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A BRIEF REVIEW OF *MILLINGTONIA HORTENSIS* (INDIAN CORK TREE)

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ABSTRACT: *Millingtonia hortensis* is commonly known as the Indian cork tree. This is an important medical plant widely used in southern Asia ranging from India, Burma, Thailand, and Southern China. It is a tall and elegant ornamental tree, reaching heights of 15 to 25 meters. It's recognized for its slender trunk with light, fern-like leaves that contribute to a delicate foliage texture. This plant is used traditionally as mainly lung tonic, asthmatics and antimicrobial properties, From April until the rains and again in November & December, a profusion of silvery-white, delightfully fragrant flowers crowns the foliage as the flowers are short-lived, the flower sprays mostly consists largely of long whitish buds. The leaves of *Millingtonia hortensis* are used as antipyretic, sinusitis, chologouge, and tonic in folklore medicine. The plant has anti-fungal, anti-bacterial, anti-proliferative, anti-mutagenic, anti-helminthic, anti-diabetic, and hepatoprotective activities. This paper gives brief information about the plant *Mellingtonia hortensis*, its medicinal aspects, pharmacognosy and phytochemistry, and pharmacological activities of the plant.

INTRODUCTION: *Millingtonia hortensis*is an important medicinal plant that belongs to the family Bignoniaceae and it is the sole species in genus *Millingtoniais* a tree native to South-East Asia. The name *Millingtonia* comes from Thomas Millington, an English botanist, while hortensis means grown in gardens [1]. In India, about 7300 plant species are used in traditional health care systems 90% of herbal remedies. Medicinal plants are of great importance to the health of individuals and communities. The medicinal value of these plants lies in some chemically active substances that produce a defined physiological action on the human body.

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The most important of these chemically active constituents of plants are alkaloids, tannin, flavonoid and phenolic compounds. In recent years, use of antimicrobial drugs in the treatment of infectious diseases has developed multiple drug resistance and with an increase in the production of new antibiotics, by the pharmaceutical industry, resistance to these drugs has also increased [2].

According to mythology, this is a heavenly tree brought to the earth by Lord Krishna. A very tall tree, flowers have a vibrant and pleasant scent. It is a drought-resistant tree.

The biological name of *Millingtonia hortensis* belongs to the family of Bignounaceae. Propagation by seeds, suckes. Longevity is perennial. The other names of this crud drug is akas nim, nim Chameli, betati nim, mini Chameli karkku, kat malli and kabuki are the same of the other names used for the cork tree. It is tall deciduous tree.

It grows up to 25m. The cork tree can grow in a variety of soil its requires sunlight for growth it mostly found in tropical forests, it has a great medicinal value.

Plant Profile:

FIG. 1: *MILLINGTONIA HORTENSIS* PLANT

Classification:

Division: *Magnoliophyta*

Kingdom: Plantae

Class: Magnoliopsida

Order: Lamiales

Family: Bignoniaceae

Genus: *Millingtonia*

Species: Hortenisis

Synonyms: *Mllingtonia dubiosa span, Bignonia suberosa Roxb, Bignonia hortensis Oken,*

Common Names:
English: Tree jasmine, India cork tree.

Hindi: Nim Chameli.

Kannada: Beratu, Akasha mallige.

Telagu: Kaviki.

Tamil: Maramalli [3]

Mellingtonia hortensis is an important medicinal plant in southern Asia ranging from India, Barma, Thailand, and south China. The trees indigenous to Bharma, and the Malay Archipelago, but grows wild in most parts of India, as well as being extensively cultivated. *Millingtonia hortensis Linn.*, a notable medicinal tree in Indian traditional medicine, has demonstrated considerable anthelmintic potential. In recent studies, various stem extracts of *M. hortensis* were tested for their effectiveness against the earthworm *Pheritima posthuma*, which serves as a model organism for evaluating anthelmintic activity. Each extract was examined at a concentration of 20 mg/ml to determine how long it took to induce paralysis and death in the worms [5].

Chemistrty of *Millingtonia hortensis:*
Roots: Lapachol, B-sitosterol and paulownia were isolated from the roots of Milligtonia.

Bark: From the heartwood and bark f-sitosterol was isolated. Bitter substances and tannins were also identified",

Leaves: From the leaves of *Millingtonia hortensis*, hispidulin was identified", Rutinoside A flavonoid dinatin together with bet carotene was reported.

