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A review on Lajjalu (mimosa pudica . L): As a medicinal plant

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ABSTRACT: Mimosa pudica Linn. (Family: Mimosaceae) is used as an ornamental plant due to its thigmonastic and nyctinastic movements. M. pudica is also used to avoid or cure several disorders like cancer, diabetes, hepatitis, obesity, and urinary infections. M. pudica is famous for its anticancer alkaloid, mimosine, along with several valuable secondary metabolites like tannins, steroids, flavonoids, triterpenes, and glycosylflavones. A wide array of pharmacological properties like antioxidant, antibacterial, antifungal, anti-inflammatory, hepatoprotective, antinociceptive, anticonvulsant, antidepressant, antidiarrheal, hypolipidemic activities, diuretic, antiparasitic, antimalarial, and hypoglycemic have been attributed to different parts of M. pudica. Glucuronoxylan polysaccharide extruded from seeds of M. pudica is used for drug release formulations due to its high swelling index. This review covers a thorough examination of functional bioactives as well as pharmacological and phytomedicinal attributes of the plant with the purpose of exploring its pharmaceutical and nutraceutical potentials.

Keyword : Antioxidant, Antibacterial, Antifungal, Anti-inflammatory, Hepatoprotective, Antinociceptive, Anticonvulsant, Antidepressant, Antidiarrheal, Hypolipidemic

I. INTRODUCTION

Nature has been a source of medicinal agents for thousands Of years. Various medicinal plants have been used for years . In daily life to treat disease all over the world. Herbal Medicine is based on the premise that plants contain natural Substances that can promote health and alleviate illnesses The most important of these biologically active constituents Of plants are alkaloids, flavonoids, tannins and phenolic Compounds. There are many herbs, which are Predominantly used to treat cardiovascular problems, liver Disorders, central nervous system, digestive and metabolic Disorders. [1,2]

It has been identified as lajjalu in Ayurveda and has been found to have antiasthmatic, aphrodisiac, analgesic, and antidepressant properties. M. pudica is known to possess sedative, emetic, and tonic properties, and has been used traditionally in the treatment of various ailments including alopecia, diarrhea, dysentery, insomnia, tumor, and various urogenital infections.[3, 4]

Phytochemical studies on M. pudica have revealed the presence of alkaloids, non-protein amino acid (mimosine), flavonoids C-glycosides, sterols, terpenoids, tannins, and fatty acids.Two well-known movements are observed in M. pudica L. (oligo-so in Japanese): one is the very rapid movement of the leaves when it is stimulated by touch, heating, etc., and the other is the very slow, periodical movement of the leaves called nyctinastic movement which is controlled by a biological clock. The leaves of the sensitive plant M. pudica can adapt their closing response to electrical and mechanical stimulation so that they reopen to repeated stimulation. The more intense the stimuli and the longer the intertribal interval, the longer it takes to adapt. Leaves adapted to the effects of mechanical stimulation can still respond by closing to electrical stimulation and vice versa.[5 , 6 ,7 ,8,9]

BiologicalClassification:
Kingdom: Plantae
Division: Magnoliophyta
Class: Magnoliopsida

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Order: Fabales
Family: Mimosaceae
Subfamily Mimosoideae
Genus: Mimosa
Species: M. pudica[10]

Synonyms:
Sanskrit: Samanga, Varakranta, Namaskari
Assamese: Lajubilata, Adamalati
Bengali: Lajaka, Lajjavanti
English: Touch-me-not
Gujrati: Risamani, Lajavanti, Lajamani
Hindi: Chhuimui, Lajauni
Kannada: Muttidasenui, Machikegida, Lajjavati
Malayalam: ThottaVati
Marathi: Lajalu
Oriya: Lajakuri
Punjabi: Lajan
Tamil: Thottavadi, Tottalchurungi
Telugu: Mudugudamara
Urdu: Chhuimui[11]

Geographical Source : Carl Linnaeus' first formally described the plant Mimosa pudica in 1753. The plant was once only found in the Caribbean and South and Central America, but it is now a pantropical weed that may also be found in Australia, South Africa, West Africa, Micronesia, South , India Asia, and the Southern United States. It is mostly found on soils with poor nitrogen concentrations and is not shade-tolerant.(10)

Macroscopic Observation:

- Stems**:** Reddish-brown to brown color, prickly.
- Leaves: Immediately fold by if touched, pinnate 4, reddish, leaflets 12-25 pairs, acute, bristly, 9-12mm long, 1.5mm wide.
- Flowers: Pink, in globules heads, nearly 1cm in diameter, auxiliary, peduncles up to 2.5cm long.
- Root : Cylindrical, tapering, rependant , with secondary and tertiary branches, varying in length, upto 2 cm thick, surface more Or less rough or longitudinally wrinkled; greyish brown to brown, cut surface of pieces pale yellow; fracture hard, woody, bark Fibrous; odour, distinct; taste, slightly astringent.
- Fruit – Lomentum, simple, dry, 1-1.6 cm long, 0.4-0.5 cm broad with indehisced segments and persistent sutures having 2-5 Seeds with yellowish, spreading bristle at sutures, 0.3 cm long, glabrous, straw coloured.
- Seed : Compressed, oval-elliptic, brown to grey, 0.3 long, 2.5 mm broad having a central ring on each face.[11

Chemical composition : The plant contains mimosine and turgorin. The periodic leaf movements exhibited by the plant are due to the presence of derivatives of 4-0- gallic acid. The aerial part of the plant Mimosa pudica contains C-glycosylflavones, 2-Orhamnosylorientin. The root of the plant contains 10% tannin and 55% ash. The seed contains mucilage.

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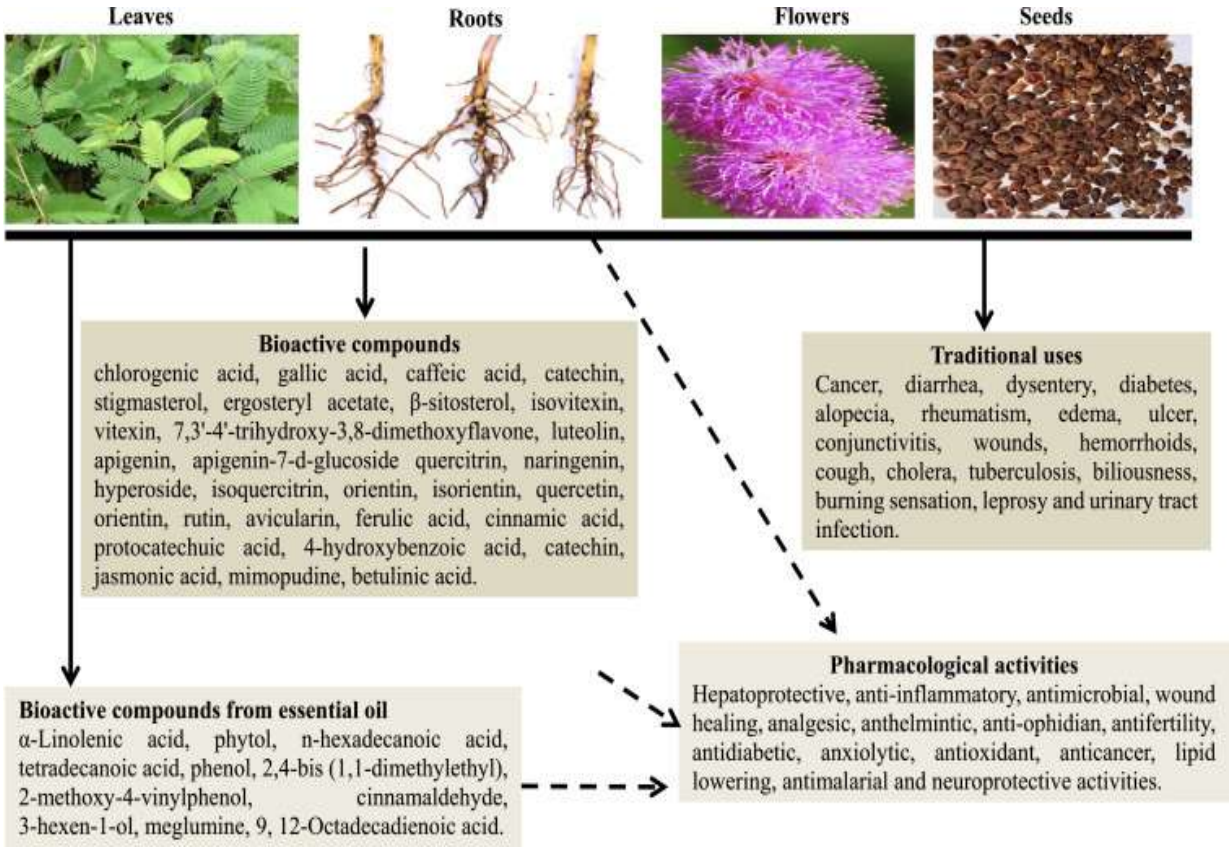
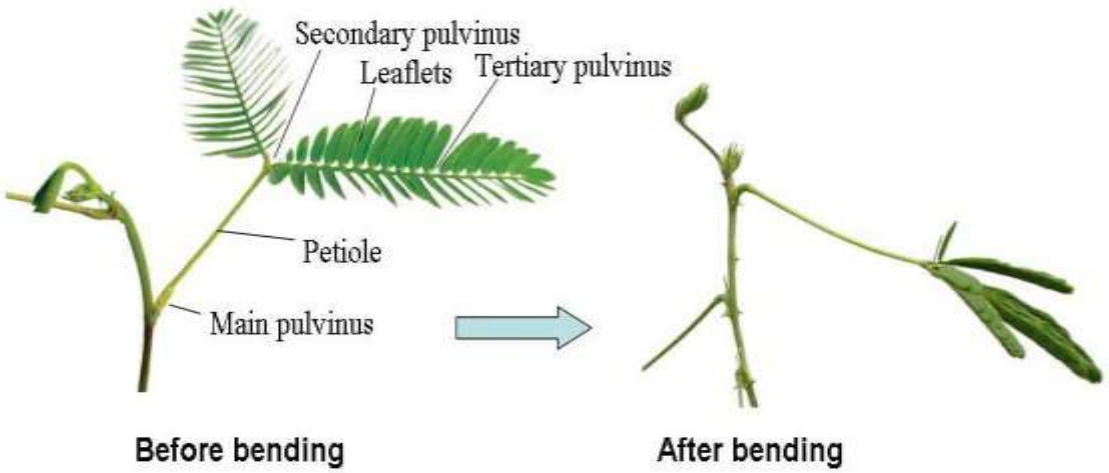


