

**Bird's eye view on *bhrungraj* (*eclipta alba* hassk.)****Tathe Mangal Suresh<sup>\*1</sup>, Kulkarni D.V.<sup>2</sup>, Harke Sanjay<sup>3</sup>**

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**ABSTRACT:**

Ayurveda plays an important role for healthy and disease free life. Medicinal plants can be best option for pharmaceutical industries to discover new chemical compound from it. Here, we took *Bhrungraj* commonly known as 'false daisy' well known medicinal plant, species of the plant from family Asteraceae for review purpose. In this review article we are going to focus morphology, phytochemistry, ethnopharmacology, phytochemical constituents, clinical studies and last but not the least Ayurvedic aspects of *Bhrungraj*. *Bhrungraj* is reviewed through all angles from origin and morphology up to recent research works. Ayurveda explains its different actions and modern science proves the different pharmacological activities of it. Here, we put in front of you that how medicinal plant can be used by modern science as well as ayurveda. Each part of *Bhrungraj* is traditionally used for many diseased conditions for different communities. In

ayurveda it is mainly used for hair problems. It is used as a valuable medicinal plant particularly for the treatment of liver disorders, gastrointestinal disorders, respiratory tract disorders and hair problems. A modern science proves its different pharmacological activities by using its different extracts. Various phytochemical constituents have been isolated and identified which includes wedelolactone, eclalbasaponin, urosolic acid, luteolin and apigenin. Recently performed scientific researches show that above components can form the next generation to treat cancer, liver diseases, skin and hair problem.

**KEYWORDS:** *Bhrungraj*, phytochemistry, Ayurvedic formulations.

**INTRODUCTION:**

Now a day Ayurveda plays an important role in medicinal field for disease prevention and cure. Herbal plants are the greatest source of medicine preparation. Drug development and drug discovery can improve the value of

medicinal plants. Natural origin drugs having significant role in common mans health care system of any country. It is need of today's era to think complete and perfect approach in relation to medicinal plants. Multidimensional study of particular medicinal plants can be a key of prevention and cure of diseases. Since good eyesight is essential for safe flight to bird, for developing of our views towards Ayurveda and medicinal plants we have to adopt bird's eyesight. World Health Organization (WHO) has mentioned that the medicinal plant species used as herbal medicine are more than 21,000 and out of them there are 2000 plants are used in Indian Systems of Medicines (ISM). In India approximately 4000 herbal and aromatic industries uses near about 650 to 700 plant species <sup>[1]</sup>. Here, *Eclipta alba* Hassk. a plant on which, we are going to focusing its whole study in different directions. Ayurveda already put in front of us various properties of *Eclipta alba* Hassk. This herb is identified as *Bhrungraj*. Which itself means shining like Peacock, as peacock is having different attractive colors same way *Bhrungraj* shows its various shades of qualities. We can re-evaluate or re-experiment different therapeutic uses of *Bhrungraj* with the help of both views Ayurveda as well as Modern. Due to side effects of allopathic drugs, scientists are going to approach towards herbal medicinal preparations. So, here we are discussing different pharmacological activities of *Bhrungraj* also its morphology, phytochemistry, standardization and at last but not least its importance in Ayurveda. Ayurveda explains all aspects about *Bhrungraj* in terms of qualitative and quantitative

values. *Bhrungraj* with Latin name *Eclipta alba* Hassk. belongs to family Asteraceae which is the largest family of flowering plants (Angiosperms), distributed throughout the world. There are 26 different medicinal plants included under the Asteraceae family.

<sup>[2]</sup>All plants of Asteraceae family are widely used as traditional medicines in various cultures. Among all the plants of Asteraceae family *Eclipta alba* Hassk. is having special importance. *Eclipta alba* Hassk. with remarkable results is gaining special attention among Asteraceae family. This paper review the ethno-botany, morphology, phytochemistry, pharmacology and all the dimensions of *Eclipta alba* Hassk. As it is demand of time to focus and evaluate all approaches of *Eclipta alba* Hassk. We hereby center all the activities, chemical composition, researches held on it and Ayurvedic considerations too.

