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## Pharmacological and therapeutic importance of *Eclipta alba* (Bili garuga): A review

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### Abstract

India is naturally blessed with the rich diversity of flora and fauna. Floral diversity is much concentrated in the hotspots of India, among which Western Ghats harbours most of the plants with known and unknown medicinal significance. Application of plants as a source of medicines has as an ancient history and traditional knowledge of treating various diseases has passed down from one generation to another generation in India. By realising the importance of herbal medicines, cultivation and use of medicinal plants has got huge potential. *Eclipta alba* (L.) is an annual herbaceous plant, which is commonly known as Bhiringraj having its significance in traditional and folk medicines. Whole plant is considered to be having medicinal importance because of the presence of various secondary metabolites such as alkaloids, flavonoids, triterpenes and their glycosides and it is used to treat various kinds of ailments. Bhiringraj plant has several therapeutic uses like maintaining dark hair and reversing baldness, strengthening hair, preventing aging and rejuvenate hair, teeth, bone, memory, sight, hearing. Recent studies revealed that Bhiringraj plant also has curative properties such Nephroprotective activity, Anti-diabetic, Analgesic, Antibacterial, Anti-breast tumor activity, Anticancer activity, Anti-hepatotoxic, Hair growth promoter activity and Memory enhancing activity and It is considered as a potent medicinal plant with tremendous pharmacological significance.

**Keywords:** Traditional use, alkaloids, pharmacology, Western Ghats and Bhiringraj

### Introduction

India is one of the rich mega biodiversity centres with 8% of the global biodiversity in 2.4% land. It hosts four biodiversity hotspots among which the Western Ghats becoming globally significant because of its medicinal plant wealth which are having huge pharmacological importance. India has a long history of medicinal plants and contribution of medicinal plants in the health care system of India is most significant (Patro, 2016) [19]. For the development of new drugs, medicinal plants are the key raw materials, hence there is a tremendous demand for the medicinal plants all over the world to treat various diseases.

*Eclipta alba* (L.) commonly known as bhiringraj and false daisy, belongs to Asteraceae family. It is one of the ancient medicinal herbs known to mankind. Bhiringraj is a small annual medicinal herb having erect stem. Traditionally in India this plant is used to treat jaundice, night blindness, and headache. Most commonly bhiringraj is used as hair tonic for nourishment, blackening, strengthening and antidandruff of hair and it is often regarded as the 'king of the hair'. The whole plant and seeds are used in the form of oil, powder and juice to treat various diseases. It is usually found spreading in moist tropical and sub-tropical regions (Mithun *et al.*, 2011) [15].

### Taxonomical Classification

Kingdom	:	Plantae
Division	:	Magnoliophyta
Class	:	Magnoliopsida
Subclass	:	Asteridae
Order	:	Asterales
Family	:	Asteraceae
Genus	:	<i>Eclipta</i>
Species	:	<i>Eclipta alba</i> (Mukhopadhyay <i>et al.</i> , 2018) [16].

Several vernacular names of *Eclipta alba* in different languages, in Hindi, it is known as Bhangar, Bhangaraiya; Bili garuga, bhiringaraja in Kannada; Bhiringaraj in Sanskrit; Kesuriya, Kesari in Bengali; kalenniyam in Malayalam; : Karisalai in Tamil; Guntagalagara in Telugu and Maka in Marathi (Mukhopadhyay *et al.*, 2018) [16].

**Plant Description**

- Bhringaraj is an annual erect herb, having spreading habit and can grow up to 30-40 cm high
- Stem is flat or cylindrical, rough, highly pubescent, branched (rooting at the nodes) and blackish green in colour and pubescent
- The leaves are simple, opposite, sessile to subsessile, 2.0-6.2cm long and 1.5-1.9cm wide, oblong, lanceolate, stigose with appressed hairs on both surfaces
- The flowers are white, small, arranged in small clusters and flowering stalk arises from the axis of the leaf; inflorescence is racemose; The flowers may be hermaphrodite or unisexual: usually pentamerous, actinomorphic or zygomorphic and epigynous.
- The fruit is formed by fusion of two carpels, which even after drying do not break open and each fruit consist of one seed. Achene 3-angled, slightly flattened
- Flowers and fruits appears throughout the year (Parrey and Ahmad, 2016; Vikaspaedia)<sup>[18]</sup>

**Active constituents**

The chemical composition of *Eclipta alba* is very wide and whole plant is having pharmacological significance because of the presence wide active principles which includes coumestans, alkaloids, flavonoids, glycosides, polyacetylenes, triterpenoids. The leaves contain a variety of other compounds like stigma sterol, a-terthienylmethanol, Demethylwedelolactone and demethylwedelolactone-7-glucoside. The roots give hentriacontanol and heptacosanol. The roots contain polyacetylene substituted thiophenes. The aerial part is reported to contain a phytosterol, P-amyrin in the n- hexane extract and luteolin-7-glucoside, P-glucoside of phytosterol, a glucoside of a triterpenic acid and wedel lactone in polar solvent extract. Major portion of plants containing coumestan derivatives such as wedelolactone [1.6%] and demethyl wedelolactone (Jadhav *et al.*, 2009; Parrey and Ahmad, 2016)<sup>[18]</sup>. All parts including seeds, stems, roots and leaves have significant and differing medicinal properties due to the presence of Chemical constituents which are given below:

