMA , THAILAND and south CHINA . The trees indigenous to Burma and the Malay Archipelago , but grows wild in most parts of INDIA as well as being extensively cultivated .

The tree is cultivated in various parts of INDIA for its ornamental purpose .they can grow upto 25 m with woody stem and thick cork . The sole species in the genus MILLINGTONIA HORTENSIS is tree native to South Asia.The name MILLINGTONIA *hortensis* comes from THOMAS MILLINGTONIA , an English Botanist while MILLINGTONIA HORTENSIS means “ GROW IN A GRADEN ”⁶.

PHARMACOGNOSY :**MACROSCOPIC CHARACTERS :**

Leaves: The leaves are large, two to three pinnate and the leaflets are shine, dark green and with toothed edges. They are arranged in opposite fashion on the stem 0.6 to 0.9 m long and pinnately compound with odd number of leaflets. Each leaflet is ovate \ lanceolate in shape 5 to 7 cm long with a short stalk and has smooth or slightly wavy margins. Drug occurs in 6-20 cm long, 0.3-0.5 cm thick cut pieces almost cylindrical internodes, smooth, stout, mostly covered with shining sheath having distinct nodes, brownish yellow, a few thin fibrous, ash colored roots at nodes. The leaves give no odor and are slightly bitter in taste⁷.

Stem bark: It is dark brown colored and characteristic odour. Stem has brittle wood and liable to damaged stroms .The inferior cork is processed from its corky bark. Externally rough with irregular ridges⁸⁹.

Flowers : Flowers are white and standout particularly against the dark green foilage they open at night and are delightfully scented .

FRUIT : Fruits are very long and narrow pointed at both ends and contain thin , flat seeds¹⁰.

Microscopic characters :

Stem bark : The Transverse section of stem bark shows epidermis with 2-3 layered tangentially elongated cell surrounded by cuticle. It shows cortex consisting of 25 to 30 rows of parenchymatous cells along with lignified medullary rays at one side in parenchymal cells. It shows phloem, xylem, pith and sclerenchyma respectively¹¹.

PHYTOCHEMICALS OF MILLINGTONIA HORTENSIS

S. NO	PHYTOCHEMICALS	PRESENT \ ABSENT
1	Carbohydrates	Present
2	Reducing sugars	Present
3	Protiens	Present
4	Alkoids	Present
5	Flavonoids	Present
6	Glycosides	Present
7	Phenols	Present
8	Steroids	Present
9	Coumarins	Present
10	Aminoacids	Present
11	Terpenoids	Present

Preliminary phytochemical screening revealed the presence of flavonoids, alkaloids, tannins, phenols and alkaloids are very important plant constituents because of their free radical scavenging ability¹².

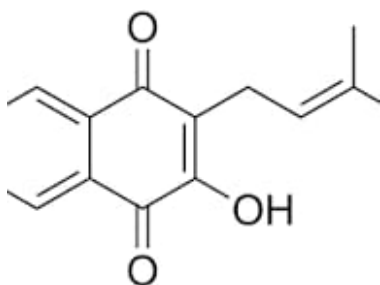
CHEMISTRY OF MILLINGTONIA HORTENSIS

ROOTS: Lapachol, β -sitosterol and poulownin were isolated from the roots of Millingtonia hortensis¹³.

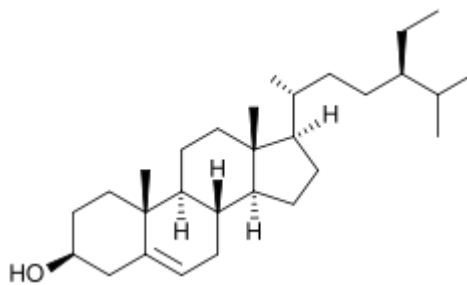
BARK : From the heartwood and bark β -sitosterol was isolated^{14,15}. Bitter substances and tannins were also identified¹⁶.

LEAVES : From the leaves of Millingtonia hortensis, hispidulin was identified¹⁷, Rutinoside¹⁶ A flavonoid dinatin together with beta-carotene was reported¹⁸.