From the ancient times *Bhrungraj* is a well known drug for hair disorders. Now, through the researches it has been proved that *Bhrungraj* shows excellent activities for curing several diseases. With the help of biotechnology and bioinformatics, we can prove different actions of *Bhrungraj*. Isolated chemical compositions of it can form the next generation to cure different life threatening diseases like cancer. It is traditionally used to cure many diseased conditions but it lacks adequate scientific proof of its activities and chemical constituents responsible for it. *Bhrungraj* is main drug of conventional medicine which plays an important role in the health services all over the world.

**PLANT ORIGIN AND MORPHOLOGY:**

***Eclipta alba* Hassk.** is a common weed observed mostly in India, Brazil, Bangladesh and China. It is annual herbaceous plant commonly known as “false daisy”. In India it is observed throughout about 6000 ft. It is an erect or prostrate, roughly hairy, rooting at nodes, the leaves are opposite, sessile and lanceolate. ***Eclipta alba*** specifically means white color of the flowers, its genus name comes from the Greek word meaning “Deficient” which means absence of bristles and awns on the fruit. Taxonomic nomenclature of ***Eclipta alba* Hassk.** as shown in table no.1.

**Table no.1: Taxonomic nomenclature of *Eclipta alba* Hassk.**

Kingdom	Plantae
Subkingdom	Viridaplantae
Infrakingdom	Streptophyta
Division	Tracheophyta
Subdivision	Spermatophytina
Infradivision	Angiospermae
Class	Magnoliopsida
Superorder	Asteranae
Order	Asterales
Family	Asteraceae
Genus	<i>Eclipta</i>
Species	<i>Eclipta alba</i>
Botanical name	<b><i>Eclipta alba</i> L. Hassk.</b>
Synonyms	<i>Eclipta alba</i> , <i>Eclipta prostrate</i> <i>Verbesina alba</i> , <i>Verbesina prostrate</i>

#### DESCRIPTION OF PLANT PARTS<sup>[3, 4]</sup>.

##### SYNONYMS

- Sanskrit - Kesharaj, Tekaraja, Bhrunga, Markava, Bhangara.
- Hindi - Bhangara, Bhangaraiya, Mochkand, Babri.
- English - Trailing Eclipta.

- Marathi - Bhangra, Bhringiraja, Maka.
- Bengali - Bheemraja, Kesuriya, Kesari, Kesuri, Kesuti.
- Gujarathi - Bhangaro, Bhangro, Kalugranthi, Dodhak, kalobhangro.
- Kannada - Garujalu, Gurugada, Soppu, Keshavardhana, Kodigaraju.
- Malayalam - Kayyonni, Knnunni.
- Tamil - Karisalankanni, Karisalanganni, Karisalai, kaikeshi.
- Telugu - Guntakalagara, Guntagalagara.
- Arab - Kadim -el-bint.
- Assam - Bhrngaraja.
- Oriya - Kesara, Kesarda.
- Santhal - Lal kesari.
- Sindh - Tik.
- Punjabi - Bhangra.
- Urdu - Bhangra.

#### MACROSCOPIC DESCRIPTION:





**1. Stem of Bhrungraj.  
with Stem of Bhrungraj.**



**2. Root**



**3. Whole plant** **4.**  
**Leaves, Flower and inflorescence of**  
**Bhrungraj.**

1. **Root** -Variety of secondary branches arise from main root, up to about 7 mm in diameter, grayish in color achromatic and cylindrical in form.
2. **Stem**- Nonwoody branched, seldom maturation at nodes, cylindrical or flat, rough due to broken white hairs, node discrete, greenish and rarely brownish in color.
3. **Leaf** - Opposite, sessile to subsessile, 2.2 - 8.5 cm long, 1.2 - 2.3 cm wide, sometimes rectangular, lanceolate, subentire, sub-acute or acute, strigose with adpressed hairs on both surfaces.
4. **Flower** - Solitary or two, together on unequal axillary peduncles; involucral bracts concerning eight, ovate, obtuse or acute, herbaceous, strigose with laden hairs; ray flowers ligulate, ligule small, spreading, scarcely as long as bracts, not toothed, white; disc flowers tubular, corolla often four toothed; pappus absent, except occasionally very minute teeth on the top of achene; stamen five,

filaments epipetalous, free, anthers united into a tube with base obtuse; pistil bicarpellary; ovary inferior, unilocular with one basal ovule.

