IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 1, December 2025
Impact Factor: 7.67

A Review on Topic Mimosa Pudica Linn. A Sensitive Plant with Powerful Healing Secrets

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Abstract: *Mimosa pudica Linn., commonly known as the sensitive plant or "touch- me-not," is a creeping herb belonging to the family Fabaceae and is widely distributed across tropical and subtropical regions. The plant is well-known for its rapid thigmonastic movement, in which the leaves fold upon mechanical stimulation due to changes in turgor pressure within the pulvinus. Beyond its remarkable movement mechanism, M. pudica has gained substantial scientific interest due to its diverse phytochemical profile, including alkaloids, flavonoids, tannins, phenolic compounds, terpenoids, and glycosides. These bioactive constituents contribute to a broad spectrum of pharmacological activities such as anti-inflammatory, antinociceptive, antimicrobial, antioxidant, antidiabetic, wound-healing, anticonvulsant, antidepressant, and hepatoprotective effects. Traditionally, the plant has been used in Ayurveda, Unani, and folk systems of medicine for managing ailments like diarrhea, dysentery, skin disorders, urogenital infections, and pain. Modern investigations continue to validate many of these traditional claims while also exploring new therapeutic potentials. Additionally, the plant demonstrates ecological significance as a nitrogen-fixing species and a natural soil stabilizer. This review highlights the botanical characteristics, phytochemical composition, mechanism of leaf movement, ethnomedicinal uses, and pharmacological actions of M. pudica, emphasizing its value as a multipurpose medicinal plant and a promising candidate for future drug development*

Keywords: Mimosa pudica, plant movement, pharmacological activities , morphology , uses

I. INTRODUCTION

Mimosa pudica Linn., commonly known as the "sensitive plant," "touch-me-not," or "humble plant," is a small perennial or annual herb belonging to the family Fabaceae. It is widely recognized for its unique thigmotactic movement, in which the leaflets rapidly fold inward upon mechanical stimulation such as touch, vibration, or heat. This rapid plant movement has made M. pudica an important model organism for studying plant physiology, signal transduction, and mechanoreception.[1] Native to tropical South and Central America,

M. pudica is now naturalized throughout Asia, Africa, and Australia, thriving in warm, humid climates with well-drained, nitrogen-rich soils[2]. The plant is characterized by its bipinnate compound leaves, prickly stems, globose pink–purple inflorescences, and sensitivity to external stimuli. Beyond its botanical interest, M. pudica holds significant medicinal value in traditional systems of medicine, including Ayurveda, Siddha, and folk practices. Various parts of the plant—leaves, roots, seeds, and whole plant extracts—exhibit pharmacological activities such as anti-inflammatory, antimicrobial, antioxidant, antidiabetic, and wound-healing properties.[2,3] Due to its distinctive physiological behavior and broad therapeutic potential, Mimosa pudica continues to be a subject of multidisciplinary research spanning botany, pharmacology, ethnomedicine, and plant biomechanics. Its combination of unique movement mechanisms and diverse bioactive constituents highlights its importance as both a scientific curiosity and a valuable medicinal resource[3].

DOI: 10.48175/568

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Fig.1 Flower of Mimosa Pudica

Fig.2 Leaves of Mimosa Pudica

Taxonomical classification

The taxonomical classification of the plant is

- Kingdom – Plantae
- Taxonomical classification: -
- The taxonomical classification of the plant is
- Kingdom – Plantae
- Division – Magnoliophyta
- Class– Magnoliopsida
- Order – Fabales
- Family – Mimosaceae
- Genus – Mimosa

Synonyms in other language

- Hindi: Lajvanti, Lajwati, Chui-mui
- Kannada: Nachige mullu, Muttidare muni, Olamucchaga
- Tamil: Thottaar siungi, Totalvadi
- Telugu: Nidrabhunji, Attipatti, Lajjavathi, Peddanidra kanni
- Odia: Lajakuli, Lajkui, Lajuli, Nachkuli, Lajalu
- Malayalam: Theendrmani, Thottavadi, Thottalvadi
- Assamese: Lajuki-lata, Nilaji-bon, Adori-bon
- Bengali: Lajak, lajjabati, lajjabathi
- Gujarati: Reesamani
- Manipuri: Ikathabi, Kangphal
- Marathi: Lajaalu, Laajari

MECHANISM OF MOVEMENT OF PLANT

1] Tropism

Tropism are directional growth movements shown by plants in response to specific environmental stimuli. In a tropic movement, the direction of the stimulus determines the direction of growth. These movements occur mainly due to differential cell elongation, often regulated by the plant hormone auxin.