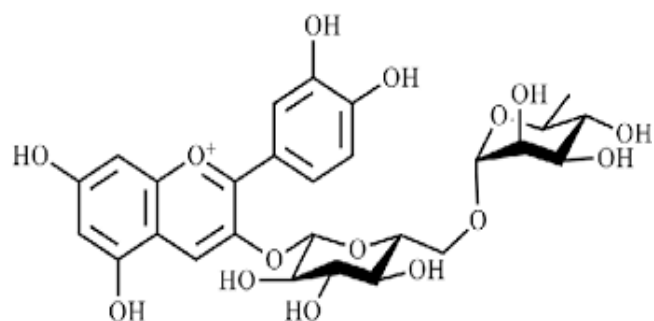
FLOWERS: From the fresh flowers of Millingtonia hortensis isolation of a new glycoside (scutellarein-5-galactoside) and scutellarein was observed¹⁹. From the flowers of Millingtonia hortensis flavonoids scutellarein, hispidulin and scutellarein-5-glucuronide were isolated¹⁷. From the dried flowers of Millingtonia hortensis a flavonoid hispidulin was isolated by using TLC²⁰.



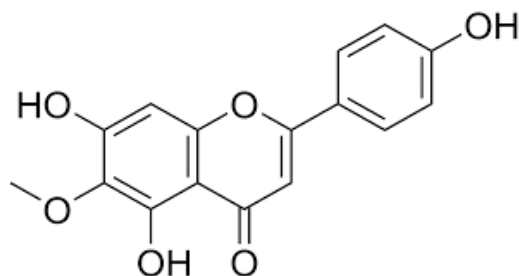
Lapachol



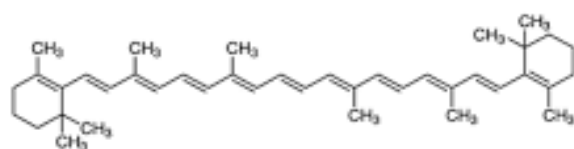
B-Sitosterol



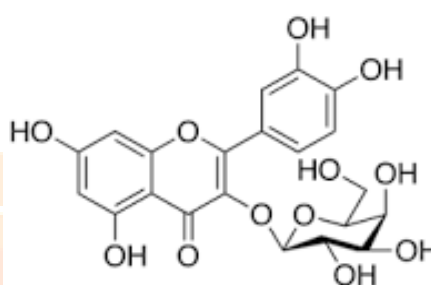
Rutinoside



Hispidulin



b-Carotene



Scutellaria 5 galactoside

PHARMACOLOGICAL ACTIONS :

ANTIMICROBIAL ACTIVITY : The Polar extracts of the leaves of *Millingtonia hortensis* showed good antimicrobial activity. Twenty different bacterial strains and two yeast cultures were used. The aqueous alcohol extract showed good activity against all microbes tested, particularly *Escherichia coli* and *Salmonella typhimurium*, both Gramnegative bacteria, with MIC values of 6.25 µg/ml. The activity is compared with known antibiotics such as gentamycin and nystatin²¹.

ANTIFUNGAL ACTIVITY : The Antifungal activities of different extracts of *Millingtonia hortensis* were investigated against various fungal pathogens. Methanol extract was found to have stronger activity than fluconazole against yeast like fungi: 4 fold against *Candida krusei* with 4 µg/ml minimal inhibitory concentration and 2 fold (MIC- 2 µg/ml) against *Sacharomyces cerevisiae*, though it showed the same activity as fluconazole against *Candidaglabrata*²².

