# THE SENSITIVE PLANT *MIMOSA PUDICA*: A USEFUL WEED

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*Abstract*: To cure all aliments of human being mother nature provides a complete store house of remedies since past years. In legume family Mimosa is one of the largest genera which distribute more than 500 species. Mimosa pudica (Family: Mimosaceae) is used as an ornamental plant due to its thigmonastic and nyctinastic movements. The plant is rich source of flavonoids, plant hormones, glycosides, amino acid, tannin etc. It folds itself when touched and sreads its leaves once again after a while. It majorly possesses antibacterial, antivenom, antifertility, anticonvulsant, antidepressant and various other pharmacological activities. The herb has been used traditionally for ages in the treatment of urogenital disorder, piles, dysentery, sinus and also applied on wounds. It is the most important plant origin has tremendous future for research.

### Keywords: Mimosa, Ornamental, Thigmonastic, Flavonoids

## **INTRODUCTION**

"Mimic" means to allude and "pudica" means bashful, results the name Mimosa pudica to that plant.[1] In legume family, Mimosa is one of the largest genera which distribute more than 500 species. Lowland tropical rainforest, savanna, tropical and subtropical dry forest and thorn scrub, mid-elevation subtropical forest, desert, grassland, and wet land are habitat of Mimosa. To cure all aliments of mankind, nature provides a complete store house of remedies for time honored period. In Indian conditions it is opt to collect plant during September to march. Mimosa pudica (Mimosaceae) is a shrubby plant with the bipinnate leaves, glandular hairs, spinouts stipules, Companulate calyxes and lilac pinkish axilary flower heads. The stems are erect and well branched. In Indian condition it flowers and fruits in the month of August to October. It contains active constituent like an alkaloid mimosine, mucilage, tannins, non- protein amino acid (mimosin), flavonoid C- glycosides, sterols, terpenoids, tannins and fatty acids. M. pudica shows certain movements like nyctinastic movement, thigmonastic movement and seismonastic movement.[2]

In Ayurveda, it has been described as "sparshaat sankochataam vaati punashcha prasruta bhavet" -a plant which folds itself when touched and spreads its leaves once again after a while. According to Ayurveda Lajjalu has tikta and kashaya rasa i.e it is bitter and astringent taste. It has property of cold (sheetha), and balances kapha, pitta. It is reported to be useful in the treatment of diarrhea (athisaara) Amoebic dysentery (raktaatisaara), bleeding piles, and to arrests bleeding [3]. Literature survey reveals that various extracts of Mimosa pudica when subjected to pharmacological studies, were found to be effective as antinociceptive, hyperglycemic, antivenom, immunomodulatory, anticonvulsant, antihepatotoxic, antifertility, diuretic and posses wound healing activity [4]. Phytochemical studies of plant have revealed presence of alkaloids, flavonoids, glycosides, phenolics tannins and fixed oil [5]. According to the Unani system of medicine, root is resolvent, alternative, useful in diseases arising from blood impurities and bile, bilious fevers, piles, jaundice, leprosy etc. In contemporary medicine, Mimosa pudica is being investigated for its potential to yield novel chemotherapeutic compounds. It contains an alkaloid called mimosine, which has been found to have potent antiproliferative and apoptotic effects. Aqueous extracts of the roots of the plant have shown significant neutralizing effects on the lethality of the venom of the monocled cobra (Naja Kaouthia). It appears to inhibit the myotoxicity and enzyme activity of cobra venom [6]. M. pudica contains mimosine which is a toxic alkaloid. Adrenalin like substance has been identified in the extract of its leaves. Some workers have reported the presence of Crocetin dimethyl Easter in the extract of the plant. Roots contain tannin up to 10 per cent. Seeds contain a mucilage which is composed of d-xylose and d-glucuronic acid. The plant extract contains green yellow fatty oil up to 17 per cent. The plant is reported to contain tubuline and a new class phytohormone turgorines is found to be active in the plant. The periodic leaf movement factors are reportedly the derivatives of 4-o-(b-D-glucopyranosyl-6-sulphate) gallic acid. [7]





Fig: 2 Flowers of Mimosa Pudica

Fig: 1 Leaves of Mimosa Pudica 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: Thotta Vati Marathi: Lajalu Oriya: Lajakuri Punjabi: Lajan Tamil: Thottavadi, Tottalchurungi Telugu: Mudugudamara Urdu: Chhuimui Scientific Classification: **Table 1: Scientific Classification** 

Kingdom	Plantae	
Division	Magnoliophyta	
Class	Mangnoliopsida	
Order	Fabales	
Family	Fabaceae	
Sub-Family	Mimosoideae	
Genus	Mimosa	
Species	Pudica	

## Mechanism of plant movements:

Plants are rooted in one place hence they are immobile. Ecological stimuli such as: light, gravity and mechanical disturbances make a plant to move such as tropisms and nastic movements.

