

# Phytochemical and Anatomical Screening of *Eclipta Prostrata* L. - An important Unani Medicinal Herb from Amravati District

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**Abstract:** *Eclipta prostrata* L., commonly known as *Bhringaraj* or *False Daisy*, is a creeping and moisture-loving annual herb widely distributed along roadsides, riverbanks, and wastelands. The plant is extensively used in traditional systems of medicine, where it is popularly called the “King of hairs” due to its beneficial effects on hair growth and scalp health. It is also well recognized for its hepatoprotective activity and is used in the treatment of various liver disorders. Because of its broad therapeutic importance, proper identification and standardization of this medicinal plant are essential. The present study was undertaken to evaluate the anatomical and phytochemical characteristics of *Eclipta prostrata* to establish reliable identification parameters. Detailed anatomical examination of different plant parts was carried out to observe diagnostic features that can serve as reference standards. Microscopic analysis revealed characteristic structural features useful for authentication of the species. Preliminary phytochemical screening of the plant extracts confirmed the presence of important bioactive compounds, including alkaloids, flavonoids, steroids, and terpenoids. These secondary metabolites are known to contribute to the pharmacological properties of the plant. The combined anatomical and phytochemical findings provide supportive evidence for the medicinal value of *Eclipta prostrata*. The results of this study may help in the correct identification, authentication, and quality control of this important medicinal herb in herbal formulations and pharmaceutical preparations.

**Keywords:** Anatomical studies, *Bhringaraj*, *Eclipta prostrata*, Phytochemical screening

## 1. Introduction

*Eclipta prostrata* L. (syn. *Eclipta alba*), commonly known as *Bhringaraj* or the “King of hairs,” is an important medicinal herb belonging to the family Asteraceae. It has long been used in traditional systems of medicine, particularly Ayurveda, where it is valued for its hepatoprotective and rejuvenating properties (Bhalerao *et al.*, 2013). Medicinal plants continue to be a major source of therapeutic agents, and a significant proportion of modern drugs are derived from plant secondary metabolites. Owing to their diverse bioactive compounds, higher plants serve as valuable resources for pharmaceutical, nutraceutical, and cosmetic applications (Neeraja, *et al.*, 2012). *Eclipta prostrata* is an annual, branched herb commonly found in tropical and subtropical regions. The plant is widely used as a liver tonic, hair growth promoter, and general health supplement. It is prepared as a decoction in coconut oil and used topically for headache, sinusitis, and ear infections due to its cooling and anti-inflammatory properties (Mukhopadhyay *et al.*, 2018). It is also reported to possess analgesic, antibacterial, antioxidant, antihaemorrhagic, antihyperglycemic, antiviral, and immunomodulatory activities. The therapeutic potential of the plant is mainly attributed to the presence of bioactive constituents such as flavonoids, alkaloids, glycosides, terpenoids, and steroids. Anatomical characters such as trichome structure and stomatal type are important diagnostic features for plant identification and standardization of herbal drugs. The non-glandular trichomes of *Eclipta alba* are simple, multicellular, echinate, and pointed at the apex, while the glandular trichomes are comparable to those reported in earlier studies on related taxa (Rasyid *et al.*, 2022, Prasad *et al.*, 2012, Sharma *et al.*, 2017). Glandular trichomes are functionally significant as natural sites of essential oil

secretion with medicinal potential (Perveen *et al.*, 2016). The stomata are anisocytic, surrounded by three subsidiary cells, one of which is distinctly smaller, a feature consistent with previous reports (Rasyid *et al.*, 2022, Khan *et al.*, 2013, Rahaman and Sultana, 2019). Glandular trichomes are known to play a significant role in the secretion of biologically active compounds, while anisocytic stomata are characteristic features of this species. Proper identification and quality evaluation of medicinal plants are essential to ensure the authenticity and efficacy of herbal formulations. Therefore, the present study aims to provide anatomical and phytochemical reference data for the correct identification and standardization of *Eclipta prostrata*. Whole plant is used for anaemic condition & also as antidote against snake bite. Oil & juice is used for blackening the hair. Whole plant is used in all type of cancers like blood cancer, is a brain tonic, increases eye vision. (Ahmad, S.A., 2005).

## 2. Materials and Methods

The hakims consulted for the study use to collect plant material themselves from the field. For identification, plant was brought to the laboratory, described and identified with the help of standard flora (Naik, 1998.). Fresh plants were collected and preserved in 70% FAA. Hand sections of root, stem, node and leaf were taken. For vessel studies thin slices of old roots and stems were treated with macerating fluid (5% solution of HNO<sub>3</sub> and 5% solution of K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub>) for 12 to 24 hr. The macerate was then thoroughly washed, stained with 1% aqueous safranin and measurements were made by ocular scale lens. Camera lucida sketches were drawn. Classification of Radford *et al.*, (1974) is followed for categorizing the vessel elements. For chemical analysis mature plants were collected, shade dried and powdered. Powder was preserved

in zip lock bags at 4°C and tested qualitatively for various bioactive compounds (Harborne, J.B. (1973) Gibbs, R. (1974), Peach, K. and M.V. Tracey. (1979), Kokate, C.K., *et.al* (1990) Evans, W.C. (1996). Amino acid profile was studied by two dimensional chromatography (Lederer E. and Lederer M. 1957, Harborne, J.B. 1973). Plant ash was prepared (A.O.A.C., 1975) at 400°C and various ash values were estimated following Kulkarni and Apte (2000). Qualitative analysis was undertaken to detect various mineral elements while quantitative estimation was done using flame photometer. (Johannson, D.A., 1940).