5. **Fruit** - Achenial cypsela, one seeded, cuneate, with a narrow wing, covered with wart excrescences and brown in color.

6. **Seed** - 0.2 - 0.25 cm long, 0.1 cm wide, dark brown, hairy and non endospermic.

#### **REPORTED PHYTOCHEMICAL CONSTITUENTS:**

*Eclipta alba* Hassk. contains a number of bioactive chemical constituents. The reported constituents are shown as table no.3

**Table no.2: Reported bioactive chemical constituents** [5, 6, 7, 8]

Sr. No.	Nature of Phytoconstituents	Phytoconstituents
1.	<b>Coumestan</b>	Wedelolactone, demethylwedelolactone, demethylwedelolactone-7-glucoside
2.	<b>Terpenoids and their glycosides</b>	Eclalbasaponins VII–X (taraxastane triterpene glycosides), eclalbasaponins I–VI (oleanane triterpene glycosides), eclalbosaponins I–VI (triterpene glycosides), ecliptasaponins C and D (triterpenoid glycosides), $\alpha$ -amyrin, oleanolic acid, ursolic acid (triterpenoids)
3.	<b>Sterol</b>	Stigmasterol, daucosterol, stigmasterol-3-O-glucoside, $\beta$ -sitosterol
4.	<b>Alkaloids</b>	[(20S)(25S)-22,26-imino-cholesta-5,22(N)-dien-3 $\beta$ -ol] (verazine), [20-epi-3-dehydroxy-3-oxo-5,6-dihydro-4,5-dehydroverazine], [(20R)-20-pyridyl-cholesta-5-ene-3 $\beta$ ,23-diol] (ecliptalbine), [(20R)-4 $\beta$ -hydroxyverazine], [4 $\beta$ -hydroxyverazine], [(20R)-25 $\beta$ -hydroxyverazine], [25 $\beta$ -hydroxyverazine]
5.	<b>Flavonoids</b>	Luteolin-7-glucoside, luteolin, apigenin, orobol (isoluteolin)
6.	<b>Sesquiterpene lactones</b>	5-hydroxymethyl-(2,2':5',2'')-terthienyl tiglate, 5-hydroxymethyl-(2,2':5',2'')-terthienyl agelate, 5-hydroxymethyl-(2,2':5',2'')-terthienyl acetate
7.	<b>Terthienyl aldehyde</b>	Ecliptal
8.	<b>Fatty alcohols</b>	Hentriacontanol, heptacosanol
9.	<b>Volatile oils</b>	Heptadecane, 6,10,14-trimethyl-2-pentadecanone, n-hexadecanoic acid, pentadecane, eudesma-4(14),11-diene, phytol, octadec-9-enoic acid, 1,2-benzenediacarboxylic acid diisooctyl ester, (Z,Z)-9,12-octadecadienoic acid, (Z)-7,11-dimethyl-3-methylene-1,6,10-dodecatriene, (Z,Z,Z)-1,5,9,9-tetramethyl-1,4,7-cycloundecatriene
10.	<b>Saponins</b>	Eclalbatin (triterpene saponin), dasyscyphin C
11.	<b>Polyacetylinic compounds</b>	$\alpha$ -Terthienylmethanol, polyacetylenes, polyacetylene substituted thiophenes



