

Pharmacological and Tissue Culture Studies on *Eclipta Alba*: A Review

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Abstract: *Eclipta alba* of family (Asteraceae) is common hair-oil plant locally known as *Bhringraj* grow as a weed throughout India. The plant have been reported to possess enormous pharmacological activities such as Hepatoprotective, hair tonic, analgesic, antibacterial, antifungal, anti-cancerous, diuretic and many more. As almost every part of the plant is of medicinal use and it is very popular medicine in Indian ayurvedic system, plant has been harvested in huge amounts. Due to over exploitation of *Eclipta alba* it is in the list of endangered plant species. The increasing demand of *E. alba* in herbal industry, less availability and unmanaged harvesting also contribute to the aforementioned factors. The application of tissue culture can be significant for the conservation of endangered plants. This review consists all the updated information about secondary metabolites, medicinal properties and tissue culture studies on *Eclipta alba*.

Keywords: *Eclipta alba*, *Bhringraj*, pharmacological activity, Tissue culture

I. Introduction

Eclipta alba of family (Asteraceae) is common hair-oil plant locally known as *Bhringraj* grow as a weed throughout India. The habit of *Eclipta alba* is completely diverse. It may be entirely erect or with some prostrate branches or sometimes completely prostrate. The plant is an annual and is found to thrive throughout the year flowering and fruiting freely. It can tolerate warm conditions and heavy rainfall and also is tolerant to saline conditions and higher altitude. *E. alba* is an edible plant and of great economic worth both for its protein content as well as existence of essential amino acids. *E. alba* have been reported to possess enormous pharmacological activated such as Hepatoprotective, hair tonic, analgesic, antibacterial, antifungal, anti-cancerous, diuretic and many more. As almost every part of the plant is of medicinal use and it is very popular medicine in Indian ayurvedic system, the plant has been harvested in huge amounts. Due to over exploitation of *Eclipta alba* it is in the list of endangered plant species. The increasing demand of *E. alba* in herbal industry, less availability and unmanaged harvesting also contribute to the aforementioned factors. *Eclipta alba* is one of the endangered plant and therefore its conservation is of great need and importance in the present scenario. The tissue culture technique has been found of great significance for the conservation of endangered plants.

II. Secondary Metabolites

The vast range of secondary metabolites showing antimyotoxic, antimicrobial, antihepatotoxic, antioxidant, antihyperglycemic, rejuveniser and antivenom action etc. has been investigated and reported in *Eclipta alba*. The bioactive compounds responsible for these activities are alkaloids, flavonoids, Phenolic compounds, Tannins, Saponin etc.¹ Plant derived secondary metabolites are really important due to their pharmacological activities especially of polyphenols.² Different bioactive compounds like phenol, alkaloid, Flavonoid and saponin are found in *Eclipta alba*. *Eclipta alba* (Linn.) consists of phytosterol, β -amyirin, triterpenes such as ecalbatin, echinocystic acid, ursolic acid; flavones such as Luteolin and coumarin such as wedelolactone.³ The plant contains a wide range of bioactive constituents such as alkaloids, flavonoids, glycosides, polyacetylene, stigmasterol, wedelolactone, demethylwedelolactone, a-terthienylmethanol, dimethylwedelolactone-7-glucoside etc.⁴ Qualitative analysis of the phytochemicals of aqueous extracts revealed the presence of carbohydrates, saponins, phytosterols, phenols, flavonoids and tannins in *E. alba* plants⁵.

