CHAPTER 07

Indian Ash Tree [*Lannea coromandelica* (Houtt.) Merr.]

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ABSTRACT

Lannea coromandelica, commonly known as the Indian Ash Tree, belongs to the family Anacardiaceae, is a large deciduous tree widely distributed in tropical and subtropical regions of India and Southeast Asia. It has been traditionally used in indigenous systems of medicine for the treatment of inflammation, wounds, diarrhoea, dysentery, and liver disorders. Phytochemical investigations have revealed the presence of diverse bioactive constituents such as flavonoids, tannins, saponins, polyphenols, steroids, and phenolic acids, including quercetin, gallic acid, catechin, and β-sitosterol. Pharmacological studies have demonstrated that extracts of different parts of *L. coromandelica* exhibit antioxidant, anti-inflammatory, antimicrobial, hepatoprotective, antidiabetic, gastroprotective, wound-healing, and anticancer activities. The scientific evidence supports the traditional uses of *L. coromandelica* and highlights its potential as a source of natural therapeutic agents for oxidative stress and inflammation-related disorders. This chapter highlights the traditional ethnomedicinal uses of *L. coromandelica*, along with its pharmacology, phytochemistry.

KEYWORDS: Indian ash tree, ethnomedicine, phytochemicals, pharmacological potentials

INTRODUCTION

Lannea A. Rich. ex Guill., is an important genus of flowering plants belonging to the family Anacardiaceae, a large botanical family comprising about 81 genera and 800 species distributed across tropical and subtropical regions with warm or temperate climates, including tropical and southern Africa, the Arabian Peninsula, India, China, and Indochina (Malu et al. 2024). In addition to their traditional medicinal significance, several members of this family, such as *Anacardium occidentale* and *Mangifera indica*, possess high economic value. Their fruits and seeds are widely used as food and in the manufacture of beverages, contributing substantially to local livelihoods and national economies as renewable forest resources and tradeable products (Jahurul et al. 2015). Species of *Lannea* are generally trees, shrubs, or dioecious subshrubs reaching up to 15 meters in height. They exhibit notable morphological diversity and occur mainly in tropical and subtropical regions of Africa and Asia. The genus is characterized by imparipinnate leaves with opposite, entire leaflets, and a terminal panicle or raceme inflorescence. Most species are deciduous, thriving in humid, arid, and dry habitats, but are rarely found in deserts or at elevations above 3500 meters (Cevallos-Ferriz 2005). Among the species, *Lannea coromandelica* (Houtt.) Merr., commonly known as the Indian Ash Tree, is particularly noteworthy. It is a deciduous tropical tree distributed throughout India, Bangladesh, and other parts of tropical Asia (Kumar et al. 2015). In Sanskrit, it is known as Jhingini, and regionally referred to as Moya, Wodier, Mohin, Mai or Gudau. The species grows well in lowland and hill forests at elevations of 100–1800 m, occurring naturally across India, Nepal, Bhutan, Myanmar, and Sri Lanka, and is also cultivated and naturalized in several parts of Southeast Asia, including Cambodia, Laos, Malaysia, Thailand, and Vietnam (Zhou et al. 2021). Traditionally, *L. coromandelica* is recognized for its medicinal importance and is widely used in folk medicine for the treatment of various ailments (Gunjal et al. 2021; Kaur et al. 2013). Beyond its therapeutic value, the plant holds significant economic importance, as its leaves, bark, and seeds are utilized for diverse purposes in local and traditional practices (Kumar et al. 2022). It exhibits diverse pharmacological properties, including anti-inflammatory, antioxidant, antimicrobial, hepatoprotective, and antidiabetic activities. These effects are attributed to its rich phytochemical profile containing flavonoids, tannins, alkaloids, and phenolic compounds (Kaur et al. 2013). Considering the significance of this tree species, this chapter aims to highlight its ecological and medicinal values and emphasize the need for its conservation.

MORPHOLOGY

L. coromandelica is a large deciduous tree that grows up to 15–20 m in height, with a thick trunk and whitish to grey bark that exfoliates in irregular, rounded plates. The bark is smooth to the touch and flakes off in small pieces when dry. Leaves are imparipinnate, 25–45 cm long, and crowded at the ends of branches, bearing 3–7 pairs of elliptic-oblong or ovate-elliptic leaflets. The flowers are yellowish-green, appearing in cymose fascicles when the tree is leafless. The fruit is a reniform drupe, red when ripe, containing a single compressed seed. A mucilaginous gum known as Jhingan gum exudes from wounds and cracks in the bark, yellowish-white when fresh and turning brown to black upon drying (Kaur et al. 2013). The species flowers and fruits from January to July (Rahman et al. 2016; Figure 1).

