

## A SHORT REVIEW ON CALLUS STUDIES OF *BIOPHYTUM SENSITIVUM* LINN.

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### ABSTRACT

Medicinal plants have been used as traditional treatments for numerous human diseases for thousands of years and in many parts of the world. The natural products derived from medicinal plants have proven to be an abundant source of biologically active compounds many of which have been the basis for the development of new lead chemicals for pharmaceuticals. Phytochemical constituents are the basic source for the establishment of several pharmaceutical industries. The constituents present in a drug or plant play a significant role in the identification of crude drug. The present study review on callus extracts of *Biophytum sensitivum* has showed very potent comparatively with wild plants Hence, these is need to be isolated, characterized and carry out further pharmacological evaluation. Phyto pharmacological screening of medicinal plants and their extracts will

reveal their presence of valuable compounds and provide insight into new ways of treatment with new drugs.

**KEYWORDS:** *Biophytum sensitivum*, callus extracts, pharmacological, phytochemical, antimicrobial.

### INTRODUCTION

Medicinal plants are the most important source of life saving drugs for the majority of the world population. Even today, the World Health Organization estimates that up to 80 percent of the people in developing countries still rely on traditional medicine for their primary health care needs.<sup>[1]</sup> A large number of medicinal plants are explored from the natural flora for the commercial production of drugs.

*Biophytum sensitivum* common name is life plant, little tree plant and sensitive plant belonging to Oxalidaceae family, Attapatti, Chumi, Jala pushpa in Telugu, Lakshmana, Lajalu in Hindi. It is an annual herb which looks like a miniature palm, with unbranched, erect, glabrous or hairy stems from 1.2-2.5 cm long, short or slender or glabrous or hairy. Leaves are sensitive, pinnately compound, crowded into a rosette on the top of the stem 3.8-7.5 cm long with 6-12 pairs of leaflets. Flowers are dimorphic, 8 mm across, yellow peduncle, many of various lengths up to 10 cm long. Sepals are 5 lanceolate, imbricate and acute with parallel nerves. Petals are 5 yellow with red marking, connate into slaver shaped corolla and much exceeding the sepals, lobes rounded. Corolla much exceeding the sepals, lobes rounded style nearly glabrous. The fruit is a capsule which is ellipsoid, apiculate, slightly exceeding the sepals. Seeds are avoided and transversely striate. Stamens are 10, distinct filament free.<sup>[2]</sup>

It possesses a wide spectrum of medicinal properties including positive effects in inflammatory diseases.<sup>[3, 4]</sup> Diabetic drink formulation from this plant is effective in treating diabetes. It possesses a wide spectrum of medicinal properties namely antiseptic properties, asthma and phythisis,<sup>[5]</sup> including positive effects in inflammatory diseases.<sup>[6]</sup> The work on *Biophytum sensitivum* has reported various pharmacological activities including protective effect on radiation-induced damage in mice,<sup>[7]</sup> immunomodulatory activity,<sup>[8]</sup> inhibition of tumor specific angiogenesis,<sup>[9]</sup> effect on cell mediated immune response in mice,<sup>[10]</sup> chemo protective effect,<sup>[11]</sup> anti-angiogenesis effect,<sup>[12]</sup> antioxidant potential,<sup>[13]</sup> and anti-inflammatory activity.<sup>[14]</sup> The biological activity of the plant shows hypoglycaemic,<sup>[15]</sup> hypocholesterolemic<sup>[16]</sup> effects. Powdered dry leaves of the plant are a known traditional remedy for the treatment of Madhumeha.<sup>[17]</sup> Diabetic drink formulation from this plant is effective in treating diabetes.

### Callus Culture Studies

Callus tissue was not uniform. Some were of fine texture and some were of nodular. These differences can be attributed to various factors like type of the explant, constituents of the medium and cultural environment. Plant tissue culture is a boon which can help to produce large quantities of the herbal material. The tissue culture system is a very useful tool for both studying and producing economically important secondary metabolites.<sup>[18]</sup> Based on Previous reports *Biophytum sensitivum* callus from leaf explants cultured on MS medium supplemented with various auxins (2, 4-Dichlorophenoxyacetic acid (2, 4-D),  $\alpha$ -Naphthalene

Acetic Acid (NAA) and Indole Buteric Acid (IBA), cytokinins (6-Benzyladenine (BA) Kinetin (KN) and cytokinin-auxin combination (BA+NAA) in different concentrations (0.5 to 5.0 mg/l) were used. BA 1mg/l, in combination with NAA (1.0 mg/l) also produced maximum amount of callus. <sup>[19]</sup>