III. Pharmacological Studies

Alcoholic extracts of *E. alba* contain variety of natural pain killing substances which help to overcome mild to moderate pain without any side effect.⁶ The extracts of *Eclipta alba* were found to possess antihelminthic activity on *Pheretima posthuma*, *Haemonchus contortus* worms^{7,8,9}. Chemoprevention using herbal substances from nature is presently considered as one of the most remarkable strategies for cancer prevention due to its least side effects and easy accessibility. The various extracts of *Eclipta alba* (different parts and whole plant) have been found to reveal potent anticancerous effect¹⁰⁻¹⁵. The water extract of *Eclipta alba* exhibited effective inhibitory activity with an IC₅₀ value of 4.8 μ g/ml followed by the methanol extract¹⁶. Apart from that *Eclipta alba* extracts have been found to possess antioxidant potential, anti-inflammatory effect,

antimicrobial activity and hepatoprotective effects.¹⁷⁻²⁵ The extracts of *Eclipta alba* have been found to show significant effects in reduction of time required for hair growth when applied topically in paste form. It has been also found effective in premature gray hair treatment also.^{26,27} Various extracts of *Eclipta alba* exhibit very protect effect against various skin problems. An Ayurvedic formulation consisting *E. alba* powder showed complete remission to 22.6% and ceased the recurrence of the disease in 89.5% patients of “Vicharchika” (eczema)^{28,29}.

IV. Tissue Culture Studies

A protocol was developed to shorten the time required for micropropagation of elite variety of *Eclipta alba*³⁰. P. An efficient rapid and large scale in-vitro clonal propagation of this valuable medicinal herb by enhanced axillary shoot proliferation in cotyledonary node segment.³¹ Micropropagation of *Eclipta alba* (Linn) by an efficient and reproducible protocol of mass propagation of *Eclipta alba* was standardized by culturing shoot tips and nodal segment taken from in-vitro raised plants³². Rapid in-vitro propagation of *Eclipta alba* (Linn) Hassk through high frequency axillary shoot proliferation has been achieved by an efficient protocol developed for in-vitro propagation of *Eclipta alba* through axillary buds multiplication.³³ Germination potential and growth behaviour of *Eclipta alba* has been achieved by laboratory experiments from the experiments conducted to determine dormancy in *Eclipta alba* seeds³⁴. A protocol was established for mass propagation of *Eclipta alba* through in-vitro culture apical and axillary buds of sprouts from selected plant were used as explants.³⁵ An improved micropropagation of *Eclipta alba* was achieved by in-vitro priming with chloro-choline chloride by an efficient method of micropropagation from young nodal axils of shoot tip explants developed by giving special attention to priming in-vitro plantlets in view of increasing their hardening ability after transplantation *ex-vitro*.³⁶ In-vitro proliferated shoots of *Eclipta alba* were encapsulated in calcium alginate beads for large scale clonal propagation, short term conservation and germplasm exchange and distribution.³⁷ Highly competent node derived callus were obtained by developing an efficient protocol for production of somatic embryos in *Eclipta alba*.³⁸

V. Conclusion

Medicinal plants are nature's precious gift to human beings. India is the largest producer of medicinal herb and is approximately called the botanical garden of the world. A large population throughout the world is moving towards herbal medication system because of its negligible side effects and efficacy. The increased harvesting coupled with restricted cultivation and inadequate attempts for conservation of medicinally important and endangered plant species strikingly leads to deforestation with rapid loss of medicinal plant wealth and also depleted the production of important secondary metabolites like alkaloids, terpenoids, steroids, saponins, phenolics, flavonoids and amino acids etc. Last few decades have been very crucial and of great interest in using micropropagation techniques for quick and large scale propagation of commercially important plants. The plants cells and tissues are totipotent i.e., can regenerate to a complete organism from a single cell or tissue when cultured under sterile conditions in suitable growth media and controlled environmental conditions, this property of plants have been utilizes to produce a large number of commercially important plants. Currently this technology is not only being used to save the endangered species but also being used to produce more efficient and important plants by genetic transformations and different crop improvement techniques. Review concludes the presence of wide range of value-aided phytochemicals in *E. alba*. Considering its great divergence with huge possibility as potent herbal drug makes it a valuable natural resource for future healthcare aids. As enlisted earlier, it exhibits wide range of pharmacological activities its enormous harvesting and utilisation may lead to ecological imbalance and even make it extinct. So it is important to grow it in *in-vitro* conditions to maintain the need and supply balance without any harmful effect on environment. This review gives a brief idea about all those efforts being made towards this direction.

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