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Review Article

A REVIEW ON BIOPHYTUM SENSITIVUM**Harithahareendran.G¹, Abhishek B Vijayan¹, Arya. S. S¹, Mrs. Anusree S²,
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Article Received: March 2024**Accepted: April 2024****Published: May 2024****Abstract:**

Biophytum sensitivum (L) DC, a medicinal plant from the Oxalidaceae family, is widely used in traditional medicine across Asia, Africa, and the Philippines. Known as one of the ten sacred Ayurvedic plants, it thrives in tropical, shaded environments. Despite propagation challenges, B. sensitivum is valued for its immunomodulatory, analgesic, antipyretic, antitumor, antibacterial, antihypertensive, antidiabetic, antioxidant, chemo protective, anti-asthmatic, and anti-inflammatory properties. Rich in phenolic compounds, saponins, and essential oils, it is traditionally used to treat asthma, stomach-ache, insomnia, convulsions, chest pain, skin diseases, and snake envenomation.

Keywords: *Biophytum sensitivum, Pharmacology, Chemical constituents, Medicinal properties*

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INTRODUCTION:

Biophytum sensitivum (L) DC is an ethnomedicinal plant belongs to the Oxalidaceae family which is mainly used in folklore medicine. This is a highly valuable medicinal herb grows in the tropical regions of Asia, Africa and Philippines. Flower of this plant is considered as one of the ten sacred plant which are called as Dashapushpam the category of ayurvedic essential plants in traditional culture of Kerala. [1] Its features are similar to that of touch me not plant. It is commonly known as Life plant which is a mesophytic shrub grows in shade of trees. [2] It can easily be propagated from seeds and plant grows on the damp soil. Seeds of the plant is dormant there by the cultivation of plant is difficult.

Various extracts of the plant show immunomodulatory, analgesic, anti-pyretic, anti-tumor, anti-bacterial, antihypertensive, antidiabetic, antioxidant, chemoprotective, radioprotective, anti-asthmatic, anti-inflammatory activities.[3] The plant contains rich source of phenolic and polyphenolic compounds, saponins, tannins, essential oil, polysaccharides, and pectin.[4] Traditional practices of the plant are bitter, expectorant, stimulant, and tonic in ayurveda. And it is recommended for the treatment of asthma, stomach-ache, insomnia, convulsions, cramps, chest pain, and convulsions and also for chronic skin disease. *B. sensitivum* is one of the plants which is used against snake envenomation. The decoction of whole plant is used for asthma.

Taxonomy [4], [6]:

BOTANICAL NAME: *Biophytum sensitivum* (L) DC

FAMILY: Oxalidaceae

KINGDOM: Plantae

PHYLUM: Tracheophyta

CLASS: Magnoliopsida

ORDER: Oxalidales

GENUS: Biophytum

SPECIES: *Sensitivum*

SYNONYMS [5], [6]

Biophytum cumingii Klotzsch, *Oxalis sensitiva* L, *Toddavaddia sensitive* (L.) Kuntze, *Oxalis cumingiana* Turcz

Common names [4], [6]:

Life plant, Sensitive plant, little tree plant

Vernacular Names [4], [6]:

- Sanskrit: Lajjalu, Jalapuspa, Krichhaha, Laghuvrikshaka, Panktipatra, Pitapushpa
- Hindi: Lakshmana, Lajalu, Zarer
- English: little tree plant, Life plant
- Malayalam: Mukutti, Nilaccurunki, Tintanali
- Kannada: Haramuni, Jalapushpa
- Tamil: Nilaccurunki, Tintaanaalee
- Telugu: Pulichinta, Attapatti, Chumi, Jala pupa
- Marathi: Lajvanti, Jharera, Ladjiri, Lahanamulki
- Gujrati: Jharera
- French: Alleluia
- Indo-China: Chua me



Figure 1: Plant of *Biophytum sensitivum*

Orgin and distribution:

B. sensitivum belongs to the family which is Oxalidaceae commonly known as mukutti is mostly found in the regions of South India in shade of trees and shrubs, in grasslands at low and medium altitudes. These are mostly found during rainy seasons. The plant comprises of sensitive plantlets and yellow color flowers resembles like a tree and that's why it is known as small tree plant. This annual herb found grows in the foothills of Himalayas (east of koshi river) Eastern Nepal.[5] Biophytum is a genus comprising of 50 species of annual and perennial herbal plants and these are distributed in tropical Asia, Africa, America, and Philippines. In India 9 species are founded among this, 3 species of *Biophytum sensitivum* DC, *B.reinwarditi*, and *B .umbraculum welw* are found to be possessed with ethnomedical properties.[5]

Botanical description:

An annual herb which actually looks like a miniature palm constitute unbranched erect hairy stem of 2.5-25 cm. mainly comprises of sensitive plantlets and flowers of yellow colour resembles like a tree and that's why it is known as small tree plant. Leaves are pinnately compound, crowded into rosette on the stem top and of 5-12 cm along with 6-12 pairs of leaflets and it is arranged as opposite. Leaflets are dorsiventral possess glandular hair, varied length stalks and unicellular heads. Short petiole which gradually increases size upward i.e. of 1.5 cm long which is oblong and apiculate at apex region.[1], [6] The dimorphic flowers, with a diameter of 8mm, yellow peduncle, numerous in quantity, and can grow up to 10cm in length. Sepals are five in number and are imbricate, lanceolate, acute, and possess parallel nerves. The petals, also five in number, are yellow in color with red markings, connate to form a salver-shaped corolla, and surpass the sepals in length. Fruits are of capsule-shaped, apiculate, ellipsoid, slightly surpassing the sepals. Seeds are ovoid and transversely striated. There are ten distinct stamens with free filaments. The vascular structure of both the stem and petiole consists of circular collateral bundles. Externally, there is a sclerenchymatous ring in the pericycle. Oxalic acid is prevalent in tissues, primarily as potassium oxalate crystals and secreted as calcium oxalate. [7] These cells form a sheath around other structures. Stomata are rubiaceous, with at least one accompanying subsidiary cell comprising two cells.