**Tropisms:** It is firmed by the direction of an ecological stimulus. Movement towards the stimulus is positive tropism, and away from a stimulus is negative tropism.

**Nastic movements:** Plants responses to stimuli (e.g. temperature, humidity, light irradiance) in a non directional way and the movement can be due to changes in turgor or changes in growth.

Table 2:	Types o	f stimulus	triggering	the movements
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Types of stimulus triggering the movement	Designation	
Shaking	Seismonastic	
Touching	Thigmonastic	
Wounding	Traumatonastic	
Light	Photonastic	
Heat	Thermonastic	
Downward-bending	Epinastic	
Movements at night or in the dark	Nyctinastic	
Response to chemicals and nutrients	Chemonastic	
Response to water	Hydronastic	
Response to gravity	Geonastic	
Response to contact	Haptonastic	

**Nyctinastic Movements:** Most leguminous plants have power over nyctinastic movements. In Mimosa pudica the pinnules close and open at the usual time was observed by the astronomer de Mairan in 1729 and Hallberg coined the term 'Circadian Rhythm' (circa =approximately, diem = day; hence circadian). According to a circadian rhythm leaves close at night and open in the daytime which is represented as nyctinasty[8]

**Thigmonastic Movements**: (thigma is the Greek word for touch) A touch stimulation results in a very rapid folding up of the small leaflets composing the doubly compound leaves. Remarkably, the touch response is not restricted to the stimulated leaflet, but can propagate to all the neighboring leaflets of the leaf. A complex electrical signal can be responded by the epidermal cell of plants and animals and capable of sensing mechanical touch which is essential for an organ to function. Sensory hairs found in the surface extrusions enhance the sensitivity e.g. the lower part of leaf joints of Mimosa pudica or sensory papillae.



Fig 3: Nyctinastic movement of Mimosa Pudica

**Distribution:** Mimosa pudica is native to South America and Central America. In India cultivaed southern states.[9]. It is a declared weed in the Northern Territory. Control is recommended in Queensland.

## Table 3: Various species of Mimosa [10]

Characters	M. Pudica	M. himalayana	M. hamata
Plants	Small woody herbs or low	A large straggling shrub,	A much branched, armed
	spreading under shrub with	studded with straw	shrub, branches
	hairy and prickly branches,	coloured, hooked prickels	downy,with numerous
	hairs glandular		straw-colored, curced or
			straight prickles
Flowers	Heads, small, peduncled,	Numerous, in globose	crowded at the end of
	globose, axilalry,	heads, peduncles crowded	branches
	pinkpurple, Calyx	at the ends of branchlets	
	campanulate, Petals		
	crenate towards base		
Pods	1.5-2.5 cm long, closely	7-10 cm long, falcate,	5-7 cm long, falcate,
	prickly on the suture	glabrous, one seeded	consisting 48 one seeded
		joints, persistant but not	joints, pubescent
		prickly	
Flowering and fruiting	SeptMarch in Indian	August-Sept. and October	AugNov. and DecFeb.
time	condition	in Indian conditions	in Indian condition

# Table 4: Chemical constituents of Mimosa Pudica [11]

Parts	Chemical Constituent	
Leaves	nor-epinephrine,d-pinitol,b-sitosterol, alkaloids-	
	mimosine, terpenoids, flavonoids, glycosides, alkaloids	
Seed	D-xylose, D-glucoronic acid 4-O(3,5-	
	dihydroxybenzoicacid)-b-Dglucoronide, Tubulin,	
	Cglycosylflavones, phenolic ketone, buffadienolide	
Root	flavonoids, phytosterol, alkaloids, amino acids, tannins,	
	glycoside, and fatty acids [26], ascorbic acid, crocetin, D-	
	glucoronic acid, linoleic acid.	
Plant	c-tetrahydroxyl-6-C-[alpha-lrhamnopyranosylb-D-	
	trihydroxyl8-C-[a-l-rhamnopyranosylb-	
	Dglucopyranosyl flavo-tetrahydroxyl6-C-[a-l-	
	rhamnopyranosyl b-Dglucopyranosyl flavone	
Stem	m-[N-(3-hydroxypyridone-4)]-aminopropionic acid [27],	
	5-MeODMT [2], mimosine	
Aerial Part	O-glycosyl flavonoids named isoquercitrin, avicularin	
	and apigenin-7-O-D-glucoside, and also four C-glycosyl	
	flavonoids, cassiaoccidentalin B, orientin and isoorientin	
	from the aerial part of the plant	