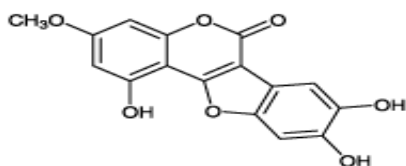
12.	Phenolic acids	Protocatechuic acid, 4-hydroxy benzoic acid
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### 1. Coumestans:

Coumestan is an organic compound which is derivative of coumarin. Wedelolactone and demethylewedelolactone are major coumestan isolated from *Eclipta alba* Hassk, percentage of them are 15.9 % and 3.5 % respectively <sup>[9]</sup>. Coumestan is responsible for maximum pharmacological activities of it and main active compounds in *Eclipta alba* Hassk are wedelolactone and desmethylwedelolactone <sup>[10]</sup>

### 1. Wedelolactone:

2.



**Fig.1: chemical structure of Wedelolactone**<sup>[11]</sup>

IUPAC name: 1, 8, 9-Trihydroxy-3-methoxy-6H-[1] benzofuro [3, 2-c]chromen-6-one

Chemical formula: C<sub>16</sub>H<sub>10</sub>O<sub>7</sub>

Molecular mass:  
314.249 g·mol<sup>-1</sup>

Wedelolactone (7-methoxy-5, 11, 12-trihydroxy-cumestan) is synthesized mainly by *Eclipta alba* Hassk. <sup>[12]</sup> Wedelolactone can be used as prevention and curative both purpose of inflammatory diseases. Many researches proves that it is best anticancer compound in *Eclipta alba* Hassk. It is proved that isolates from *Eclipta alba* Hassk.

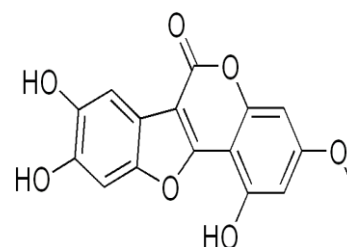
can be used as alternative and effective treatment against many pharmacological activities.<sup>[13]</sup>

Wedelolactone also shows anti-glycation and anti-diabetic activity in experimental diabetic animals <sup>[14]</sup>K. P. Mansoorali et.al. experimented and stated that responsible compound for preventing oxidative stress against cerebral ischemia may be wedelolactone. <sup>[15]</sup>

Wedelolactone is best candidate drug against metastatic prostate cancer cell (In vitro).<sup>[16]</sup> It does not alter the bioavailability of paracetamol significantly, and shows hepatoprotective effect so, can be used in prolonged paracetamol therapy or paracetamol toxicity<sup>[17]</sup>. It is estimated that wedelolactone acts as phytoestrogen in breast cancer cells by stimulating ER genomic and non-genomic signaling pathways. <sup>[18]</sup> Wedelolactone also gives protective effect against CCl<sub>4</sub> induced liver damage in mice. So, it acts as a best supportive treatment against acute liver injury <sup>[19]</sup> Wedelolactone indicated in inhibition of abnormal proliferation of human renal mesangial cells via NF-kB signaling pathway.<sup>[20]</sup> It can significantly used against OH-induced damage to protect mesenchymal stem cells. <sup>[21]</sup> Wedelolactone was also evaluated for its free radical scavenging property

using different in vitro models.<sup>[22]</sup> In vitro study revealed that Trypsin inhibitory effect of wedelolactone.<sup>[23]</sup> wedelolactone inhibit invasive growth (*In vitro*) and lung metastasis MDA-MB-231 breast cancer cells in mice (*In vivo*).<sup>[24]</sup> wedelolactone not only regulate bone resorption but also help to bone formation, and therefore develop a dual therapeutic action for osteoporosis.<sup>[25]</sup> Wedelolactone proves result against inflammatory and tumor promoting events in murine skin depicting plausible role of NFkB Pathway.<sup>[26]</sup> Genetically modified wedelolactone inhibits snake venom phospholipase A2 activity by inhibiting the myotoxic activity induced by basic phospholipase A2 isolated from the venoms of *Crotalus durissus terrificus* (CB) and *Bothrops jararacussu* (BthTX-I and II)<sup>[27]</sup> Coumarin nasal formation (CNF) of *Eclipta alba* is having maximum percentage of wedelolactone which shows a promising therapeutic approach to offer protection from unexpected regular seizures alone or in combination with existing drugs in management of epilepsy.<sup>[28]</sup> Wedelolactone has best antimicrobial property (*In vitro*).<sup>[29]</sup>

