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Review Article

Traditional Applications, Phytochemical Profiling and Advanced Pharmacological Properties of Plant *Macaranga Peltata*

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ABSTRACT

Macaranga peltata (*M. peltata*) is a type of plant within the family Euphorbiaceae, and is known in Kannada as uppalige and chanda in Hindi. These plants are little bushes or trees that can grow as tall as 15 meters. These shrubs are very common in the Western Ghats of India. More than 350 species are included in the *Macaranga* genus. This genus is found in Africa, Australia, Asia, and the South Pacific Islands. The phytochemicals included in the plant, such as flavonoids, tannins, sucrose, steroid glycosides, saponins, proteins, and amino acids, play a significant role in its pharmacological effects. Ayurveda Unani, as well as other traditional medicine systems employ different parts of various plants like leaves, fruits, flowers, roots, or bark as a form of medicine. Plants extracts are capable of curing numerous diseases, such as wounds, hepatic issues, inflammation, and even microbial or bacterial infections both in India and other countries. Traditionally, the fruits of *Macaranga peltata* were thought to possess antibacterial properties, while the roots and bark were used for pole treatment, and the leaves were used to treat ulcers. The plant *Macaranga peltata* was tested to have antibacterial activity, anti-fungal activity, wound healing, anticancer activity, hepatoprotective activity, analgesic activity, antioxidant activity, and a cytotoxic activity when experimented on animal models. This review includes geographical distribution, phytochemical profile, traditional applications and advanced pharmacological uses of *Macaranga peltata* plant. Although it includes which part of plant and which chemical compound is used in the treatment of disease.

INTRODUCTION

All over the world, people have utilized herbs for treatment and medications. In plants, some specific constituents are responsible for the

medicinal effects. It is said that India is the world's botanical garden as this country is the highest producer of medicinal herbs. Because of their low side effects, therapeutic use of medicinal plants is

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gaining popularity, though the recovery time is prolonged¹. Ayurveda is one of the oldest medical systems known in India. The ayurvedic system considers the human body to be maintained by minerals, herbs, and animal origin products. The government of India has recently made many efforts towards creating information systems, monitoring scientific work, and designing systems aimed at conservation and use of medicinal herbs². Natural products have served a crucial purpose in the treatment and prevention of human diseases. The strong share of raw materials in pharmaceuticals comes from the variety of forms and intricate carbon backbones of natural products³. However, herbal supplements can work as either agonists or antagonists, and can enhance the effects of other medicinal therapies⁴. The *Macaranga* genus includes 250 species of plants that need light in order to grow in lowland forests within clearings and along riverbanks. In India and Sri Lanka, *M. peltata* has been observed to grow in large shaded open spaces and is known to be a disturbance tolerant keystone species⁵. This group of species belonging to the family Euphorbiaceae are shrubs or small trees reaching heights of up to 15 meters. The trees of this genus are beneficial because the ants attack or feed on herbivorous insects. In ancient times, the traditional medicine would treat swellings, cuts, sores, boils, and

bruises with the fresh or dried leaves of some *Macaranga* species. Flavonoids and stilbenes are the most important and actives constituents in this genus⁶. *Macaranga peltata* are commonly known as uppalige and podini in Kannada and Malayalam respectively. The plant grows beside roads in Mangalore and western Ghat forests and is traditionally used for the treatment of wounds. The phytochemical constituents are very important in the plant because they play a major role in the treatment or curing of any diseases in traditional and modern medicine. Phytochemical investigation confirmed the given information of the chemical entities and the role in the management of any ailment⁷