TRADITIONAL MEDICINAL USES

L. coromandelica is an important medicinal and multipurpose species extensively used in traditional medicine systems such as Ayurveda, Siddha, and folk medicine by tribal communities of India, Bangladesh, and neighbouring countries.

Leaves: The leaves of *L. coromandelica* are used in traditional medicine for treating lipoma, ulcers, cancer, skin diseases, blood dysentery, scurvy, and inflammation (Rahman et al. 2016). Boiled leaves are applied externally to relieve local swelling, sprains, bruises, and body pain (Merlin Franco and Narasimhan 2009; Rai et al. 2010). Leaf juice is also used to treat ulcers and toothache, and as an antidote in coma caused by narcotics in Goa. In Bangladesh, the leaves are administered for pain, inflammation, and infectious diseases. The leaves are considered astringent and are also fed to livestock to relieve inflammatory and digestive problems. In some regions, young leaves and sprouts are eaten raw or cooked as a vegetable or consumed as lalab (a salad served with sambal and rice (Mia et al. 2009). In Odisha, tribal groups use tender leaves and roots to relieve stomach disorders and abdominal pain (Merlin Franco and Narasimhan 2009). On Sriharikota Island in Andhra Pradesh, the local name Gumphini refers to the same species, whose leaf juice is taken orally for ulcers, bark paste applied for body pains, and wood used to make agricultural tools (Gunjal et al. 2021).