Movement or Action of mimosa pudica: During the daytime, or in the absence of touch, the leaflets are held open in a horizontal position. At night, or when the plant is touched, warmed, or shaken, the leaflets close or fold up, and the rachises and petiole droop downward,



As we know, all plant cells contain water.The pressure exerted by water on the plasma membrane of each cell helps maintain the cell's shape and rigidity. This is called the turgor pressure.

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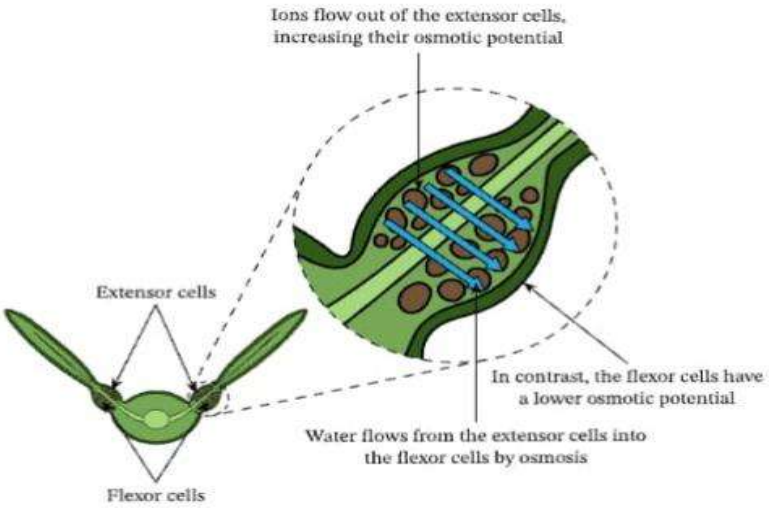
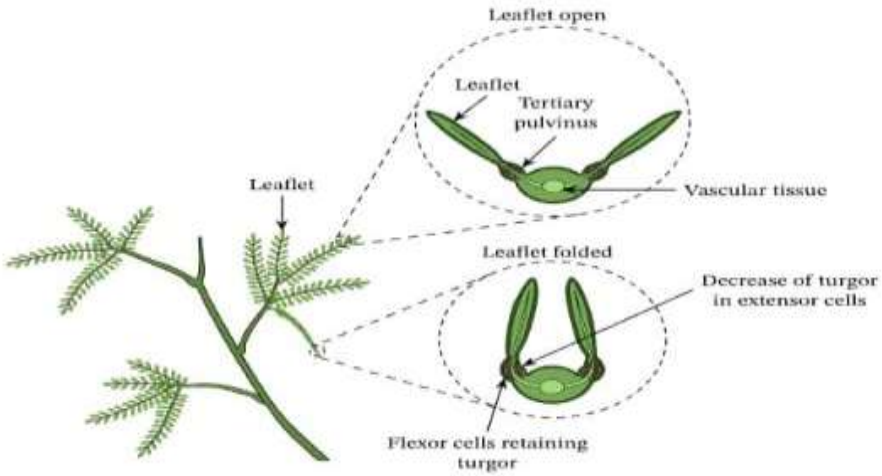