Fig. No. 1: *Macaranga Peltate* Tree

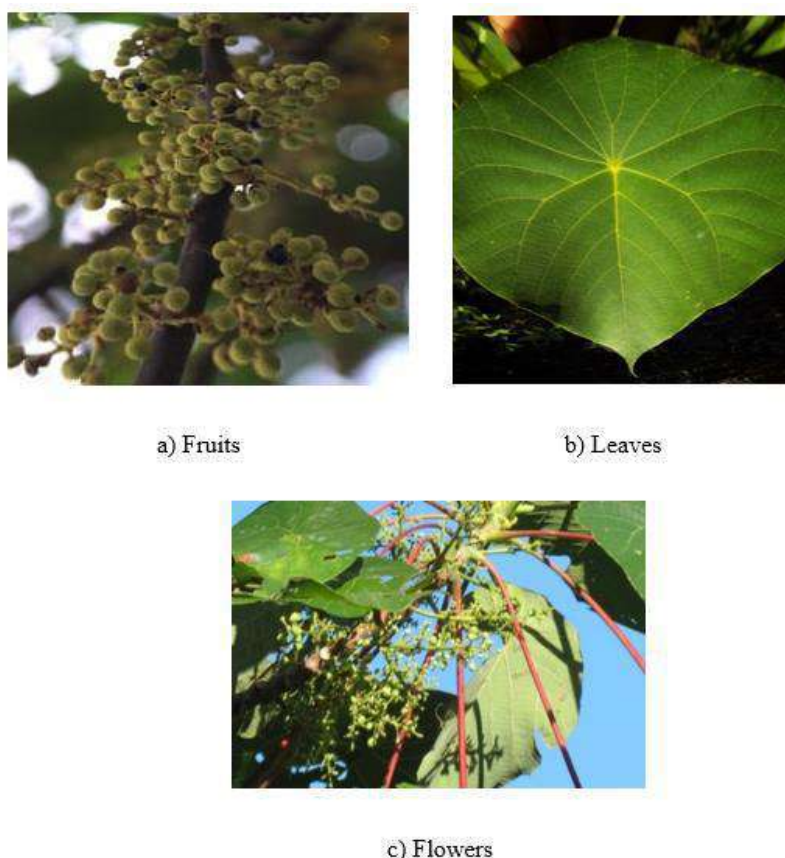


Fig. No. 2: Morphology of *Macaranga peltata* a) fruits b) leaves c) flowers.

Geographical Distribution:

Macaranga peltata, the most significant plant that is found abundantly in Western Ghats of India. *Macaranga peltata* which is a member of family Euphorbiaceae, is a genus of important pioneering trees found in south east Asia. *Macaranga* is a dicotyledon plant with more than 350 species. This genus *Macaranga* is found in countries like Africa, Australia, Asia and South Pacific. There are some evidences which indicates that bergenin derivatives and polyphenols are reported from the *Macaranga peltata* plant and some other flavonoids and diterpenes are also found in this plant⁸. *Macaranga* is one of the biggest genus of trees from the Old World rainforests. They are distributed all over Kerala. These plants are mostly small trees and are typical of secondary forest, although some are found under the canopy of tall

forest, yet most of them require direct sunlight and cannot live in shade⁹.

Vernacular Names¹⁰:

English	Macaranga
Hindi	Chandala
Tamil	Vattakanni
Kannada	Uppalige
Malayalam	Podini
Konkani	Chandado
Marathi	Chanda
Telugu	Boddi

Scientific Classification¹¹:

Kingdom	Plantae
Order	Malpighiales
Family	Euphorbiaceae
Genus	<i>Macaranga</i>
Species	<i>peltata</i>

Phytochemistry¹²:

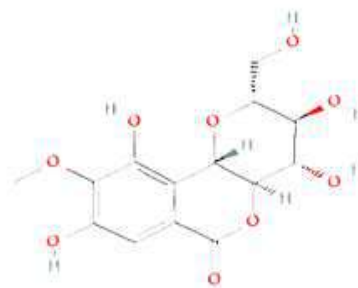


The leaf extract of *Macaranga peltata* proved the existence of carbohydrates, sterols, steroids, glycosides, flavonoids, tannins, proteins, and amino acids through chemical tests. The extract of stem bark gave a positive test for the presence of carbohydrates, glycosides, saponins, steroids, flavonoids, tannins, proteins, and amino acids. The leaves of *Macaranga peltata* have identifiable luteolin flavonoids within their rich phenolic compounds of flavonoids and tannins. The stem

bark of *Macaranga peltata* has steroids such as bergenin, β -sitoesterol, tri-O-methyl ether, and 8,10-di-O-methylether. The qualitative phytochemical analysis uncovered the presence of triterpenoids in the plant's leave extract. Some of the tannins contained in the leaves are Macatannin A, 4-O-galloylglucose, and 6-O-galloylglucose. Triterpenoid siaresinolic acid can be found in the roots of *Macaranga peltata*.