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Tropisms help plants to survive, adapt, and optimize the use of environmental resources such as light, water, and gravity.[4,6]

• Characteristics of Tropisms
• Directional movement toward or away from a stimulus.
• Growth movement — involves permanent change in plant part.
• Controlled by hormones, especially auxins.
• Mostly observed in shoots and roots.
• Occurs slowly, not immediately like nastic movements.

2] Nastic movements

Nastic movements, also known as nastic responses, are non-directional plant movements that occur in response to external stimuli. Unlike tropisms, which depend on the direction of the stimulus, nastic movements are independent of the direction from which the stimulus is applied. Instead, the movement depends on the intensity and nature of the stimulus as well as the physiological properties of the plant tissues.[7]

Key Characteristics

Non-directional

The movement does not orient toward or away from the stimulus source. For example, a touch will cause a leaf to fold regardless of the direction of impact.

Stimulus-dependent Common stimuli include:

• Touch or mechanical disturbance
• Light (day–night cycle)
• Temperature
• Chemicals
• Humidity changes

Rapid or slow Some nastic movements (e.g., in Mimosa pudica) are rapid, while others, such as opening and closing of flowers, occur slowly.

Turgor-based or growth-based

• Turgor movements involve changes in water pressure inside specialized motor cells (e.g., pulvini).
• Growth movements involve differential growth rates on opposite sides of an organ.

3] Nyctinastic movement:-

Nyctinastic movements are non-directional, rhythmic plant movements that occur in response to daily light–dark cycles, mainly influenced by changes in light intensity and internal biological (circadian) rhythms.

These movements do not depend on the direction of the stimulus, only on its presence or absence (day or night).[8]

Key Features

• Non-directional: Movement is the same regardless of where light comes from.
• Rhythmic and reversible: Leaves or petals open during the day and close at night, or vice versa.
• Controlled by the plant's internal circadian clock + light levels.
• Involves turgor pressure changes in the pulvini (swollen motor organs at the base of leaves or leaflets).

Mechanism of Nyctinastic Movement

• Stimulus: Light–dark changes
• During daylight, exposure to light triggers specific ion movements in the pulvini.
• During night, absence of light reverses the process.
• Turgor Pressure Modulation
• Pulvini cells (flexor and extensor cells) gain or lose water.

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• Ion transport (K^+ and Cl^-) regulates water movement.

· Day: Extensor cells gain ions → water enters → leaf opens.

· Night: Ions move out → water leaves cells → leaf closes.

• Circadian rhythm involvement

• Even in continuous darkness or continuous light, the movements may continue for a few days because of the internal biological clock