### 3. Demethylwedelolactone:



**Fig.2: chemical structure of DemethylWedelolactone<sup>[30]</sup>**

IUPAC name: 1,3,8,9-tetrahydroxy-[1]benzofuro[3,2-c]chromen-6-one

Chemical formula: [C<sub>15</sub>H<sub>8</sub>O<sub>7</sub>](#)

Molecular mass: 300.222 g/mol

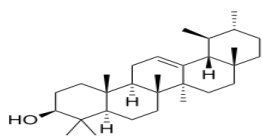
In vitro study also revealed that Trypsin inhibitory effect of demethylwedelolactone.<sup>[23]</sup>

Desmethylwedelolactone inhibit invasive growth (*In vitro*) and lung metastasis MDA-MB-231 breast cancer cells in mice (*In vivo*).<sup>[24]</sup> Genetically modified demethylwedelolactone inhibits snake venom phospholipase A2 activity by inhibiting the myotoxic activity induced by basic phospholipase A2 isolated from the venoms of *Crotalus durissus terrificus* (CB) and *Bothrops jararacussu* (BthTX-I and II)<sup>[27]</sup>

## 2. Terpenoids and their glycosides:

It contains Eclalbasaponins VII–X (taraxastane triterpene glycosides), eclalbasaponins I–VI (oleanane triterpene glycosides), eclalbosaponins I–VI (triterpene glycosides), ecliptasaponins C and D (triterpenoid glycosides),  $\alpha$ -amyrin, oleanolic acid and ursolic acid (triterpenoids).

### 1. $\alpha$ -amyrin:



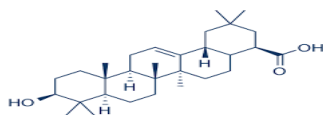
**Fig .3: chemical structure of  $\alpha$ -amyrin**

IUPAC Name: 4,4,6a,6b,8a,11,12,14b-octamethyl-2,3,4a,5,6,7,8,9,10,11,12,12a,14,14a-tetradecahydro-1H-picen-3-ol

Molecular formula:  $C_{30}H_{50}O$

Molecular Weight: 426.729 g/mol

## 2. oleanolic acid:



**Fig.4: chemical structure of oleanolic acid**

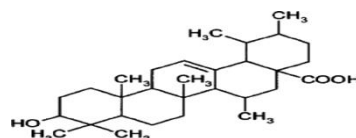
IUPAC Name: (4aS,6aR,6aS,6bR,8aR,10S,12aR,14bS)-10-hydroxy-2,2,6a,6b,9,9,12a-heptamethyl-1,3,4,5,6,6a,7,8,8a,10,11,12,13,14b-tetradecahydropicene-4a-carboxylic acid

Molecular Formula:  $C_{30}H_{48}O_3$

Molecular Weight: 456.711 g/mol

Oleanolic acid is used in the treatment of liver disorders, especially nonalcoholic fatty liver disease. <sup>[31]</sup> Oleanolic acid should be considered as a natural planned prophylactic intervention with a lot of potential in the fight against the scourge of metabolic disorders that are impacting significantly on the health systems globally. <sup>[32]</sup>

## 3. Ursolic acid:



**Fig.5: chemical structure of Ursolic acid**

IUPAC Name: (1S,2R,4aS,6aR,6aS,6bR,8aR,10S,12aR,14bS)-10-hydroxy-1,2,6a,6b,9,9,12a-heptamethyl-2,3,4,5,6,6a,7,8,8a,10,11,12,13,14b-tetradecahydro-1H-picene-4a-carboxylic acid