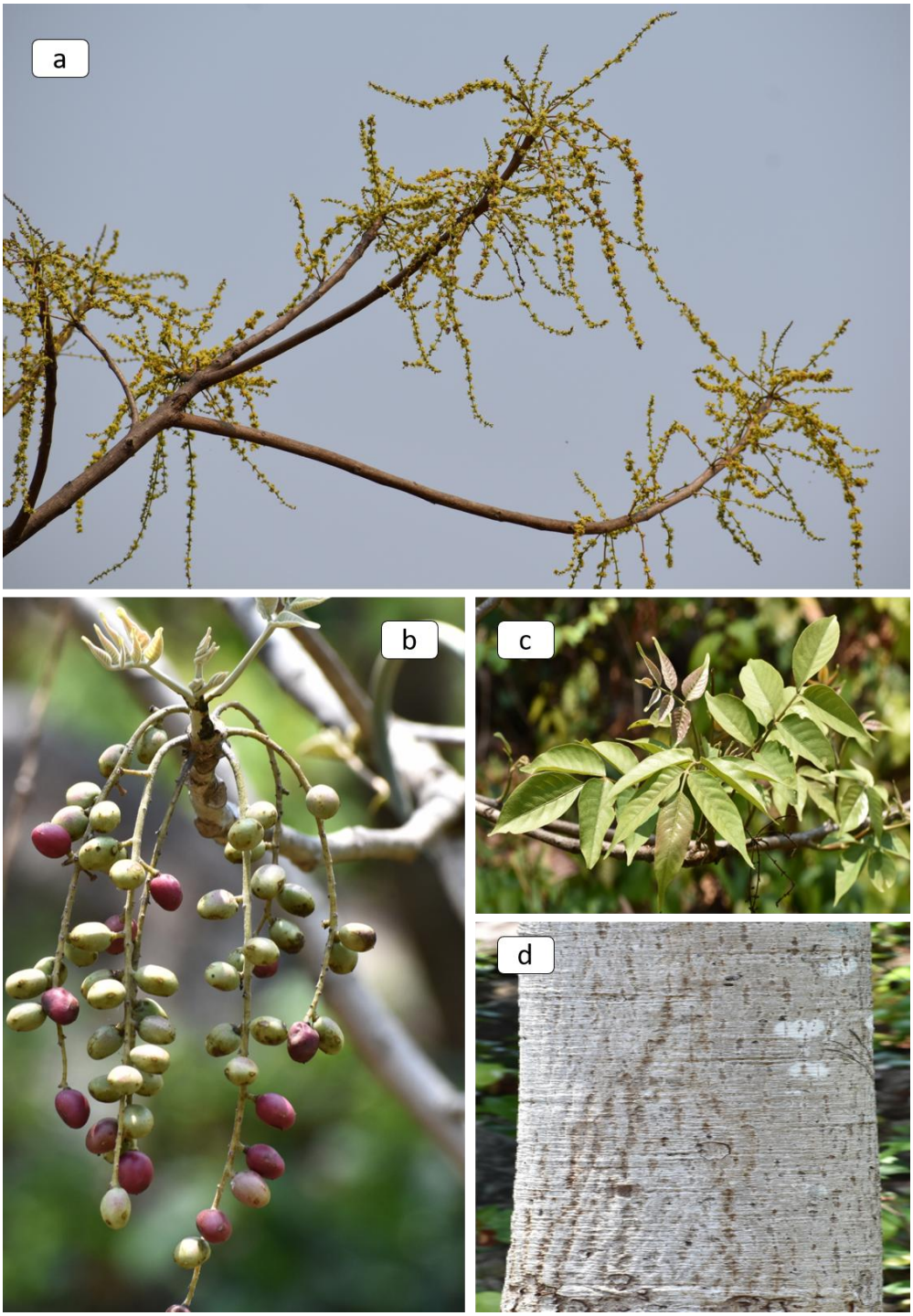

Figure 1: Vegetative parts of *L. coromandelica*; a) Flowers, b) Fruits, c) Leaves, d) Bark

Bark: The bark of *L. coromandelica* is one of its most valued parts. It is used as an astringent, stomachic, and antiseptic in treating ulcers, dysentery, diarrhea, skin eruptions, leprosy, heart diseases, gout, toothache, and mouth sores (Zhenga et al. 2009). Decoctions are used as a gargle for aphthae and toothache, while the powdered bark is employed as a tooth powder and flavoring agent. The bark contains tannins, useful in fishnet impregnation and tanning. Its paste and lotion are applied to cuts, wounds, burns, ulcers, and leprous eruptions, and the crushed extract is used to cure stomach pain and dysentery (Dinesh and Sharma 2010; Ramadhan et al. 2022). In Goa, known locally as Moi, the bark is used for tanning leather, and medicinally as an antidote for narcotic-induced coma, and for treating dyspepsia, gout, leprosy, sprains, and bruises (Gunjal et al. 2021). Among the Lambada tribes of Nizamabad, Andhra Pradesh, the bark is tied as a bandage over bone fractures and employed in the treatment of impotency. Similarly, in Bangladesh, the Garo tribes use the stem bark (Jiga bark) for treating seminal weakness and excessive seminal emissions (Vijigiri and Sharma 2010). In Odisha, tribal groups such as the Kondh, Poraja, Gadaba, and Bonda communities recognize the species under local names like Kanbeli marnu, Paalkaara, and Pithmari. The twigs are used as natural toothbrushes; the bark is applied for skin diseases (Merlin Franco and Narasimhan 2009).

Roots: The roots are used traditionally for stomach ache by the Paraja and Gadaba tribes of Odisha, often consumed in brew form (Merlin Franco and Narasimhan 2009). In Bangladesh, root decoctions are used for seminal weakness and excessive seminal emission (Mia et al. 2009).

Fruits: The fruits are edible and have both therapeutic and practical uses. They are used in the treatment of fish poisoning (Heda Nilesh et al., 2009) and as a remedy for bone fractures by tribal communities in the Eastern Ghats, Andhra Pradesh (Venkata et al. 2010). In some regions, fruit paste is also applied externally to promote bone healing. In Maharashtra, among the Gond tribes of Gadchiroli district, the fruits, locally called Gopid, are crushed and mixed with water to serve as a fish poison (Kamalkishor and Kulkarni 2009).

Gum: The gum exuded from the trunk is widely used in confectionery and traditional medicine. In Rajasthan, it is soaked in water, rubbed on a stone, and applied locally to relieve pain. In Rajasthan, it is called Jingini, the gum is mixed with water and applied locally to relieve pain, while the inner bark juice is squeezed over fresh cuts to stop bleeding and prevent tetanus (Swathi and Lakshman 2022).

BIOACTIVE COMPOUNDS

Every part of *L. coromandelica* is rich in bioactive compounds responsible for its pharmacological activities (Figure 2).