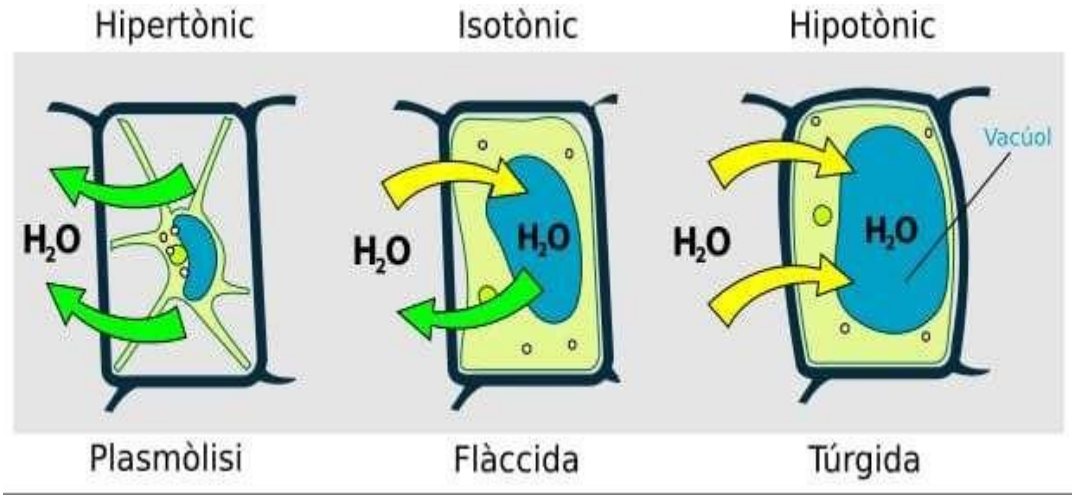

Fig.2: Turgor pressure

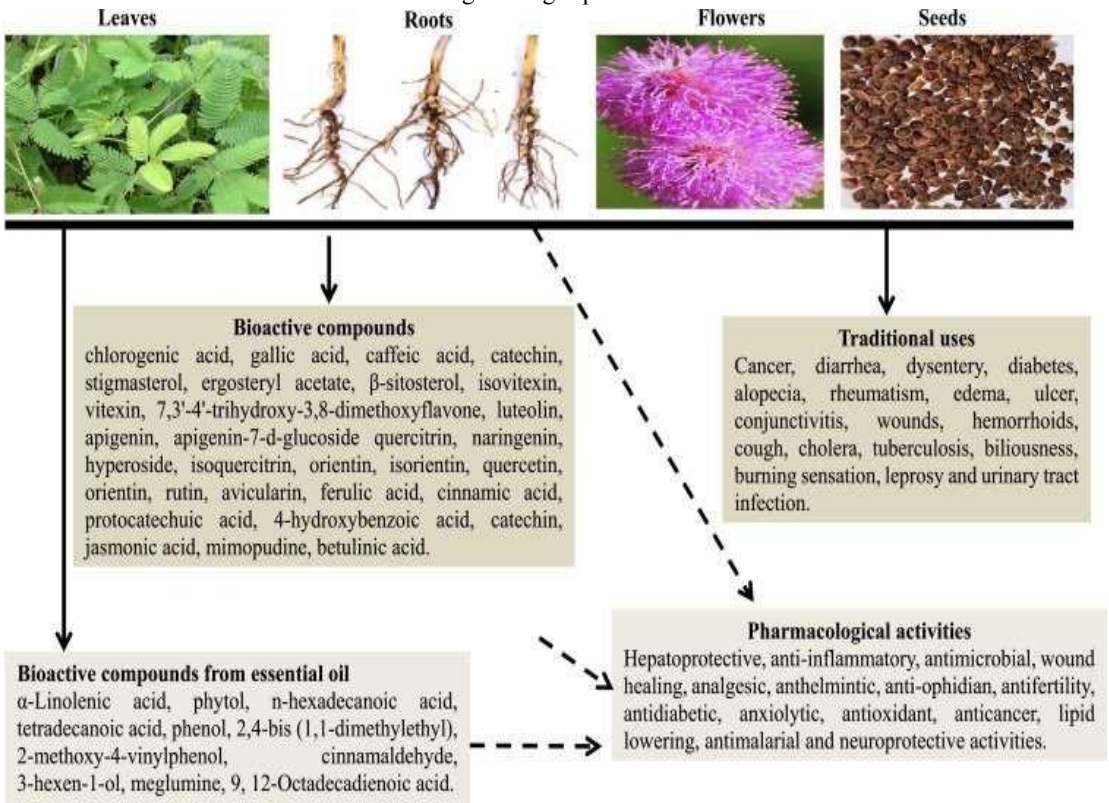

Fig.3: Parts of plant

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PHARMACOLOGICAL ACTIVITIES

1] Hepatoprotective Activity

A study evaluated the liver-protective potential of Mimosa pudica Linn. leaf extract in albino rats with carbon tetrachloride (CCl_4)-induced hepatic injury. The extract significantly lowered serum SGOT, SGPT, and ALP levels and restored normal liver histology. Its effectiveness was comparable to that of Silymarin, with no additional synergistic effect observed. These findings indicate that Mimosa pudica offers considerable protection against CCl_4-mediated liver damage.[10]

2] Antimicrobial Activity

Leaf extracts of Mimosa pudica were examined for their antibacterial and antifungal activities. Their efficacy was tested against Bacillus subtilis, Pseudomonas aeruginosa, Klebsiella pneumoniae, Aspergillus flavus, and Trycophyton rubrum at doses of 25, 50, 75, and 100 µl/disc. Phytochemical screening suggested that the observed antimicrobial effects are mainly attributed to bioactive constituents such as alkaloids and tannins.[11]

3] Wound-Healing Activity

An ointment containing 2% (w/w) methanolic extract and 2% (w/w) total aqueous extract of Mimosa pudica demonstrated significant wound-healing activity ($P < 0.001$). The extracts were analyzed for total phenolic content (expressed as gallic acid equivalents), revealing 11% (w/w) phenols in the methanolic extract and 17% (w/w) in the aqueous extract. The enhanced wound-healing effect of the methanolic extract is likely due to its phenolic composition.[12]

4] Analgesic and Anti-inflammatory Activity

Ethanolic leaf extracts of M. pudica administered at 200 and 400 mg/kg exhibited notable analgesic and anti-inflammatory effects. The extract markedly reduced carrageenan-induced paw edema in a dose-dependent manner. In analgesic testing, the acetic acid-induced writhing model showed greater sensitivity to the extract compared to the tail-flick method. The presence of flavonoids in the extract is believed to contribute to these therapeutic effects[13].