Molecular Formula:  $C_{30}H_{48}O_3$

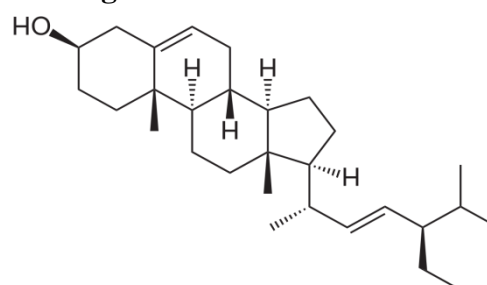
Molecular Weight: 456.711 g/mol

Eclalbasaponins VII–X isolated from *Eclipta alba* Hassk. <sup>[33]</sup> Eclalbasaponins I–VI also separated from *Eclipta alba* Hassk. <sup>[34]</sup>

## 3. Sterol:

Stigmasterol, daucosterol, stigmasterol-3-O-glucoside these sterols present in *Eclipta alba* Hassk.  $\beta$ -sitosterol also extracted from *Eclipta alba* Hassk. <sup>[35]</sup>

### 1. Stigmasterol:

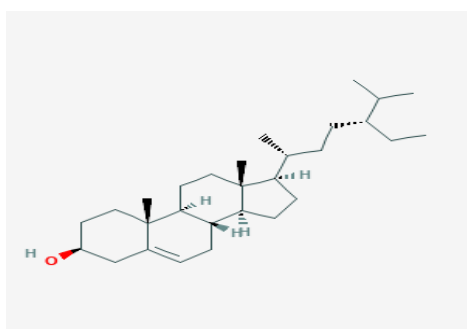


**Fig.6: chemical structure of Stigmasterol**



IUPAC Name:  
(3S,8S,9S,10R,13R,14S,17R)-17-  
[(E,2R,5S)-5-ethyl-6-methylhept-3-en-2-  
yl]-10,13-dimethyl-  
2,3,4,7,8,9,11,12,14,15,16,17-  
dodecahydro-1H-  
cyclopenta[a]phenanthren-3-ol  
Molecular Formula: [C<sub>29</sub>H<sub>48</sub>O](#)  
Molecular Weight: 412.702 g/mol  
Molecular Weight: 576.859 g/mol

## 2. $\beta$ -sitosterol:



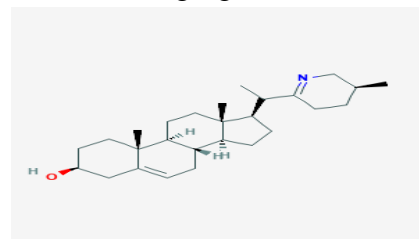
**Fig.7: chemical structure of  $\beta$ -sitosterol**

IUPAC Name:  
(3S,8S,9S,10R,13R,14S,17R)-17-  
[(2R,5R)-5-ethyl-6-methylheptan-2-yl]-  
10,13-dimethyl-  
2,3,4,7,8,9,11,12,14,15,16,17-  
dodecahydro-1H-  
cyclopenta[a]phenanthren-3-ol  
Molecular Formula: [C<sub>29</sub>H<sub>50</sub>O<sub>6</sub>](#)  
Molecular Weight: 414.718 g/mol  
In androgenic alopecia  $\beta$ -sitosterol from  
*Eclipta alba* Hassk. help to rebuild hair.  
[36]

## 4. Alkaloids:

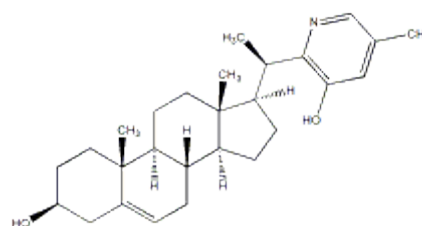
Alkaloids in *Eclipta alba* Hassk.  
are [(20S)(25S)-22,26-imino-  
cholesta-5,22(N)-dien-3 $\beta$ -ol]  
(verazine), [20-epi-3-dehydroxy-  
3-oxo-5,6-dihydro-4,5-  
dehydroverazine], [(20R)-20-  
pyridyl-cholesta-5-ene-3 $\beta$ ,23-  
diol] (ecliptalbine), [(20R)-4 $\beta$ -

hydroxyverazine], [4 $\beta$ -  
hydroxyverazine], [(20R)-25 $\beta$ -  
hydroxyverazine], [25 $\beta$ -  
hydroxyverazine]. These  
alkaloids are act as DNA  
damaging steroidal alkaloids. [37]