When a leaflet is touched, this mechanical stimulation is recognized by the plant and is converted into an electrical signal. This signal is passed on to the pulvini, causing ions like potassium and chloride to flow out of the extensor cells. This changes the ion concentration in the extensor cells and increases their osmotic potential. The flexor cells in the lower side of the pulvini, in contrast, have a lower osmotic potential. The difference between the volume change of flexor cells and that of extensor cells is due to the transport of ions along with the osmotic transport of water. This causes water to flow rapidly out of the extensor cells and into the flexor cells by osmosi.



As the signal is propagated, the extensors in the secondary pulvini and eventually the primary pulvini also lose turgor pressure. This causes the petiole to droop downward. This type of plant movement, in response to being touched or shaken, is called thigmonasty. Thigmonasty is a type of nastic movement, which means that the direction in which the plant moves is independent of the direction of the stimulus. No matter in which direction the mimosa plant is touched or shaken, its leaflets will always fold up in the same way and droop downward! This is why we say that thigmonasty is a nondirectionalresponse.

Aside from its response to touch, mimosa plants also exhibit the same reaction in response to light/dark cycles. This type of movement is called nyctinasty or sleep movement: the plant folds up

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.its leaflets and droops at night and reopens them in the daylight.[14]

Extraction Method :25 gms of each sample were taken and extracted separately with 250 ml ethanol usingsoxhlet apparatus. The extract Were collected and dried. The condensed extract was then dissolved in ethanol to the concentration of 100mg/ml. After that allow for 5 cycles and switch of the apparatus and then take the sample solution and extracted solution in A beaker and cover it with a paper and make holes on the paper for the evaporation of the solvent .Allow it for Drying.and then collect the residue from the beaker. [15]

Phytochemical Screening :

1. Test For Tannins Preparation of 0.1% ferric chloride: To 99.9 ml of distilled water 0.1ml of ferric chloride reagent was added.
2. Ferric chloride Test : 1 ml of the sample taken and a few drops of 0.1% ferric chloride was added and observed for brownish green or Blue, black colouration.
3. Test For Saponins : To 1 ml of extract 5 ml of distilled water was added and shaken vigorously. Observed for soaking appearance Indicates the presence of saponins.
4. Test For Flavonoids : To 1 ml of extract 5 ml of dilute ammonia solution was added, followed by addition of concentrated sulphuric acid Along the sides of the tube. Appearance of yellow colouration.
5. Test for Alkaloids : 1 ml of sample was taken to that few drops of Dragandoff reagent was added and observed for orange red colour.
6. Test for Protein :1 ml of sample was taken to that few drops of Bradford reagent was added. The blue colour was observed.
7. Test for Steroids : 1 ml of the filtrate was taken to that 10% concentration H2SO4 was added and observed for green colour.
8. Test for Anthroquinones : 1 ml of sample was taken to that aqueous ammonia (shaking) was added and observed for change in colour of Aqueous layer (Pink, Red or Violet).

Pharmacology Activity :

1. Anti Microbial Movement : Ethanolic concentrates of M. pudica leaves were evaluated for phytochemical constituents and antimicrobialAction towards microorganisms for example microscopic organisms and parasites. The action was tried against Bacillus subtilisPseudomonas eruginosa, Klebsiella pneumonia, Aspergillusflavus and Trycophytonrubrum at variousConvergences of 25, 50, 75 and 100 µl/circle and the outcomes have been shown. Phytochemical investigation ofThe concentrate uncovered that the antimicrobial action of the plant materials is because of the presence of dynamicConstituents like alkaloids or tannins[16].

