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Casearia tomentosa Roxb: A comprehensive review on botany, traditional uses, phytochemistry and pharmacology

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Abstract

Casearia tomentosa is a member of the Salicaceae family, which is also known as Chilla. Different portions of *Casearia tomentosa* have traditionally been used to treat ulcers, dropsy, fissures, malarial fever, tonsillitis pain, wounds, and plaster. This plant's extract indicated the presence of alkaloids, flavonoids, carbohydrates, glycosides, protein, steroids, phytosterol, terpenoids, lipids, and oils. The leaves have been shown to be a natural source of antioxidants, antidiabetic, and antibacterial properties. The available information was gathered from scientific databases using a keyword search in "Google Scholar," "Pub med," "Science direct," "Springer Link," "Wiley" and "Sci finder". Moreover, books were recommended for plant data and synthetic structure. Nonetheless, pharmacological information is very restricted. Subsequently, the point of this review is to give an extensive information of the botany, phytochemistry and pharmacology of *Casearia tomentosa* and to feature the holes in our insight for future exploration openings.

Keywords: *Casearia tomentosa*, traditional uses, phytochemistry, pharmacology

1. Introduction

Medicinal plants are thought to be a rich source of components for medication discovery and synthesis. Aside from that, these plants are important in the evolution of human cultures all over the world. The Indian subcontinent contains a vast range of habitats with a diverse range of plant species. There are around 17,000 species of higher plants, of which 8,000 are considered medicinal and utilized by village populations, notably tribal tribes, or in traditional medical systems like Ayurveda. UNESCO has documented the widespread use of traditional medicine and medicinal plants in most developing nations as a foundation for maintaining good health^[1].

Casearia tomentosa Roxb. Is a member of the Salicaceae family, which is often known as the coffee plum family. There are 90 genera and 1,000 species in the family, including three genera and five species found in Pakistan. Chilla is the native name for *Casearia tomentosa*. It is a small to medium-sized tree that may be found in Pakistan's hilly regions, as well as India, Malaysia, and North Australia^[2]. Different portions of *Casearia tomentosa* have traditionally been used to treat ulcers, dropsy, fissures, abdominal colic discomfort, malarial fever, tonsillitis pain, wounds, and severe bone fractures as a plaster^[3; 4; 5]. The fruit juice of *Casearia tomentosa* is used to cure seafood poisoning, while a decoction of the boiling water extract of the root bark is taken to treat diabetes. Ringworm is treated with stem bark juice. Externally, the bark juice is used to cure dropsy and snake bites. The fruit's pulp has diuretic effects^[6]. *Casearia tomentosa* is an understudied plant with a wide range of traditional applications. This article summarizes the findings of a thorough research of secondary metabolites, total phenolic content, and biological activities such as antioxidant, antidiabetic, and antibacterial, in order to offer reliable scientific information about the plant *Casearia tomentosa*.

As a result, the goal of this study is to offer a complete overview of *Casearia tomentosa*'s botany, phytochemistry, and pharmacology, as well as to highlight information gaps for future research.

2. Taxonomical Classification

Kingdom: Plantae

Phylum: Tracheophyta
Class: Equisetopsida
Order: Malpighiales Juss.
Family: Salicaceae
Genus: *Casearia*
Species: *Casearia tomentosa* Roxb.

3. Synonyms

Anavinga lanceolata Lam.
Bedousia malabarica Dennst.
Casearia ovata Roxb.
Guidonia tomentosa Roxb.
Casearia elliptica Willd.
Casearia pauciflora Royle

4. Vernacular Names

English: Toothed Leaf Chilla
Bangladesh: Bhari, Chilla, Maun
Pakistan: Chilla
Hindi: Chilla, Churcha
Nepali: Sonne betha
Tamil: Kottukkuvai, Kakoli, Kodichai [6].

5. Description

Casearia tomentosa is a deciduous tree with a short trunk. It may reach a height of 7-8 meters. All portions of the plant are bitter, and the branches are spreading. The leaves are serrated, elliptic-oblong, and oblique at the base. The stem is 6-12 mm long and the leaves are 5-12 cm long. The hairy midrib and stalks of fully developed leaves. Flowers are velvety, greenish-yellow, regular bisexual, and thickly grouped on scaly axillary tubercles, measuring 8 mm wide. There are no petals. The average number of sepals is five. Stamens generally number eight and are alternated with short hair-like staminodes. The fruit has six ribs, three valves, and seeds buried in a crimson flesh. Fish poison is made from the fruit's juice. Combs may be made from the wood. March-May are the months when the flowers bloom [7].



Fig 1: *Casearia tomentosa* Roxb

6. Geographic Range

6.1 Distribution

Global Distribution

Asia: India, Nepal, Pakistan, Sri Lanka.

Local Distribution

Andaman and Nicobar Islands, Andhra Pradesh, Jammu and Kashmir, Karnataka, Kerala, Maharashtra.

6.2 Habitat

Dry deciduous forests to scrubs, altitude up to 900 m. [6].