### Phytochemical analysis

Cell cultures which have been used extensively for *in vitro* secondary metabolite production were obtained from callus tissue through cell suspension culture. The establishment of callus cultures has considerable potential for the production of known and novel secondary metabolites. Cell cultures that have been used extensively for *in vitro* secondary metabolite production were obtained from callus through cell suspension culture. Zhao *et al.*, 2001 <sup>[20]</sup> reported that callus culture could provide alternative supply of secondary metabolites for use in medicine and stimulating the production of novel compounds not found *in vivo*. Phytochemical constituents are the basic source for the establishment of several pharmaceutical industries.

Kala *et al.*, 2014 <sup>[21]</sup> reported that the phytochemical study of hexane, chloroform ethyl acetate and methanolic callus extracts of *Biophytum sensitivum*, indicates the presence of flavonoids, terpenoids, saponins quinones and phenols.

### Antimicrobial screening

Since their discovery during 20<sup>th</sup> century, antimicrobial agents have substantially reduced the threats posed by infectious diseases. The use of these “wonder drugs” has lead to a dramatic drop in deaths from diseases that were previously wide spread, untreatable and frequently fatal. These drugs have also contributed to the major gains in life expectancy. The bacterial infections which contribute mostly to human diseases such as acquired infections are also developing resistance against drugs used to treat them. Callus cultures from medicinal plants have been established under suitable conditions to enable production of anti-microbial substances *in vitro*. <sup>[22, 23]</sup>

Antimicrobial activity of leaf callus extracts of *Biophytum sensitivum* using various solvents revealed that the callus contain phytochemicals which can inhibit the growth of various microbes. Among all the four solvents used for extraction of phytochemicals, only three solvent extracts showed great affinity to inhibit the growth of 12 bacterial species. Strong inhibition of growth measured as zone of inhibition is observed in all Gram positive and

Gram negative bacteria indicates that the various callus extracts of *Biophytum sensitivum* contain valuable phytochemicals.<sup>[21]</sup>

Leaf callus extracts of *Biophytum sensitivum* inhibited the growth of six fungal species and is ineffective against two species namely, *Fusarium solani* and *Aspergillus niger*. *Fusarium oxysporum* and *Rhizoctonia solani* also showed minimal response with chloroform and methanol extracts. In other extracts they are irresponsive. *Trichoderma viride*, *Helminthosporium solani* and *Candida albicans* potentially inhibited by extracts of *Biophytum*. Though the extracts of *Biophytum* showed antifungal activity in few species but the activities are very potent.<sup>[21]</sup>

### Pharmacological screening

Despite the belief that the majority of clinical drugs are synthetic in origin, it is interesting to note that 6 out of the top 20 pharmaceutical prescription drugs dispensed in 1996 were natural products and that over, 50% of the top 20 drugs could be linked to natural products research.<sup>[24]</sup> It is estimated that in 1997 the world market for phyto medicinal products was US\$ 10 billion, with annual growth of 6.5%. Presently, about 25% of the drugs prescribed being in current use. Of the 252 drugs considered as basic and essential by the WHO, 11% are exclusively of plant origin and a significant number of synthetic drugs obtained from natural precursors. There are 119 drugs of known structure that are still extracted from higher plants and used globally in allopathic medicine. These 119 plant derived drugs are produced commercially from less than 90 species of higher plants.

To find out the *in vitro* pharmacological screening by used methanol callus extract of *Biophytum sensitivum* has shown *in vitro* inhibition of enzyme activities like  $\alpha$ - glucosidase, 5- lipoxygenase, acetyl cholinesterase and tyrosinase, but the potency (IC<sub>50</sub>) was found to be low including with antioxidant activity. The occurrence of antioxidant activity may be due to the presence of phenolic compounds in the methanol callus extract. The reason for low antioxidant activity of *Biophytum sensitivum* callus extract could be due to presence of phenol compounds in low concentration.<sup>[25]</sup> In the case of *Biophytum sensitivum* callus extracts, important finding is that methanol extracts of *Biophytum sensitivum* has shown significant and remarkable cytotoxic activity.<sup>[26]</sup>

## CONCLUSION

This plant leaf callus can be further subjected to enhancement and isolation of the therapeutic antimicrobial and carry out further pharmacological evolution. It is highly valuable species, with impressive range of medicinal uses. This review is very useful for further work to isolate the active principle from the callus extracts and to carry out pharmacological studies.

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