## TRADITIONAL USES OF MIMOSA PUDICA:

The root of M. pudica is declared to be bitter, cooling vulnerary, acrid, alexipharmic and used in the treatment of various types of diseases such as leprosy, dysentery, inflammation and many more by Ayurveda [12]. The Unani Healthcare system uses its root in the treatment of disease arising from blood impurities and bile, bilious fevers, piles and jaundice. It also reduces a toothache by the decoction of root with water. It is also found to arrest bleeding and fasten the wound healing process. It is also used in herbal preparation for a gynaecological disorder. It is beneficial in the treatment of diarrhoea, amoebic dysentery and has been researched to have medicinal properties to cure skin diseases. Studies have shown that it is also used to treat neurological problems. The flower, root, stem, leave, and the fruits are used as medicines in the traditional health care system different parts of the plants are used in India for long for treatment of various kind of ailments. Researchers have indicated that M. pudica is used to relax the mind, relieves depression, mental distress, irritability and amnesia. It is also used to enhance mood and improves the circulation of blood. It also promotes healthy cell growth and prevents baldness. In western medicine, its root was used for the treatment of insomnia, irritibility, Premenstrual syndrome, haemorrhoids and whooping cough [13].

## PHARMACOLOGICAL ACTION:

Anti-ulcer Activity: The extracts used for the activity were, 90% ethanol, methanol, chloroform and diethyl ether extract. The activity was investigated in albino rats. The models used were aspirin induced model, alcohol induced model and pylorus ligation induced ulcer and the parameters evaluated were ulcer protection, gastric ulcer protection and reduction in total volume of gastric juice, free and total acidity of gastric secretion, gastric ulcer respectively. [14]

**Analgesic and anti-inflammatory Activity:** The ethanolic extract of the leaves of M. pudica at the doses of 200 and 400 mg/kg was tested for anti-inflammatory and analgesic activity. The extract produced dose dependent and significant inhibition of carrageenan induced paw oedema. The analgesic activity was found to be more significant on the acetic acid induced writhing model than the tail flick model. The presence of flavonoids in the ethanolic extract may be contributory to its analgesic and anti-inflammatory activity. [15]

Antimicrobial Activity: The Methanolic extract of Leaves of M. pudica was tested against micro organisms like Aspergillus fumigates, Citrobacter divergens and Klebsiella pneumonia at various concentrations like 50, 100, 200  $\mu$ g/ml. Terpenoids, flavanoids glycosides, alkaloids, quinines, phenol, tannins, saponins and coumarin were the active substances found in the extract which may be responsible for this activity.[16]

Anticonvulsant Activity: The decoction of leaves of M. pudica when given intra peritoneal at a concentration of 1000-4000 mg/kg showed anti convulsant activity.

**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 enter pooling [17]

Anti-fertility Activity: The air dried Methanolic root extracts of M. pudica at a dose of 300 mg/ kg body weight/ day was administered through oral route. This dose prolonged the estrous cycle. The extract of the root altered the estrdiol secretion and gonadotropin release. The animals used for determing the activity were Swiss albino rats. [18]

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. [19]

**Aphrodisiac Property:** Ethanolic extract of roots of M. pudica were administered orally at a concentration of 100, 250, and 500 mg/kg. The standard drug used was sildenafil citrate. The animal used was Swiss albino male mice and female albino mice. The results indicated that the ethanolic extract of roots of M. pudica produced a significant and sustained increase in the aphrodisiac activity of normal male mice, without any adverse effects. [20]

Anti hyperglycemic Activity: The chloroform extract of leaves of M. pudica was used for determing the anti hyperglycemic activity. The animal used was Wister albino rats. The chloroform extract exhibited atherogenic index and protection against hyperlipidemic activity. The bioactive constituents responsible for this activity may be flavanoids, glycosides and alkaloids. [21]

**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.[22]

**Wound healing Activity:** The wound is defined as a loss or breaking of cellular and anatomic or functional continuity of living tissues. Healing of wound is a biological process that is initiated by trauma and often terminated by scar formation. Screening for wound healing activity was reported to be performed by using excision and incision wound models which reveals that Mimosa pudica chloroform extract posses significant wound healing at dose of 200mg/kg in 5% ointment of leaf extract [23].

**Depilatory Effect:** Toxic alkaloid, such as L-mimosine is reported to be present in higher proportion in leaves than bark and roots of plant and is also responsible for depilatory effect & it was reported that depilatory activity of mimosine noted during the 1st hair growth cycle of the mouse at the dose of  $10\mu$ l which was injected via s.c route causes significant loss of hairs from body surface. It was reported that mimosine bears a structural resemblance to L-tyrosine & mimosine probably acts as a tyrosine analogue or tyrosine antagonist which inhibits protein biosynthesis in the living body and causes toxic symptoms including retardations of growth.[24]

## **CONCLUSION:**

From above discussion we can conclude that the Mimosa pudica plant shows various pharmacological and biological activities with different aspect of treating the diseases and disorders with help of herbal therapy using above plant also indicating the least adverse reactions as the benefit of natural therapy Herbal therapies applied worldwide to reduce adverse drug reaction, improve patient compliance, improve quality of life, and also enables its use in future research for treating different medical conditions.

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### **CONFLICT OF INTEREST:**

Author's have no conflict of interests.