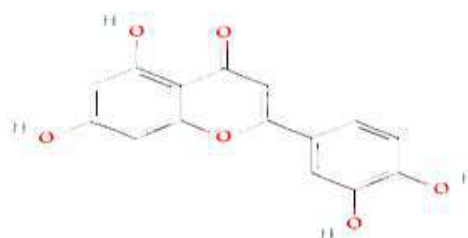
β -Sitosterol



Bergenin



Siaresinolic acid



Luteolin

The above structures Representative Chemical Structures of Phytoconstituents in *Macaranga peltata*.

Traditional Applications¹³:

Macaranga peltata has its plant profile well documented in traditional medicine materials especially Indian medicine. This plant has many ethnopharmacological uses. Different parts of the plants like stem bark, leaves, fruits, and roots are used traditionally for their medicinal values. The fruit of *Macaranga peltata* has shown the

existence of antibacterial properties towards *Escherichia coli*. The extracts from the roots and bark of *Macaranga peltata* are utilized for the treatment of piles. The bark and the leaves of this plants are used in the treatment of ulcer. Inflammation along with swellings, boils, bruises, sores, and even wounds are treated traditionally with these plants. Moreover, the extracts of the plant possess anti-plasmodia, anti-microbial, and inflammation antioxidant properties alongside other claimed pharmacological effects.

Therapeutic Activity:

Antibacterial Activity:

The fruit extract from the *Macaranga peltata* tree demonstrates antibacterial properties towards *E. coli*, *Proteus vulgaris*, and *klebsiella pneumoniae*. The leaf extract was noted for its unique ability to treat antimicrobial staphylococcal infections^{1,14}.

Antioxidant and cytotoxicity activity:

The leaves and stem bark of *Macaranga peltata* were found to contain antioxidant properties, and they were further investigated for their cytotoxic properties, demonstrating strong results for antioxidant activity¹⁵.

Hepatoprotective activity:

By lowering the levels of SGOT, SGPT, ALP, creatinine, urea, and cholesterol, methanolic extract of aerial components of *Macaranga peltata* exhibited hepatoprotection as described in reference¹⁶.

Anticancer activity:

Ethanollic extract of dried leaves of *Macaranga peltata* demonstrated anticancer effects on KB cell lines through inducing cytotoxicity and

genotoxicity. Thus, the leaf extracts can be considered as effective in treating oral cancer¹⁷.

Analgesic activity:

Using Eddy's Hot Plate method, dose dependent analgesic properties were demonstrated with ethanolic extracts of *Macaranga peltata* leaves. The phytochemical tests confirmed the presence of bioactive compounds responsible for analgesic and anti-inflammatory activity¹⁸.

Wound healing:

Macaranga peltata bark methanolic extract demonstrated antioxidant, antimicrobial, and wound healing activity in excision and incision wound models in rats¹⁹.

Anti-inflammatory activity:

Tender stem and leaf extract of *Macaranga peltata* show anti-inflammatory activity both in vivo and in vitro using albino Wistar rats. The phytochemical analysis suggests the flavonoids are the compounds with anti-inflammatory activity^{20,21}.

CONCLUSION:

The *Macaranga peltata* is one of the plant species which is known for its ethnomedicinal uses and has demonstrated phytochemical medicinal values for various pharmacological activities. The preliminary screening for phytochemical constituents such as carbohydrates, steroids, sterols, glycosides, flavonoids, tannins, and proteins and amino acids from the leaves, roots, and stem bark of the plant account for the aforementioned pharmacological activities. A brief summary of the pharmacological and phytochemical activities reveals the ancillaries of



the more sophisticated medicine and further investigation is warranted to establish the optimum doses and forms of treatment.

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