5] Anti-Diabetic Activity

The anti-diabetic potential of Mimosa pudica Linn. leaves (family Mimosaceae) was assessed using ethanolic and petroleum ether extracts. Their efficacy was compared with Metformin (500 mg/kg). Diabetes was induced in Wister rats using Alloxan (150 mg/kg), and plasma glucose concentration was measured using the Glucose Oxidase/Peroxidase method. The ethanolic extract produced a significant reduction in blood glucose levels, indicating strong anti-diabetic activity[14].

6] Hypocholesterolemic Activity

The hypocholesterolemic properties of Biophytum sensitivum leaves were evaluated in male albino rabbits. After inducing hypercholesterolemia with 100 mg/kg/day of cholesterol for one week, the animals received 200 mg/kg/day of the plant extract. The extract significantly lowered serum total cholesterol, triglycerides, and the total cholesterol/HDL ratio. Since blood glucose levels remained unaffected, the extract appears to specifically target lipid reduction.[15]

7] Antifertility Activity

The antifertility effects of Mimosa pudica, traditionally used in India as a natural contraceptive, were examined in Swiss albino mice. Oral administration of root extract for 21 days altered the estrous cycle by prolonging the diestrous phase, disrupted reproductive hormone balance, and reduced litter size. These outcomes suggest that the extract interferes with gonadotropin secretion and estradiol synthesis.[16]

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8] Antivenom Activity

The efficacy of Mimosa pudica tannins (MPT) was compared with commercially available tannic acid in neutralizing Naja kaouthia venom. MPT produced a 100% survival rate in mice after 24 hours, whereas commercial tannins failed to provide similar protection. Protein expression analysis using 2-DE revealed decreased venom protein spots in MPT-treated samples, indicating substantial venom-neutralizing potential.[17]

9] Anticonvulsant Activity

Epilepsy is a neurological disorder characterized by abnormal neuronal activity leading to seizures, behavioral disturbances, sensory abnormalities, and possible loss of consciousness. This study investigated the anticonvulsant efficacy of an alcoholic extract of Mimosa pudica using the maximal electroshock seizure (MES) model. Thirty Swiss albino rats were divided into five groups: control (normal saline, 25 ml/kg), standard (phenytoin, 25 mg/kg), and treatment groups receiving 50, 100, and 200 mg/kg of the extract. The alcoholic extract exhibited significant anticonvulsant activity by reducing seizure intensity and duration in the MES model.[18]

10] Antinociceptive Activity

This study evaluated the central nervous system (CNS) depressant and antinociceptive effects of a methanolic extract prepared from the aerial parts of Mimosa pudica (MAMP). The extract, administered orally at doses of 100 and 200 mg/kg, was tested for CNS depressant effects using the open-field and hole-cross methods, while pain-relieving activity was examined through the acetic acid-induced writhing test and formalin-induced pain model. A significant reduction in locomotor activity ($p < 0.05$) was observed at both doses in the behavioral tests. Additionally, the extract significantly and dose-dependently reduced acetic acid-induced writhing and formalin-induced inflammatory pain. These findings demonstrate that Mimosa pudica possesses notable CNS depressant and antinociceptive properties, supporting its potential application in managing neuropsychiatric disorders[19].

11] Hypolipidemic Activity

Mimosa pudica extract exhibited strong lipid-lowering activity in rats with high-fat diet- induced hyperlipidemia. Hyperlipidemic rats showed increased levels of cholesterol, triglycerides (TG), low-density lipoprotein (LDL), and very-low-density lipoprotein (VLDL). Treatment with the ethanol extract significantly reduced these serum lipid markers while elevating high-density lipoprotein (HDL) levels, producing effects comparable to the standard drug Lovastatin. Preliminary phytochemical investigations confirmed the presence of bioactive compounds, including steroids, flavonoids, glycosides, alkaloids, and phenolic substances, which are likely responsible for the hypolipidemic action.[20]