Bark: Several bioactive compounds have been isolated from the bark of *L. coromandelica*. These include quercetin, (2S,3S,4R,10E)-2-[2'R)-2'-hydroxytetracosanoyl amino]-10-octadecene-1,3,4-triol, aralia cerebroside, 5,5'-dibuthoxy-2,2'-bifuran, β-sitosteryl-3β-glucopyranoside-6'-O-palmitate, β-sitosterol palmitate, myricadiol, protocatechuic acid, *p*-hydroxy benzoic acid ethyl ester, isovanillin, trans-cinnamic acid, palmitic acid, and stearic acid. High-Performance Liquid Chromatography (HPLC) analysis has revealed the presence of gallic acid, (-)-epigallocatechin-3-gallate, catechin, chlorogenic acid, and caffeic acid in the bark extract (Sathish et al. 2010). Furthermore, bioassay-guided fractionation and MALDI-TOF-MS characterization identified angular-type polyflavonoid tannins as the active constituents responsible for zoosporicidal activity (Iqbal and Jariah 2025). Based on its traditional medicinal applications, the bark extract exhibits notable antioxidant potential, as confirmed by preliminary phytochemical and in vitro antioxidant studies (Selvaraj 2015). Additional studies have reported the presence of phlobatannin, leucocyanidin, β-sitosterol, physcion, and physcion anthranol B from the bark (Sathish et al. 2010).

Leaves: Phytochemical investigations on the leaves of *L. coromandelica* have led to the isolation of several flavonoids and polyphenolic compounds such as quercetin-3-O-arabinoside, ellagic acid, rutin, quercetin, and 6,6-dimethyl-[2,3:7,6]-pyrano-8-(γ,γ-dimethylallyl)flavanone (Agarwal and Arora 2024). The leaves, traditionally known as *Tammate* in some regions, are rich in flavonoids, polyphenols, saponins, tannins, and steroids—phytoconstituents associated with strong antioxidant, antimicrobial, anti-inflammatory, and immunomodulatory activities (Mangla et al. 2021; Sathish et al. 2010; Iqbal and Jariah 2025).

Flowers: From the flowers of *L. coromandelica*, flavonoid derivatives such as lanceolatin-B and 7,2'-dimethoxy-4',5'-methylenedioxyflavone have been isolated (Mangla et al. 2021).

Roots: Phytochemical screening of the roots of *L. coromandelica* revealed the presence of a ferulic acid ester (Iqbal and Jariah 2025). This compound is recognised for its antioxidant and potential antimicrobial properties, which support the traditional use of root preparations in indigenous medicine.

