

Mimosa Pudica: A Plant of Medicinal and Ecological Significance

**Sowmya. K.L.¹, Mohammed
Asif Killedar² &
Ramalingappa. B***

^{1&2}Research Scholars,
Department of Microbiology,
Davangere University,
Shivagangotri, Davangere-
577007, Karnataka.

*Senior Professor, Department
of Microbiology, Davangere
University, Shivagangotri,
Davangere-577007, Karnataka.



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INTRODUCTION

Medicinal plants and their bioactive compounds are used worldwide to treat and prevent many diseases. Approximately 80% of people on the planet today are said to rely primarily on herbal remedies or medicinal plants for the management, prevention, and treatment of a variety of illnesses. The increasing popularity of herbal remedies over traditional therapies may be explained by the active ingredients' ability to act as natural therapeutic agents, as well as by their accessibility, affordability, and well-recognized non-toxic or diminished side effects. Additionally, in the past ten years, a number of researchers have become interested in medicinal plants and their bioactive compounds because of their potential to treat and prevent chronic and life-threatening conditions like stroke, diabetes, and cerebrovascular accidents.



Mimosa pudica, commonly known as the "sensitive plant" or "touch-me-not," is a perennial herbaceous plant belonging to the Fabaceae family, renowned for its unique ability to exhibit rapid movements in response to external stimuli.

Native to South and Central America, it has now spread to tropical and subtropical regions worldwide, thriving in various habitats, including grasslands, roadsides, and gardens.

The plant is distinguished by its delicate, feathery, bipinnate leaves that fold inward and droop when touched, shaken, or exposed to sudden environmental changes a phenomenon known as thigmonasty. This remarkable response, believed to be a defense mechanism against herbivores, is complemented by its nyctinastic movements, where the leaves close at night and reopen at dawn, demonstrating a diurnal rhythm controlled by its internal biological clock. *Mimosa pudica* is a creeping or trailing plant with small, spherical, pinkish-purple flowers that bloom in clusters and produce flat, bristly pods containing seeds. In traditional medicine, it is highly regarded for its therapeutic properties, with various plant parts used to treat ailments such as wounds, diarrhea, and inflammation due to their antimicrobial,

antioxidant, and anti-inflammatory effects. Furthermore, as a leguminous plant, it plays a significant ecological role in improving soil fertility through nitrogen fixation. Beyond its biological and ecological significance, *Mimosa pudica* has captivated scientists and the general public alike, serving as a model organism for studying plant movements, physiology, and adaptive mechanisms. *Mimosa pudica* has a variety of pharmacological properties, including hepatoprotective, anti-inflammatory, antimicrobial, wound healing, analgesic, antidiabetic, anxiolytic, antioxidant, anticancer, hypolipidemic, neuroprotective, immunological, diuretic, anthelmintic, antiophidian, antifertility, antidepressant and sedative activities as shown in the Figure.1.



The essential oil of *Mimosa pudica* contains a diverse range of bioactive compounds that contribute to its medicinal and therapeutic properties. These compounds include terpenoids, alkaloids, flavonoids, and phenolic compounds, which exhibit significant biological activities. Major components identified in the essential oil include methyl salicylate, which is known for its anti-inflammatory and analgesic properties, and

linalool, a compound with antimicrobial, sedative, and stress-relieving effects. Other terpenes, such as α -pinene, β -caryophyllene, and myrcene, contribute to the oil's antibacterial, antifungal, and antioxidant activities. Additionally, the presence of phytosterols and tannins enhances its wound-healing and astringent qualities.



The roots of *Mimosa pudica* are a rich source of bioactive compounds that contribute to its wide range of pharmacological properties. Key constituents include alkaloids, flavonoids, tannins, terpenoids, phenolic acids, and glycosides, which are responsible for its medicinal benefits. Among these, mimosine, a non-protein amino acid unique to the plant, exhibits antimicrobial, antiproliferative, and antioxidant activities. Flavonoids like quercetin and kaempferol contribute to its anti-inflammatory and free radical-scavenging properties, while tannins enhance its astringent

and wound-healing effects. Terpenoids, including β -sitosterol, exhibit significant anti-inflammatory and immunomodulatory activities. The roots are also rich in saponins, which have antimicrobial and hemolytic properties, and phenolic acids, which provide strong antioxidant benefits. These bioactive compounds make *Mimosa pudica* roots highly valuable in traditional medicine for treating ailments such as wounds, diarrhea, dysentery, and inflammation, while also highlighting their potential for modern therapeutic applications.



The flowers of *Mimosa pudica* are a valuable source of bioactive compounds that contribute to their medicinal and therapeutic properties. They are rich in flavonoids, phenolic acids, alkaloids, terpenoids, and tannins, which exhibit a variety of biological activities. Flavonoids such as quercetin and luteolin are known for their potent antioxidant and anti-inflammatory effects, helping to neutralize free radicals and reduce oxidative stress. Phenolic acids contribute to the flowers' antimicrobial and antioxidant properties, while alkaloids provide antimicrobial and

analgesic benefits. Terpenoids, including β -caryophyllene, enhance the flowers' anti-inflammatory and antibacterial activities. Additionally, tannins present in the flowers exhibit astringent and wound-healing properties. These bioactive compounds collectively make *Mimosa pudica* flowers beneficial in traditional medicine, where they are used for treating skin conditions, inflammation, and microbial infections, while also offering potential for further pharmaceutical exploration.



The seeds of *Mimosa pudica* are a rich repository of bioactive compounds that endow them with significant pharmacological properties. These include alkaloids, flavonoids, saponins, tannins, and phenolic acids, each contributing to the seeds' therapeutic potential. Alkaloids in the seeds exhibit antimicrobial and anti-inflammatory effects, while flavonoids like quercetin and kaempferol are powerful antioxidants that combat oxidative stress and support cellular health. Saponins in the seeds provide antimicrobial, hemolytic, and cholesterol-lowering benefits, making them valuable for cardiovascular health. Tannins

contribute to the seeds' astringent and wound-healing properties, while phenolic acids enhance their antioxidant and anti-inflammatory activity. The seeds also contain fatty acids, which further support their anti-inflammatory and protective effects on skin and tissues. These bioactive compounds highlight the potential of *Mimosa pudica* seeds in traditional medicine for managing ailments such as infections, inflammation, and oxidative stress-related disorders, as well as their promise in pharmaceutical and nutraceutical development.

Figure.1. *M. pudica* L., various parts and their traditional uses, bioactive constituents, and pharmacological activities.

CONCLUSION:

Mimosa pudica is a remarkable plant with unique biological features and a rich profile of bioactive compounds that contribute to its ecological, medicinal, and scientific significance. Its thigmonastic and nyctinastic movements not only captivate curiosity but also demonstrate its advanced adaptive mechanisms in nature. The plant's roots, seeds, flowers, and essential oils are abundant in alkaloids, flavonoids, phenolic acids, tannins, and terpenoids, each offering diverse therapeutic benefits, including antimicrobial, anti-inflammatory, antioxidant, and wound-

healing properties. Widely utilized in traditional medicine, *Mimosa pudica* has proven effective for treating various ailments such as infections, inflammation, and skin disorders, while also enriching soil health through nitrogen fixation. Beyond its medicinal applications, it serves as an essential model for studying plant physiology and defense strategies. With its immense potential for pharmaceutical and agricultural advancements, *Mimosa pudica* stands as a symbol of nature's ingenuity and resilience, deserving continued research and sustainable utilization.