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Plant parts	Chemical constituents (Jadhav <i>et al.</i> , 2009; Parrey and Ahmad, 2016) <sup>[18]</sup> .
Leaves	Wedelolactone [1.6%], desmethywedelolactone, desmethylwedelolactone-7-glucosidde, stigmaterol
Roots	Hentriacontanol, heptacosanol and stigmaterol, ecliptal,eclalbatin.
Aerial parts	P-amyrin and Luteolin-7-O-glucoside, Apigenin, Cinnaroside, Sulphur compounds, Eclalbasaponins I-VI
Stems	Wedelolactone
Seeds	Sterols, ecliptalbine(alkaloid)
Whole plant	Resin, ecliptine, reducing sugar, nicotine, stigmaterol, triterpenesaponin, eclalbatin, ursolic acid, Oleanolic acid.

**Traditional uses**

Traditionally various parts of the plants are used to treat various diseases such as:

Sl no.	Plant part	Uses	Reference
1.	leaf extract	a powerful liver tonic, rejuvenative and especially good for the hair	Parrey and Ahmad, 2016 <sup>[18]</sup>
2.	Seeds	Sexual debility, Tonic, Aphrodisiac	Khare, 2004
3.	Juice of Leaves	Skin diseases, allergic Urticaria, Asthma, Inflatulence, Colic and liver affections, Bronchitis, Enlarged glands, Dizziness, Vertigo, Blurred vision	Khare, 2004
4.	Paste of leaves	Applied over swelling	Khare, 2004
5.	Powder	Bronchitis, Cough, Rheumatism and Skin diseases	Khare, 2004
6.	Decoction	Invigorate the liver, Graying of hair, To staunch Bleedings, Spermatorrhoea, Menorrhagia	Khare, 2004
7.	Paste of herb	Healing effect, Headache, Toothache	Chopra <i>et al.</i> , 1958
8.	Root	Liver tonic, Emetic, Purgative, Antiseptic to ulcers, Wounds in cattle	Joshi, 2004; Khare, 2004
9.	Whole plant	Rejuvenating, Age-sustaining tonic, Detoxifying, Deobstruent, Antiseptic herb in vitiated blood, Anaemia, Splenic and liver enlargements, Catarrhal jaundice, Hyperacidity, Gastritis, Dysentery, Anticarrhal, Spasmogenic, Hypotensive properties	Khare, 2004

**Pharmacological properties**

Plant part	Pharmacological Action/Bioactivity	Bioactive fractions/compound	Reference
Leaf	Nephroprotective activity	Methanolic leaf extract	Dungca, 2016 <sup>[8]</sup>
Whole plant	Anti-breast tumor	Methanol extract of <i>Eclipta alba</i> - chloroform fraction	Arya <i>et al.</i> , 2015 <sup>[2]</sup>
Whole plant	Analgesic activity	Ethanollic and alkaloid extracts	Sawant <i>et al.</i> , 2004 <sup>[20]</sup>
Whole plant	Anti-aggression activity	Aqueous extract of <i>Eclipta alba</i>	Khare 2004
Aerial parts	Anti-bacterial activity	acetone, ethanol, methanol, aqueous and hexane extract	Pandey <i>et al.</i> , 2011 <sup>[17]</sup>
Whole plant	Anticancer activity	Crude methanol extract; The hydro alcoholic extract	Desireddy <i>et al.</i> , 2012 <sup>[7]</sup> ; Chaudhary <i>et al.</i> , 2011 <sup>[4]</sup>
Leaves	Anti-diabetic activity	Aqueous extract of the formulation	Hemalatha <i>et al.</i> , 2006 <sup>[10]</sup>
Leaves and Roots	Anti-hepatotoxic properties	Ethanol extract of <i>Eclipta alba</i>	Lal <i>et al.</i> , 2010 <sup>[13]</sup>
Leaves	Anti-inflammatory activity	Methanolic extract	Arunachalam <i>et al.</i> , 2009 <sup>[1]</sup>
Whole plant	Hair growth promoter activity	The methanol extract	Datta <i>et al.</i> , 2009 <sup>[6]</sup>
Dried leaves	Memory enhancing activity	Aqueous suspension of <i>Eclipta alba</i>	Banji <i>et al.</i> , 2007 <sup>[3]</sup>

## Conclusion

With the emerging worldwide interest over traditional herbal medicines, these medicines have got huge global demand all over the world for the development of new drugs; as these are natural products which are free from side effects, comparatively safe, eco-friendly and locally available. *Eclipta alba* is one such plant having pharmacological significance and this plant has been studied for various pharmacological activities like Nephroprotective activity, Anti-breast tumour activity, Analgesic activity, Anti-aggression activity, Anti-aggression activity, Anticancer activity, Hair growth promoter activity and Memory enhancing activity. Whole plant has been proved to be a medicinal active plant used for the treatment of various health issues. Still there is a vast scope for clinical evaluation of *Eclipta alba* to exploit it to its maximum potential in the pharmaceutical field because of its rich chemical constituents presence in the entire plant.

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