Chemical constituents:

The phytochemical analysis of *B. sensitivum* indicates the presence of wide range of chemical compounds such as phenolic and polyphenolic

compounds, essential oils, saponins, pectin and polysaccharides.[1][5] Bioflavonoid is the main bioactive constituent present i.e. amentoflavone with minute amount of cupressuflavone. Amentoflavone is quantified by reversed HPLC. In methanolic extract of roots, leaves, Amentoflavone present i.e. of 0.26% in roots, 0.33% in stems and 0.012% in leaves.[7] Other than the amentoflavone certain flavanols are present that includes luteolin 7-methyl ether, isoorientin and 3-methoxyluteolin 7-O- glucoside. Acids present in aerial parts of *b sensitivum* i.e. 4-caffeoylquinic acid and 5-caffeoylquinic acid. In addition to this orientin, isovitexin, isoorientin 7-O glycoside, isoorientin 2''-O-rhamnoside and proanthocyanidin B are also founded. Essential oils of air-dried plant were found by GC-MS and GC-FID that includes 1,4-dimethoxy benzene(24.9%), 1, 2-dimethoxy benzene(10.6%) , linalool oxide(8.1%), 2-methoxy-4-methyl phenol(3.5%), linalyl acetate, 1-octen-3-ol and isophorone.[5], [7]

Pharmacological activities:

- Immunomodulatory activity: Methanolic extract of *B. sensitivum* boost the immune system in mice. And the extract increases WBC count, bone marrow cells and stimulate the haemopoietic system.[8]
- Analgesic activity and Antipyretic activity: By the aid of tail flick method and acetic acid induced writhing are used to assess the analgesic activity in mice Methanolic extract of *B. sensitivum* reduces pain. Methanolic extract of plant reduces body temperature in yeast induced pyrexia in rats. [9]
- Antitumor activity: Stimulate the immune system by increasing WBC and bone marrow activity.[8], [10]
- Antibacterial activity: Methanol, chloroform, petroleum and acetone extract leaves shows significant antibacterial activity against *B. subtilis*, *S. aureus*, *S. pneumonia*, *K. pneumonia*, *S. typhi*, *P. vulgaris* and *E. coli*. [11]
- Antihypertensive activity: Entire plant extract shows lower blood pressure in rats and guinea pigs by blocking calcium channels. Noradrenaline induced aortic contraction is also inhibited by the extract.[9]
- Hypoglycemic activity: Aqueous and methanolic *B. sensitivum* extract decreases blood glucose level which is elevated by the application of alloxan.[12]
- Antioxidant activity: *B. sensitivum* extract scavenge free radicals like hydroxyl radicals, superoxide radicals. It also inhibits peroxidation of lipid. In mice it also inhibits the superoxide

generation.[13]

- Antifungal activity: Amentoflavone which is a major chemical constituent in *B. sensitivum* shows antifungal activity against certain strains of *Candida albicans*, *Saccharomyces cerevisiae* .[14]
- Diuretic activity: *B. sensitivum* increases the urinary output. Methanolic extract elevated the potassium and sodium ions and aqueous extract elevates potassium ions moderately.[15]
- Anti urolithiatic activity: Ethyl acetate fraction of methanolic extract of *B. sensitivum* prevented the growth of urinary stones.[16]
- Larvicidal activity: Shoot and root extract of *B. sensitivum* are employed for the biological control of mosquitoes and mosquitos borne diseases.[17]
- Anti-inflammatory activity: Aqueous extract of aerial parts and methanol extract of roots of *B. sensitivum* tested on carrageenan induced rat paw edema model. Except methanolic extract other extracts inhibit the formation of carrageenan induced paw edema.[18]
- Chemo protective activity: Ethanolic extract of *B. sensitivum* was studied against cyclophosphamide induced toxicity in mice. The extract from the plant may help in protecting cells from damage caused by carcinogens. [1]

MEDICINAL USES:

- Paste of the leaves are applied in the wounds, burns and contusions.
- Seeds of the plant are grounded with water and applied to the ulcer and wounds.[7]
- Leaves possess diuretic, astringent and antiseptic activity.
- Leaves of the plant along with jaggery is cooked and given to delivered ladies for expelling the lochia and remains from uterus.
- Decoction of roots are used in treatment of fever, lithiasis and gonorrhoea.[7], [17]
- For the treatment of diarrhea, the leaves are grounded and given with buttermilk.[5]
- For the treatment of cough, the whole plant is grounded and mixed with honey or samoolam of the plant is used.
- Smacked Plants are used in insomnia
- Induce sterility in man
- Powdered leaves and seeds are used in snake envenomation
- In Eastern Nepal the plant is used as a folk medicine against diabetes mellitus.[1], [5]

CONCLUSION:

Biophytum sensitivum, an ancient medicinal plant,

has gained a significant attention due to its diverse pharmacological properties. It exhibits significant antitumor activity, analgesic, anti-pyretic, anti-hypertensive, and anti-inflammatory, chemo protective immunomodulatory, antioxidant, antibacterial, antidiabetic, and diuretic properties.

Biophytum sensitivum holds promise as a valuable medicinal plant with multifaceted applications. Its rich chemical composition and diverse biological activities warrant continued investigation for future healthcare advancements.

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