12] Anxiolytic and Antibacterial Activity

This work investigated the anxiolytic and antibacterial properties of a methanolic leaf extract of Mimosa pudica (MEMP). The extract's anxiolytic potential was evaluated in mice using the light–dark box, elevated plus maze, and hole-board tests. Antibacterial activity was assessed throughdisc diffusion assays. Phytochemical screening revealed the presence of reducing sugars, tannins, glycosides, alkaloids, and flavonoids. MEMP, at doses of 200 and 400 mg/kg, produced significant anxiolytic effects ($p < 0.05$) in the light–dark box and elevated plus maze, and also reduced head-dipping behavior in the hole-board test, further suggesting anxiolytic potential. The extract displayed dose-dependent antibacterial activity against several bacterial strains, including Staphylococcus aureus, Staphylococcus epidermidis, Streptococcus agalactiae, Escherichia coli, and Shigella flexneri[21].

13] Antioxidant Activity

The study examined the phytochemical composition of Mimosa pudica Linn. (Lajwanti), identifying alkaloids, flavonoids, cardiac glycosides, phenols, and saponins as key constituents. Phenolic content increased with extract concentration, with chloroform extract exhibiting the highest levels. The plant extracts showed a concentration-dependent enhancement in DPPH radical scavenging, superoxide radical scavenging, and nitric oxide inhibition. Strong

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antioxidant activity was observed overall, with the maximum reducing power recorded at 80 µg/ml. These findings confirm the significant free radical–neutralizing capacity of Mimosa pudica[22]

14] Anti-diarrhoeal Activity

Diarrhea remains a major health concern in developing nations, particularly in many Asian regions where it contributes substantially to morbidity and mortality. The anti-diarrheal potential of an ethanolic leaf extract of Mimosa pudica Linn. was evaluated across several experimental models in Wistar albino rats. The extract effectively inhibited castor oil- induced diarrhea, reduced PGE_2-induced enteropooling, and decreased gastrointestinal motility in the charcoal meal test. At doses of 200 and 400 mg/kg, the extract produced a significant ($P < 0.001$) reduction in diarrheal output, comparable to the standard drug. The presence of tannins and flavonoids in the extract is believed to contribute to these therapeutic effects. Overall, the study demonstrates that Mimosa pudica ethanolic leaf extract is highly effective against diarrheal conditions[23].

HEALTH BENEFITS

- The juice obtained from the leaves is applied topically.
- Commonly utilized to treat ulcers and piles, and also employed in dressings for various ailments.[24]
- Conditions such as sinuses, diabetes mellitus, vaginal problems, diarrhea, and whooping cough are prevalent[24].
- Mimosa.Pudica acts as both anxiolytic and anti-depressant[25].
- The use of M. pudica has been a long-standing tradition in this particular organism[24].
- Cameroon and Africa are being considered as a practical solution in traditional medicine to address the issue of disease.[25]
- Anxiety.
- The Unani healthcare system began with alternative therapies for medical conditions[26].
- The treatment of diseases like impurities in the blood and bile, as well as other illnesses, makes it particularly useful[27].
- Bilious fever, jaundice, leprosy.etc[26].
- The methanolic extract contains significant of phenolic compounds[28].
- Boosts its potent wound healing mechanism[29].'

AYURVEDIC AND UNANI USES

- This plant has been used in diseases arising from corrupted blood and bile, billious fever, piles, jaundice, leprosy, ulcers, small pox.[30]
- Ayurveda has declared that its root is bitter, acrid, cooling, vulnerary, alexipharmic, and used in the treatment of leprosy, dysentery, vaginal and uterine complaints, inflammations, burning sensation, asthma, leucoderma, and fatigue and blood diseases.[31]
- Unani Healthcare System its root is resolvent, alternative, and useful in the treatment of diseases arising from blood impurities and bile, bilious fevers, piles, jaundice, and leprosy etc[32].
- It is very useful in diarrhea (athisaara), amoebic dysentery (raktaatisaara), bleeding piles and urinary infections[32].
- Some herbal doctors recommend it for general weakness and impotence[33].
- It is a mood enhancer and improves circulation of the blood[33].

II. CONCLUSION

The available evidence indicates that Mimosa pudica exhibits a broad spectrum of pharmacological and biological activities, supporting its therapeutic potential in the management of various diseases and disorders through herbal interventions. Its use is further strengthened by the relatively low incidence of adverse effects typically associated with natural remedies. Globally, herbal therapies are increasingly adopted to minimize drug- related side effects, enhance patient compliance, and improve overall quality of life. The diverse medicinal properties of Mimosa pudica also

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highlight its promise for future scientific exploration and its potential application in developing novel treatments for multiple health conditions.

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