

A COMPREHENSIVE REVIEW OF ECLIPTA ALBA (BHRINGRAJ)

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ABSTRACT

False Daisy, or Bhringraj (*Eclipta alba* L.), is a well-known Ayurvedic medicinal plant with a long history and a wide range of therapeutic uses. This review highlights its pharmacological potential by combining contemporary scientific study with traditional wisdom. In Ayurveda, bhringraj is often used to treat liver diseases, encourage hair growth, and enhance general wellness. It has hepatoprotective, anti-inflammatory, antioxidant, neuroprotective, and antibacterial qualities due to its bioactive components, which include wedelolactone, coumestans, flavonoids, and alkaloids. Its involvement in immunological regulation, liver detoxification, hair renewal, and possible anticancer benefits has been confirmed by scientific investigations. Its effects on metabolic diseases like diabetes and hyperlipidemia have also been investigated. Clinical studies indicate that it is effective in treating skin conditions, dandruff, and alopecia. The plant is a desirable target for additional pharmacological and

cosmeceutical innovations due to its phytochemical composition and safety profile. Even with its proven advantages, more study is required to fully realize its potential, especially through clinical studies. Its incorporation into contemporary medicine will require extensive pharmacokinetic research and formulation standardization. Bhringraj is thoroughly examined in this paper, with particular attention paid to its phytochemical makeup, pharmacological effects, and possible medical uses. The plant has a wide range of pharmacological effects due

to its abundance of bioactive substances, including sterols, alkaloids, flavonoids, polyacetylenes, wedelolactone, and ecliptine. It has been shown in scientific research to have hepatoprotective function, which includes protection against hepatotoxic substances and effectiveness in liver regeneration.

KEYWORDS: Bhringraj, Hepatoprotective, false Daisy, Dandruff, Wedelolactone.

INTRODUCTION

E. alba (L.) is a member of the Asteraceae family. The ethnomedical history of this plant is extensive. The classical text "Bhavaprakash" also mentions *E. alba* and its medicinal benefits.^[1]

Bhringraj has been used since ancient times in Ayurveda, where it is categorized as "Shweta," "Peet," and "Neel," which are white, yellow, and blue blossoms, respectively. Astringent, depurative, emetic, purgative, nervine tonic, catarrhal, febrifuge, ophthalmic, styptic, tonic, anti-nociceptive, anti-leprotic, anti-hemorrhagic, anti-myotoxic, anti-hyperlipidemic, anti-diabetic, hepatoprotective, diuretic, hypotensive, nootropic, anti-venom, ovicidal, and spasmogenic are just a few of its many medicinal uses. A traditional plant, bhringraj has many ayurvedic applications. Bhringraj has a raw, harsh, and acidic flavor. 'Raj Nighantu', an Ayurvedic encyclopedia, goes into considerable depth about the significance of this plant. Bhringraj's traditional applications in Raj Nighantu include Kusthahara (for treating skin infections and diseases), Kesharanjaka (for protecting and nourishing hair), Raktapitta Shothahara (for treating blood disorders and reducing inflammation), Jantujit (for curing worm trichinosis), Rasayana (for preventing aging and cancer), and Pachana.^[3]

As a result, the plant is widely used in India as a hair oil for long, healthy black hair. Fresh leaf juice is used as a moderate bowel regulator, to improve digestion, and to increase appetite. In Ayurveda, the herb is known to have anti-aging properties. A broad tonic for debility is *Eclipta alba*. Fresh leaf juice is thought to be highly helpful in halting bleeding, and it is applied externally to minor cuts, burns, and irritation. Additionally, leaf juice combined with honey is used to treat eye and ear infections as well as upper respiratory infections in children. Compounds of the coumestan type found in *Eclipta alba* are utilized in phytopharmaceutical formulations of medications recommended to treat cirrhosis of the liver and infectious hepatitis.^[4]



1-Botanical Description^[5]

1.1 Scientific Classification

- Kingdom: Plantae
- Division: Angiosperms
- Class: Eudicots
- Order: Asterales
- Family: Asteraceae
- Genus: Eclipta
- Species: Eclipta prostrata (Synonym: Eclipta alba)

1.2 Common Names

- Sanskrit: Bhringraj
- Hindi: Bhangra, Bhringraj
- Tamil: Karisalankanni
- Telugu: Guntagalagara
- Malayalam: Kayyunni
- English: False Daisy

1.3 Habit & Habitat

- A small, branched, erect, or prostrate herb.
- Commonly found in moist places, riverbanks, and wastelands.
- Native to tropical and subtropical regions of the world, including India, China, Thailand, and Brazil.

1.4 Morphological Features

- **Root:** Fibrous root system.
- **Stem:** Cylindrical, erect or prostate, covered with fine hairs.
- **Leaves**
 - Simple, opposite, lanceolate.
 - Green in color with a rough surface.
 - 2-12 cm long with entire or slightly serrated margins.
- **Flowers**
 - Small, white, solitary, axillary, or terminal heads.
 - Belongs to the Asteraceae family, having a composite inflorescence (capitulum).
- **Fruits**
 - Small, compressed achenes, black in color, without pappus.
- **Seeds**
 - Tiny, oblong, dark brown to black, with no endosperm.