7. Traditional Uses

It has a long history of traditional applications, including diabetes, skin disorders, gastric ulcers, and malarial fever, according to literature [3]. When fruit juice or powder is added to water, it acts as a fish toxin and kills the fish. Root bark decoction is used to treat diabetes. Its use of stem bark juice aids in the healing of ring worm. Bark juice is used to treat snake bites. In the case of oedema, bark juice is administered externally. *Casearia tomentosa* is also listed as a source of antidotes for snake bites in a review of medicinal plants used in the treatment of local tissue damage caused by snake venom, from traditional use to pharmacological proof [8].

8. Phytochemical Constituents

The phytochemical screening and various pharmacological properties of several extracts of the leaves of the plant *Casearia tomentosa* were examined in this study. Alkaloids, flavonoids, carbohydrates, glycosides, protein, and other phytochemicals are found in *Casearia tomentosa* leaves [9]. Preliminary phytochemical analysis of this plant's extract indicated the presence of active phytoconstituents such as steroids, phytosterol, terpenoids, fats and oils, and other phytoconstituents. Terpenoids are one of the most common and chemically varied classes of natural compounds [10]. Plant-derived terpenoids have been shown to have antioxidant, anticancer, anti-inflammatory, sedative, and cytotoxic properties. Plant steroids, often known as "cardiac glycosides," are one of the most commonly found phytoconstituents in plants, and several studies have supported their use as heart medicines and antioxidants [11]. Aside from phytosterols, this plant extract also included flavonoids, which are responsible for antioxidant action. Various studies show that plant-fixed oil has a wide range of biological activities, including cytotoxic and antioxidant properties [12]. GC-MS Analysis of leaves oil. This study revealed 13 chemical entities that accounted for 77.62 percent of the overall oil composition. Terpenoids, diterpenoids, sesquiterpenoids, fatty acid esters, hydrocarbons, and other compounds make up leaves essential oil. The oil is mainly composed of 9,12-Octadecadienoic acid, ethyl ester (31.45%) followed of the 9,12,15-Octadecatrienoic acid, ethyl ester (20.11%), Phytol (10.70%), Di-epi-alpha-cedrene (3.74%), Betabisabolene (1.87%), β -Caryophyllene (0.83%) and some other trace components [13].

9. Pharmacological Activities

A study of the antioxidant activity of the leaves of the *Casearia tomentosa* plant revealed that it had a high antioxidant property [10]. Different extracts of the leaves of the plant *Casearia tomentosa* have been found to be a possible natural source of antioxidant, antidiabetic, and antibacterial agents in the current investigation [9]. The goal of this study is to see if *Casearia tomentosa* Roxb's bark and leaf extracts have antibacterial and antioxidant properties. The extracts have good to satisfactory antimicrobial properties, with methanolic leaf extract having a maximum bactericidal potential of 37 3.03 mm in an agar-well diffusion experiment against *E. coli* and 0.013 0.05 (at 0.9 mg/L) in an agar-well diffusion assay against *B. subtilis* by broth-dilution (MIC) analysis. Methanolic leaf extract also has antifungal activity against *F. solani*, with a value of 34.5 4.59 mm, and *A. oryzae*, with a MIC of 0.010 0.001 (at 0.9 mg/L). The bark

petroleum-ether extract had a radical scavenging potential of 92.5 0.03 percent, while the chloroform extract of the leaf had an IC₅₀ of 10.77 1.02 g/mL. TAA (maximum at 1.131 0.10 by bark methanolic extract), FRAP (highest at 296 0.23 by chloroform bark extraction), and TPC (peak at 86.16 0.08 GAE mg/mL of chloroform bark extract) are used to confirm the plant's antioxidant capabilities [14].

10. Acute Toxicity

Mice were used in an acute toxicity test, as described before. Mice were split into nine groups, with each group including six mice. 1 percent Tween 80 in normal saline was administered to Group 1. (2 ml per kg body weight). The remaining eight groups (Groups 2-9) were given 100, 200, 300, 600, 800, 1000, 2000, and 3000 mg of MECE per kg of body weight, respectively. For the following 8 hours, all animals were closely monitored for any behavioral abnormalities or death, and they were kept under close monitoring for the next two weeks. Even at the highest dose tested, the crude extract (MECE) showed no toxicity in mice. There were no behavioral changes, and no mortality was reported [15].

11. Conclusions

Casearia tomentosa is a medicinal herb with ethnopharmacological significance. Alkaloids, flavonoids, carbohydrates, glycosides, protein, steroids, phytosterol, terpenoids, lipids and oils, and other active phytoconstituents were found in this plant. The leaves of *Casearia tomentosa* have been shown to be a natural source of antioxidants, antidiabetic, and antibacterial agents. However, there is a scarcity of pharmacological information about this therapeutic herb. To discover the active chemicals and the underlying processes, more study is required. As a result, the goal of this study is to offer a complete overview of *Casearia tomentosa's* botany, phytochemistry, and pharmacology, as well as to highlight information gaps for future research.

12. Conflict of interest statement

We declare that we do not have any competing interests.

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