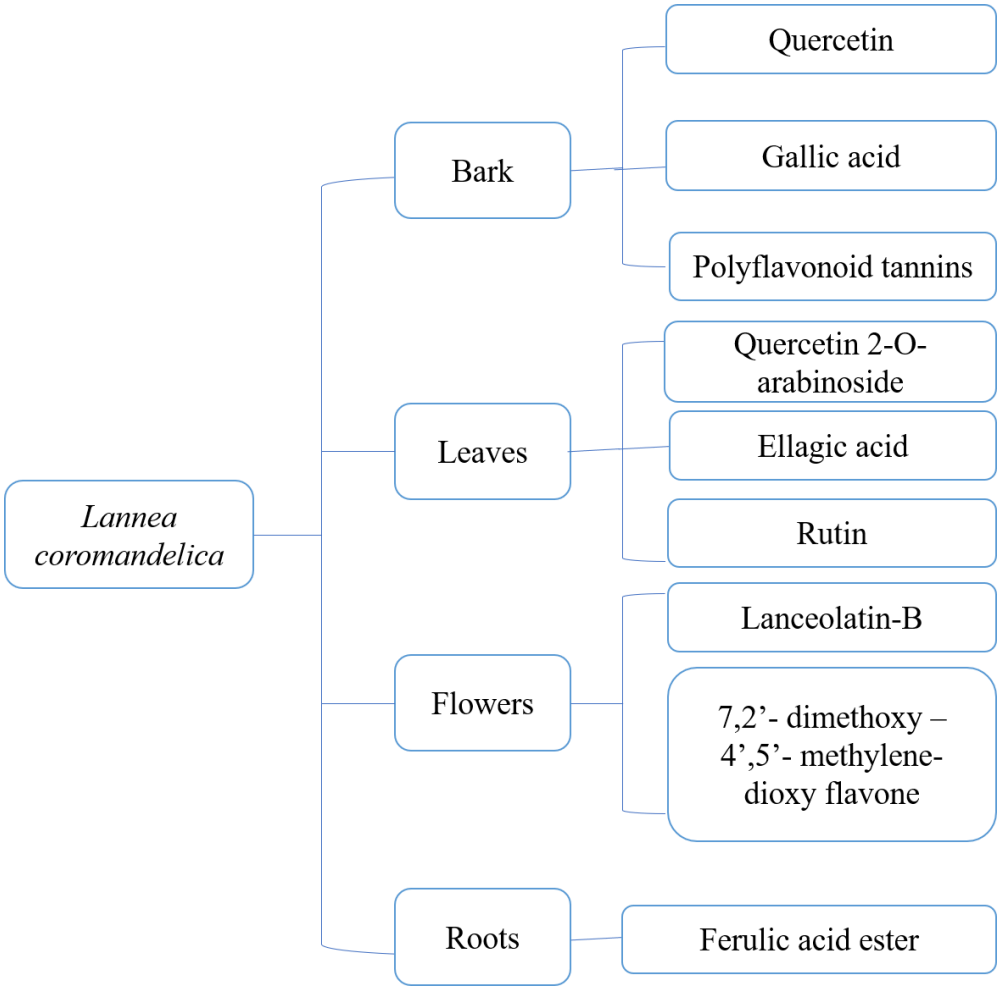

Figure 2: Bioactive compounds found in *L. coromandelica*

PHARMACOLOGICAL USES

Antioxidant activity: Extracts of *L. coromandelica* bark and leaves exhibit strong antioxidant potential due to the presence of polyphenols, flavonoids, tannins, and phenolic acids such as gallic acid, catechin, chlorogenic acid, and caffeic acid. These compounds help scavenge free radicals and protect cells from oxidative stress (Malu et al. 2024).

Anti-inflammatory and analgesic activity: The bark and leaf extracts have demonstrated significant anti-inflammatory and analgesic properties. The bioactive constituents, particularly flavonoids, saponins, and sterols, reduce inflammation by inhibiting prostaglandin synthesis and other inflammatory mediators (Alam et al. 2012).

Antimicrobial activity: Ethanolic and methanolic extracts of *L. coromandelica* have shown antibacterial and antifungal activity against pathogens such as *Staphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa*, and *Candida albicans*. This activity is attributed to the presence of tannins, saponins, and phenolic compounds that disrupt microbial cell walls (Ha et al. 2024).

Hepatoprotective activity: Bark extracts have been reported to protect the liver against chemically induced hepatotoxicity by stabilizing cell membranes and enhancing antioxidant enzyme activity. This supports its traditional use in treating liver ailments (Malu et al. 2024).

Antidiarrheal activity: Methanol and aqueous extracts of the bark have shown activity against castor oil–induced diarrhea in animal models. The astringent tannins and flavonoids help reduce intestinal motility and fluid secretion, supporting traditional use for gastrointestinal disorders (Majumder et al. 2013).

Antidiabetic activity: Studies indicate that *Lannea coromandelica* bark and leaf extracts can lower blood glucose levels by improving insulin sensitivity and inhibiting carbohydrate-metabolizing enzymes. This effect is likely due to polyphenolic compounds such as catechin and gallic acid (Ha et al. 2024).

Wound-healing effects: Topical application of bark extracts promotes wound contraction and epithelialization. The antimicrobial and antioxidant activities contribute to faster healing of cuts, burns, and ulcers (Ramadhan et al. 2022).

CONCLUSION

The comprehensive evaluation of *L. coromandelica* confirms its significant pharmacological potential, validating many of its traditional medicinal applications. The presence of diverse secondary metabolites, particularly flavonoids, polyphenols, tannins, and sterols, accounts for its broad spectrum of biological activities. Among its pharmacological effects, the antioxidant, anti-inflammatory, hepatoprotective, and antimicrobial properties are most pronounced, indicating possible use in managing oxidative stress, infections, and liver-related ailments. Despite promising findings, further studies focusing on isolation of active compounds, elucidation of molecular mechanisms, and clinical validation are essential to establish *L. coromandelica* as a standardized herbal drug. The species is thus significant as a valuable natural resource for the development of safe and effective phytotherapeutics.

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