Flowers: From the fresh flowers of *Millingtonia hortensis* isolation of a new glycoside (scutellarein-5-galactoside) and scutellare was observed. From the flowers of *Millingtonia hortensis* flavonoids scutellarein, hispidulin and scutellarein-5-glucuronide wer isolated". From the dried flowers of *Millingtonia hortensis* a flavonoid hispidulin was isolated by using TLC [1].

Pharmacological Activity:
Anti-helmintic Activity: The results revealed that all the extracts had significant anthelmintic effects,

but the ethyl acetate soluble fraction of the methanolic extracts showed particularly impressive results. This fraction proved to be more effective than the other extracts in causing paralysis and death of the worms. To provide a benchmark, albendazole was used as a standard reference drug, and distilled water was used as a control. The findings suggest that M. hortensis possesses substantial anthelmintic activity, particularly in the ethyl acetate fraction, which reinforces its value in traditional medicine and highlights its potential for therapeutic use [6].

Anti-inflammatory Activity: This plant shows significant anti-inflammatory potential. The aqueous extract of its leaves, prepared by cold maceration, contains compounds such as alkaloids, flavonoids, carbohydrates, and phenols. This extract has proven to be highly effective in reducing inflammation, surpassing the standard drug ibuprofen. Inflammation is a critical biological response to injury or infection, often resulting in pain, swelling, and tissue damage. Chronic inflammation is linked to various health issues, including arthritis, diabetes mellitus, and cancer. The ability of *Millingtonia hortensis* to mitigate these inflammatory processes suggests its potential as a natural therapeutic option, providing an alternative or supplementary approach to conventional treatments for managing inflammatory conditions [7].

Antioxidant Activity: Recent investigations have explored the antioxidant potential of various stem extracts from this plant. The study employed qualitative phytochemical tests and evaluated antioxidant activity by assessing the scavenging effects on Nitric oxide (NO) radicals, Superoxide (SO) radicals, Hydrogen peroxide (OH) radicals, and anti-lipid peroxidation activity. Ascorbic acid served as a reference standard.

The results demonstrated that *M. hortensis* stems possess notable antioxidant properties, with the methanolic extract showing the most pronounced activity. These findings corroborate the traditional medicinal use of *M. hortensis* and suggest that its stems contain bioactive compounds with significant antioxidant effects. This review underscores the therapeutic potential of *M. hortensis* and highlights the need for further research into its bioactive constituents to fully elucidate their roles in antioxidant activity [8].

Anti- diabetic Activity: Diabetes is a chronic condition characterized by high blood glucose levels due to inadequate insulin production or impaired insulin action. Effective management often involves medications and lifestyle changes to control blood sugar levels and avoid complications.

In this context, the green synthesis of silver nanoparticles (AgNPs) using an ethanolic extract of *Millingtonia hortensis* leaves-rich in phenols and flavonoids shows promise. The synthesis process involves converting silver nitrate into AgNPs, which were characterized using FT-IR, particle size analysis, and zeta potential. FT-IR analysis confirmed the presence of various functional groups around the AgNPs, and particle size analysis verified their spherical, nano-sized form. A zeta potential of -14 mV indicates good stability due to particle repulsion. The AgNPs exhibited significant anti-diabetic properties, including effective inhibition of key carbohydrate-digesting enzymes (a-Amylase and a-glucosidase). This suggests that these green-synthesized nanoparticles could be a promising phyto-medicine for managing diabetes [9].

Anti fungal Activity: Research into *Millingtonia hortensis* extracts shows that the methanol extract stands out with impressive antifungal activity, outperforming fluconazole against Candida krusei and *Saccharomyces cerevisiae*, achieving minimal inhibitory concentrations (MIC) of 4 µg/ml and 2 µg/ml, respectively. The aqueous extract also shows strong results against these similar MIC values. On the other hand, chloroform and ethyl acetate extracts exhibit lower antifungal effectiveness overall, although they still manage to act against *Candida krusei*. None of the extracts perform as well against the filamentous fungus *Trichosporon cutaneum* compared to standard treatments. These findings highlight the promising potential of *Millingtonia hortensis* extracts, especially the methanol and aqueous varieties, as effective antifungal options deserving further investigation [10].