ANTIOXIDANT ACTIVITY : The antioxidant activity of aqueous extract of *Millingtonia hortensis* Linn. Stem bark studied by various methods. Both the extract and standard drug quercetin were evaluated for its antioxidant potential at 10, 20, 30, 40 and 50 µg/ml. In addition the amount of total phenol (241 mg/gm) and total flavonoid (172 mg/gm) were determined. The extract showed its antioxidant potential: DPPH radical scavenging activity (IC₅₀ 29.05 µg/ml), FRAP radical scavenging activity, DCF/AAPH assay (TRAP) (IC₅₀ 41.10 µg/ml), ABTS scavenging activity (IC₅₀ 24.0 µg/ml), superoxide anion scavenging activity assay (IC₅₀ 26.0 µg/ml) and Nitric oxide assay (IC₅₀ 31.0 µg/ml). The present study depicts that *Millingtonia hortensis* Linn. bark has a potential natural antioxidant that can be used as a supplementary drug for various ailments²³

HEPATOPROTECTIVE ACTIVITY : The hepatoprotective and antioxidant potential of ethanolic extract of *Millingtonia hortensis* on carbon tetrachloride(CCl₄) induced hepatotoxicity were investigated, phytochemical studies were carried out to determine the total phenol and flavonoid contents. 30 adult wistar rats were allocated into 5 groups²⁴.

ANTIASTHMATIC ACTIVITY : The methanol extract exhibited bronchodilating effect on isolated rat trachea, this extract was further fractionated into petroleum ether, chloroform, n-butanol and aqueous fractions. Pharmacological studies indicated that the chloroform fraction elicited the most prominent effect. Further separation of the chloroform fraction by short column chromatography enabled hispidulin, the bronchodilating agent, to be isolated. Detection by TLC indicated that hispidulin is one of the compounds present in the smoke of the dried flowers. It is therefore likely that the antiasthmatic activity of the dried flowers of *M. hortensis* Linn. is due to hispidulin. Hispidulin is more potent than aminophylline on a molar basis. It was interesting to observe that the aqueous extract of these flowers exhibits a bronchoconstricting action which gradually diminishes upon storage²⁵.

ANTHELMINTIC ACTIVITY : The present study was undertaken to evaluate anthelmintic activity of different extracts (petroleum ether, benzene, chloroform, methanol and aqueous extracts) of stem bark of *Millingtonia hortensis* (Bignoniaceae) against adult earthworm *Pheretima posthuma*. Piperazine citrate was used as standard reference drug. Among all the extract tested, methanol showed dose dependent anthelmintic and better activity in comparison with reference standard. Chloroform and benzene extracts at 20 mg/ml concentration also showed similar activity in comparison with piperazine citrate at dose of 60 mg/ml. Aqueous extract was not at all active²⁶.

ANTIPROLIFERATION ACTIVITY : the *Millingtonia hortensis* is a medicinal plant widely used in many Asian countries. An aqueous crude extract of this plant has been shown the apoptosis induction on RKO colon cancer cells. However, its mechanism remains unknown. To learn more about this plant extract, we partially purified the crude extract using Sephadex LH-20 and three aqueous fractions were collected. Each fraction was investigated for cytotoxicity using MTT assay²⁷.

MUTAGENICITY AND ANTIMUTAGENICITY : the mutagenicity and antimutagenicity of hispidulin and *hortensis*, the flavonoids from *Millingtonia hortensis* L. (Bignoniaceae), were performed using the liquid preincubation method of the *Salmonella*/microsome test²⁸.

CONCLUSION :

The current report shows that *Millingtonia hortensis* Linn. is a favourite garden tree commonly known as Cork tree. It is a perennial herb. The plant has high medicinal values and is used for indigenous treatment of numerous diseases including asthma, rheumatism, tuberculosis, cancer, antipyretic, sinusitis and as an cholagogue and tonic. This review find the description of the herb, phytochemistry, mutagenicity and antimutagenicity, antimicrobial activities like antibacterial, antifungal, anticonvulsant, and larvicidal activity, different types of pharmacologically actions like antioxidant, induction of apoptosis on RKO colon cancer cell line, anthelmintic, antiproliferative, antiasthmatic and hepatoprotective activity. This review will definitely help for the researchers as well as practioners, dealing with this plant, to know its proper usage. Therefore, considering its versatile medicinal uses, there is an ample scope for future research on *Millingtonia hortensis* Linn. and hence further pharmacological investigations are warranted.

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