2-Phytochemistry^[6]

The phytochemistry of *Eclipta alba* underpins its extensive medicinal uses. Key bioactive compounds include:

1. **Coumestans:** Notably wedelolactone and demethylwedelolactone, recognized for their hepatoprotective and anti-inflammatory activities.
2. **Alkaloids:** Compounds like ecliptine exhibit anti-microbial properties.
3. **Flavonoids:** Luteolin and apigenin contribute to the plant's antioxidant and anti-inflammatory potential.
4. **Terpenoids:** Ursolic acid and β -amyrin are known for anti-inflammatory and hepatoprotective effects.
5. **Saponins:** Eclalbosaponins enhance immunomodulatory functions.

In order to isolate and characterize these molecules, sophisticated analytical methods like GC-MS and HPLC have proved essential. These phytochemicals serve as a basis for upcoming medication development in addition to providing therapeutic advantages.

3. Pharmacological Activities

3.1 Hepatoprotective Effects^[7]

Wedelolactone, which helps return liver enzyme levels to normal, fights oxidative stress, and encourages hepatocyte regeneration, is responsible for *Eclipta alba*'s hepatoprotective qualities. Its effectiveness in treating ailments including alcoholic liver disease and hepatitis has been shown in preclinical research.

3.2 Antimicrobial Activity^[8]

With its broad-spectrum antibacterial activity, *Eclipta alba* efficiently combats viral, bacterial, and fungal infections. Alkaloids and flavonoids work together to break down microbial cell membranes, which makes them inactive. This makes the plant a viable option for creating organic antimicrobials.

3.3 Antioxidant Properties^[9]

Numerous chronic illnesses, such as cardiovascular and neurological conditions, are exacerbated by oxidative stress. Strong antioxidant qualities are provided by *Eclipta alba*'s high phenolic and flavonoid content, which scavenges free radicals and shields cellular constituents from oxidative damage.

3.4 Anti-inflammatory and Analgesic Properties^[10]

Eclipta alba's anti-inflammatory qualities are beneficial for a variety of inflammatory illnesses, including skin problems and arthritis. The plant's bioactive components reduce pain and swelling by blocking pro-inflammatory cytokines like TNF- α and IL-6 as well as enzymes like COX-2.

3.5 Hair Growth Promotion^[11]

In Ayurveda, *Eclipta alba* is praised for its exceptional capacity to encourage hair growth and delay the onset of graying. Because of its capacity to increase hair follicle activity and extend the anagen phase of hair development, it is used in formulations such as Bhringraj Taila. Current research supports its effectiveness and shows promise in the treatment of alopecia.

3.6 Anticancer Activity^[12]

In vitro, wedelolactone and other phytochemicals found in *Eclipta alba* have demonstrated the ability to stop the growth of cancer cells and trigger apoptosis. Pathways involving the control of cell cycle proteins and pro-apoptotic factors mediate this anticancer action.

4. Traditional Uses^[13]

For many years, *Eclipta alba* has been used for a variety of therapeutic purposes in traditional medical systems. Because of its restorative qualities, it is classified as a "Rasayana" herb in Ayurveda. Important traditional applications consist of:

- **Hair Care:** Applied as oils and pastes to prevent hair fall and graying.
- **Liver Health:** Used in formulations for treating jaundice and promoting bile flow.
- **Skin Disorders:** Applied topically for managing eczema, dermatitis, and wound healing.
- **Respiratory Ailments:** Recommended for conditions like asthma and bronchitis.
- **Digestive Health:** Used to alleviate indigestion and dysentery.

5. Toxicity and Safety^{[14][15]}

Preclinical research has shown that *Eclipta alba* has an excellent safety profile despite its widespread use. Studies on acute and chronic toxicity show no appreciable side effects at recommended dosages. However, more clinical research is necessary to determine long-term safety in humans as well as possible interactions with other drugs.

6. Future Perspectives

Eclipta alba is a good option for therapeutic development due to its flexibility. Some potential avenues for future investigation are:

1. **Clinical Trials:** Expanding studies to confirm efficacy and safety in humans.
2. **Phytochemical Standardization:** Ensuring consistent quality and potency of extracts.
3. **Innovative Formulations:** Developing delivery systems like nanoemulsions to enhance bioavailability.^{[16],[17]}
4. **Genomic Studies:** Investigating genetic markers to optimize cultivation for higher yield of active compounds^[18]

DISCUSSION

It is mostly used because of its remarkable ability to strengthen and encourage hair growth. It contains a variety of phytochemical elements, including alkaloids, saponins, and cumestans, which have important biological qualities like immunomodulatory, hepatoprotective, antibacterial, antiviral, and anti-stress. Because of its nutritive qualities, certain cultures have also used it as a leafy vegetable. According to research, Bhringraj may be used in Ayurvedic medicine to treat conditions like splenomegaly, elephantiasis, leprosy, eczema, psoriasis, jaundice, cough, and anorexia.

7. CONCLUSION

Eclipta alba is well known for its ability to shield the liver and encourage hair growth. This review, however, identifies a number of additional noteworthy pharmacological actions that the plant is thought to have. These include anti-inflammatory, anti-diabetic, antifungal, antibacterial, cytotoxic, anti-hyperlipidemic, anti-hepatotoxic, anti-helminthic, anti-venom, anti-cancer, antioxidant, neuroprotective, and analgesic qualities. A significant active ingredient in *Eclipta alba*, wedelolactone, is thought to be responsible for a number of these effects. *Bhringaraj* and its extracts have not been extensively studied in clinical settings, despite its wide range of therapeutic applications.

A diverse medicinal plant with a broad range of therapeutic uses is *Eclipta alba*. Its potential in both conventional and contemporary medicine is highlighted by its extensive phytochemistry and varied pharmacological actions. Its integration will be made possible by ongoing research and clinical validation.

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