2. Anti-Fungal activity :Methanolic extract and Aqueous extract leaves of M.pudicawere tested Against Aspergellisfumigatesby well diffusionat Various concentrations like 100,200, and 500 mg.[17]

3. Antifertilityactivity:M. pudica has been used in India for treatment of a different kind of Ailment but is commonly used as an antifertility agent. The methanol Extract of the root was administered orally to Swiss albino mice for Twenty-one consecutive days. Phytochemical studies of the extract Were carried out using thin layer chromatography (TLC) and Quantitative methods . Hormones responsible for reproduction (such as luteinizing hormone (LH), follicle-stimulating hormone (FSH), Prolactin, estradiol, progesterone), oestrous cycle and many litters Produced were studied in both extracts administered and control Groups by using standard methods. The decrease in FSH levels in the Pro-oestrous and oestrous stage in the extract administered group Compared with those of the control animals indicates the disturbance Of the oestrous cycle and ovulation through suppression of FSH. This Study suggested that the root of M. pudica may possess antifertility Effects as it disturbs the secretion of gonadotropin hormone and it Prolongs the oestrous cycle in albino mice[18].

4. Anticonvulsant :The decoction of M. pudicaLeaves were given Intraperitoneally at dose of 1000-4000 mg/kg which Protected mice against pentylentetrazol and strychnineinduced seizures. M. pudica had no effect against picrotoxininduced seizures. It also antagonized N-methyl-D-aspartateinduced turning behavior[19].

5. Anti-depressant activity : Aqueous extract of From dried leaves ofM.pudicawas used to test the Behavioural actions of at various doses of 2,4,6 And 8 mg/kg. The animal used as a rat. And the Standard drug id Diazepam. At a concentration Of 1.3 mg/kg[20]

6. Wound healing activity: The M. pudica shoot methanolic extract, M. pudica root Methanolic extract showed very good wound healing activity.Themethanolic extract exhibited good wound healing Activity probably due to presence of phenols constituents.[21,22]

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7. Hyperglycemic Activity : Ethanolic extract of Mimosa pudica leaves given by oral route to mice at a dose of 250 mg/kg showed a significant Hyperglycemic effect.[23]
8. Anti-diarrheal activity:Ethanolic extract leaves of M. pudica at doses of 200 and 400 mg/kg showed significant anti Diarrheal activity. Tannins and Flavanoids were the Bioactive constituents which were responsible for The activity. The models used were castor oil Induced diarrhea and PGE2 induced enteropooling[23].
9. Anti – malaria activity: Plasmodium berghei was the organism used to testThe anti- microbial property of methanolic extract Of mimosa pudica. The presence of active Constituents like terpenoids, flavinoidsandAlkaloids may be responsible for the activity[20].
10. Effect of uterine bleeding: The aqueous extract of root powder of M. pudica was used for determing the activity. The test was Carried in patients with dysfunction uterine bleeding.[23]
11.Anti-hepatotoxic activity: The ethanolic extract of M .pudica was given at a dose of 200 mg/kg body weight. The animal used was Wister albino rats.The extract showed dose dependent hepatoprotective effect in CCl4 induced hepatic damage. The activity was Assessed for parameters such as glutamate oxalo acetate transaminase, glutamate pyruvate transaminase, alkaline phosphate, bilrubin and total protein.[17]
Conclusion :Phytochemical studies on M. pudica have revealed the presence of alkaloids, non-protein amino acid (mimosine), flavonoids C-glycosides, sterols, terpenoids, tannins, and fatty acids. Two well-known movements are observed in M. pudica L. (ojigi-so in Japanese): one is the very rapid movement of the leaves when it is stimulated by touch, heating, etc., and the other is the very slow, periodical movement of the leaves called nyctinastic movement which is controlled by a biological clock.The leaves of the sensitive plant M. pudica can adapt their closing response to electrical and mechanical stimulation so that they reopen to repeated stimulation. The more intense the stimuli and the longer the intertribal interval, the longer it takes to adapt. Leaves adapted to the effects of mechanical stimulation can still respond by closing to electrical stimulation and vice versa.

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