### 3. Results and Discussions

#### Macromorphology:

Erect or prostrate, much branched annual herb. Stems 6-60 cm long with rough hairs, rooting at lower nodes. Leaves opposite, sessile, oblong, lanceolate 2-15 x 0.5-2 cm, narrowing to the base, serrate, acute, hairy. Heads terminal or axil usually solitary or 2-4 together. Receptacle paleate; palea somewhat spoon shaped enclosing florets. Involucre of 2-series; outer bracts herbaceous 5 x 3 mm. appressed hairy; of inner series membranous 3 x 1 mm, ciliate on margins. Marginal florets female, ligulate; white, 3 x 6 mm long; calyx 2- dentate, outer florets somewhat larger than the florets inner series, ligule of outer series entire, that of inner series two toothed. Disc florets tubular tube 4-5 fid, white, 4-5 mm long. Achenes blackish brown, oblong, turbinate, compressed 2-2.5 mm, long, narrowly winged, surface warty. (Fig. 1-8).

#### Micromorphology

**Root** pentarch or with more than 5 xylem poles; pith large; cells polygonal thick. Epiblema gets replaced by exodermis which is outer hypodermal layer. Cortex parenchymatous; outer cortex with large air chambers: inner cortex with radially arranged files of cells large air spaces. Epidermis single layered; cells barrel shaped; pericycle single layered, cells thin walled. (Fig. 9-10). Secondary growth normal but scanty. Resin canals present in inner cortex and secondary phloem.

**Stem** circular in t.s. Epidermis cutinized and cuticularized, cells comparatively much smaller, hypodermis 2-3 layered, collenchymatous. Cortex parenchymatous; large air chambers present in outer cortex; inner cortex 2-3 layered, cells compactly placed. Resin canals present in the inner cortex. Endodermis single layered, cells barrel shaped, amyliiferous. Pericycle heterogenous; sclerenchymatous patches capping the vascular bundles. Vascular bundles conjoint, collateral, open, arranged in a ring. Pith large, cells parenchymatous. (Fig.11-12).

**Node** tri-lacunar three trace. (Fig.13)

**Lamina** dorsiventral, amphistomatous. Epidermis cutinized and cuticularized cells deeply sinuate; stomata many, anomocytic. Palisade single layered. Spongy tissue 5-6 layered, cells with irregular outlines. Entire mesophyll with large chloroplasts. Lateral veins with non-chlorophyllose bundle sheath. (Fig. 14-16)

**Midrib** with three bundles in the lower part of lamina. Vascular bundles widely spaced, arranged in c-shaped arc.

Vascular bundle single higher above. Epidermis single layered followed by a collenchymatous layer of hypodermis on both sides. Ground tissue parenchymatous, resin canals present. seen in the ground tissue neighboring the vascular bundles. (Fig. 17).

**Trichomes** present all over the plant body. Non- glandular, uniseriate, 3-4 celled. Terminal cell short, acute; trichome wall rough, warty, (Fig.18)

#### Vessels - Roots vessels (Fig R1 - R3)

Very Short (Class B)- 250 µm long - 23 – 38 µm broad

Moderately short (Class C)- 262 µm long – 38 µm broad

#### Stem vessels (Fig. S1 - S6)

Extremely small (Class A)- 138 – 154 µm long - 23 – 42 µm broad

Very Short (Class B)- 177 – 235 µm long - 23 – 39 µm broad

#### Phytochemistry

Phytochemical analysis was done for whole plant as they are used medicinally. The plant contains alkaloids, anthraquinones, cardenolide, phenolics (Naphthol), steroids/triterpenoids and Chlorogenic present. Ten free amino acids were found in the whole plant. These are aspartic acid, lantionine, glucosamine- HCl, L-cystine / Ornithine monohydrochloride, DL-alanine, threonine, proline, valine, isoleucine, Nor- leucine present. Ash yield was found to be 868 mg/gm. dry tissue. HCL soluble ash – 913 mg/gm, HNO<sub>3</sub> soluble ash – 508 mg /gm. Acid insoluble ash 87 mg./gm. 492 mg./gm respectively. Among the minerals – Sulphur, Calcium, Magnesium, Iron, Chlorine, were detected. The Sodium, Potassium and Chlorine contents were found to be 113.11 mg/gm, 103.93 mg/ gm, and 24.98 mg/gm. respectively.

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#### Conflict of Interest: None

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*Eclipta prostrata* (L.) Linn.