Antibacterial Activity: *Millingtonia hortensis*, commonly known as Tree Jasmine or Indian Cork

Tree, is native to Burma and the Malay Archipelago and is cultivated as an ornamental plant in various regions. The flowers, roots, and bark of this plant have medicinal uses. This study focuses on the volatile oil (VO) extracted from the flowers of plants grown in the Sultanate of Oman through hydro-distillation, which was analyzed using GC-MS. A total of 32 compounds were identified, accounting for 97.7% of the volatile oil. The primary components include 1-linalool (29.16%), q-farnesene (11.80%), nerolidol (11.34%), pentacosane (9.69%), 1-octen-3-ol (7.62%), (e)-isoeugenol (4.87%), a-terpineol (3.82%), linalool oxide (3.68%), heptacosane (3.03%), and trico [11].

Anti-arboviral: Theethonolic extracts derived from the stems and leaves of these plants were tested for their effectiveness against chikungunya zika, and marayo virus. These extracts underwent ultra effective liquid chromatography combined with mass spectrometer for detailed analysis. Hispidulin was effective in inhibiting the viral cytopathic effects of both MAYV, with an EC50 of 32.2 µM, and CHIKV, with an EC50 of 78.8 µM. The M. hortensis leaf extract exhibited anti-arboviral activity against all three viruses, with EC50 values ranging from 37.8 to 134.1 µg/mL, while the O. indicum stem extract showed an EC50 range of 18.6 to 55.9 µg/mL. Through LC-DAD-ESI-MS/MS analysis, we identified and confirmed the presence of 25 distinct flavonoids [12].

Hepatoprotective Activity: Phytochemical screening was performed to quantify total phenol and flavonoid contents. Thirty adult Wistar rats were divided into five experimental groups. The control group was treated with a vehicle, while the second group received only CC14 (1 ml/kg body weight, intraperitoneally). The remaining groups were administered the ethanolic extract of *M. hortensis* flowers at two dosage levels (200 and 400 mg/kg) and Curcumin (100 mg/kg) as a reference standard, orally for 8 days, followed by a single dose of CC14 on the 8th day. Blood samples were taken 48 hours later for serum biochemical assays, and liver homogenates were analyzed for levels of lipid peroxides, glutathione, superoxide dismutase, catalase, and total protein. Histopathological evaluations of hepatic tissue were also performed [13].

Anti-proliferative: *Millingtonia hortensis Linn.*f. (Bignoniaceae) was authenticated by Dr. ChusieTrisonthi from the Department of Biology at Chiang Mai University. The bark of *M. hortensis* was first dried in a hot air oven and then ground into a fine powder. A 100-gram sample of this powder was subjected to extraction with 1,000 mL of either distilled water or 80% ethanol, with stirring for 4 hours. The supernatant from the ethanol extraction was filtered directly through Whatman No. 1 filter paper, whereas the supernatant from the water extraction was first centrifuged at 3,500 rpm for 15 minutes at 4°C before filtering. The filtrates were concentrated using a rotary evaporator at 60°C and then lyophilized to dryness. The resulting residues were dissolved in culture medium to prepare a stock solution with a concentration of 20 mg/ml, and the stock extracts were sterilized using membrane. um Millipore filters.

Anti- fertility Activity: Despite technological advancements, India's growing population poses significant challenges in meeting basic needs, particularly for the poor. Medicinal plant extracts offer a promising approach to addressing population control through contraceptive therapy. In this context, *Millingtonia hortensis* extracts have shown potential antifertility activity in male albino rats. Administration of methanol and aqueous extracts resulted in decreased sperm count and motility, altered serum lipid profiles and liver enzymes, and degenerative changes in testis tissue. These findings suggest that *Millingtonia hortensis* extracts may be a useful natural remedy for population control. However, further research is needed to fully understand its antifertility activity and potential applications. This study contributes to the growing body of research on medicinal plants as potential contraceptive agents, highlighting the importance of exploring natural remedies for reproductive health.

Cardioprotective: The bark of *M. hortensis* was dried in a hot air oven and ground to a power. One hundred grams of the powder was extracted with 1,000 mL of distilled water or 80% ethanol by stirring for 4 hours. Then, the supernatants from the ethanol extraction were directly filtered through Whatman filter paper number 1, while the supernatants from the water ex- traction were

centrifuged at 3,500 rpm for 15 min at 4 µC, before filtering. The filtrates were evaporated using a rotating evaporator (60 µC) followed by lyophilization until dry. The resi- dues were dissolved in cultured medium to get a stock solution of 20 mg/mL. The stock extracts were sterilized by Millipore filter membrane 0.22 µm [17].

Anti-mutagenicity: Hispidulin and hortensin, flavonoids from *Millingtonia hortensis*. (Bignoniaceae), were examined for mutagenic activity using the Salmonella/microsome preincubation assay. At 100 µg/plate, neither compound exhibited mutagenic or cytotoxic effects in S. typhimurium strains TA98 and TA100, with or without the S9 mix. Mutagenicity refers to the ability of a substance to induce mutations in the DNA of an organism, potentially leading to genetic damage or cancer. Both flavonoids demonstrated antimutagenic properties by inhibiting the mutagenic effects of indirect mutagens such as 2-aminoanthracene, aflatoxin B1 (in TA98), and dimethylnitrosamine (in TA100). However, they did not affect the direct mutagenic activity of 2-(2-furyl)-3-(5-nitro-2-furyl) acrylamide or sodium azide, which are known to cause mutations through direct interaction with DNA. These findings suggest that while hispidulin and hortensin do not cause mutations themselves, they may have a protective effect against certain types of mutagenic agents [17].

Anti pyretic: The investigation into the antipyretic properties of the aqueous extract of *Millingtonia hortensis Linn*. stem bark revealed noteworthy results. Using the Yeast-induced Hyperthermia model, the extract was tested at dosages of 200 mg/kg and 400 mg/kg, and both doses exhibited significant antipyretic effects. The efficacy of the extract was found to be dose-dependent and comparable to the standard antipyretic, paracetamol, administered at 150 mg/kg body weight. These results suggest that the aqueous extract of *Millingtonia hortensis* holds substantial promise as an effective treatment for fever, potentially offering a natural alternative to conventional antipyretics. Further research focusing on isolating and characterizing the bioactive compounds within the extract could pave the way for the development of an innovative and cost-effective herbal remedy for fever reduction [18].

Larvicidal Activities: Mosquito-borne diseases are significant health issues in both developing and developed countries. Larviciding is an effective method to reduce mosquito populations in their breeding sites before they develop into adults. This study investigates the larvicidal activity of the aqueous extract of *Millingtonia hortensis* Linn. F stem bark. The extract was tested against 3rd and 4th instar larvae of Aedes aegypti at concentrations of 100 µg/ml, 250 µg/ml, 500 µg/ml, 750 µg/ml, and 1000 µg/ml over a 24-hour period. Results showed that the extract had limited larvicidal activity, with a maximum efficacy of 31.66% at the highest concentration after 24 hours, indicating that the aqueous extract of *Millingtonia hortensis* L. F stem bark is not an effective larvicidal agent [19].

Anti-hypertensive: "The 70% ethanolic extract *of M. hortensis* was chromatographed on a silica gel column using a PE-EtOAc (9:1) solvent system, and occasionally subjected to PTLC on a silica gel layer with a PE-EtOAc mixture. This process yielded several compounds, including β-sitosterol-stigmasterol (3:1) at 0.162%, acacetin at 0.36%, 7-methoxy-4,6,8-trihydroxyisoflavone at 0.08%, and 7'-carboxy-6,8-dihydroxy-4-methoxyisoflavone at 0.04%. Notably, this may represent the first report of these flavonoids in *M. hortensis*. The structures of the isolated compounds were elucidated using UV, FT-IR, ^1H-NMR, and mass spectroscopic methods [20].

CONCLUSION: *Millingtonia hortensis*, commonly known as the Indian Cork Tree, Tree Jasmine, or Akash Neem, is a plant of considerable medicinal significance, offering a wide spectrum of pharmacological activities. The plant is rich in bioactive compounds, including flavonoids, alkaloids, terpenoids, and glycosides, which are the foundation of its therapeutic potential. Extensive research has revealed that *M. hortensis* exhibits a remarkable range of biological activities, such as anti-helminthic, anti-inflammatory, antioxidant, antidiabetic, antifungal, antibacterial, antiviral, hepatoprotective, antiproliferative, antifertility, cardioprotective, antipyretic, larvicidal, and antihypertensive effects. These diverse pharmacological properties not only validate its traditional uses but also position M. hortensis as a promising candidate for the development of novel therapeutic agents.

Despite the promising potential of *Millingtonia hortensis*, there is still a need for more comprehensive research to fully explore its medicinal applications. Future studies should focus on the isolation and characterization of individual compounds, understanding their precise mechanisms of action, and conducting clinical trials to confirm their efficacy and safety in humans. As the demand for natural and plant-based therapies continues to grow globally, *Millingtonia horteis* presents a valuable opportunity for the discovery of new treatments. Its extensive pharmacological profile highlights its potential to contribute significantly to modern medicine, making it a crucial subject for continued research and exploration in the development of future pharmaceutical interventions.

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