**Fig.8: chemical structure of Verazine**

IUPAC Name:  
(3S,8S,9S,10R,13S,14S,17R)-10,13-  
dimethyl-17-[(1S)-1-[(3S)-3-methyl-  
2,3,4,5-tetrahydropyridin-6-yl]ethyl]-  
2,3,4,7,8,9,11,12,14,15,16,17-  
dodecahydro-1H-  
cyclopenta[a]phenanthren-3-ol  
Molecular Formula: [C<sub>27</sub>H<sub>43</sub>NO](#)  
Molecular Weight: 397.647 g/mol



**Fig.9: chemical structure of ecliptalbine**

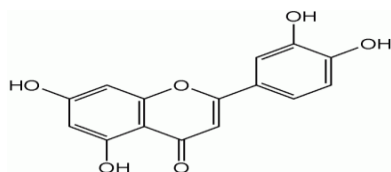
IUPAC Name: 2-[(1R)-1-  
[(3S,8S,9S,10R,13S,14S,17R)-3-hydroxy-  
10,13-dimethyl-  
2,3,4,7,8,9,11,12,14,15,16,17-  
dodecahydro-1H-  
cyclopenta[a]phenanthren-17-yl]ethyl]-5-  
methylpyridin-3-ol  
Molecular Formula: [C<sub>27</sub>H<sub>39</sub>NO<sub>2</sub>](#)  
Molecular Weight: 409.614 g/mol

## 5. Flavonoids:

Flavonoids present in *Eclipta alba*  
Hassk. are Luteolin-7-glucoside,

luteolin, apigenin, orobol  
(isoluteolin)

### 1. Luteolin:



**Fig.10: chemical structure of Luteolin**

IUPAC Name: 2-(3,4-dihydroxyphenyl)-5,7-dihydroxychromen-4-one

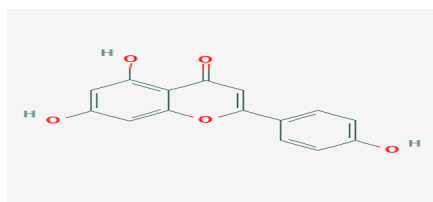
Molecular Formula:  $C_{15}H_{10}O_6$

Molecular Weight: 286.239 g/mol

Luteolin can be used for anticonvulsant effect in the treatment of epilepsy (*In vivo*).<sup>[38]</sup>

### 2. Apigenin:

Luteolin and apigenin are essential bioactive phytochemicals of *Eclipta alba* Hassk.<sup>[39]</sup>



**Fig.11: chemical structure of Apigenin**

IUPAC Name: 5,7-dihydroxy-2-(4-hydroxyphenyl)chromen-4-one

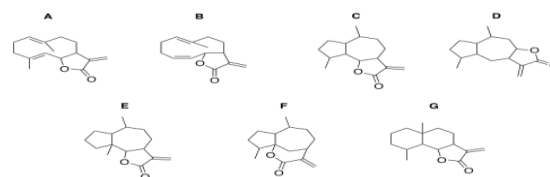
Molecular Formula:  $C_{15}H_{10}O_5$

Molecular Weight: 270.24 g/mol

### 6. Sesquiterpene lactones:

Sesquiterpene lactones are a class of [sesquiterpenoids](#) which contain a lactones ring, mainly present in plants of Asteraceae family. 5-hydroxymethyl-(2,2':5',2'')-terthienyl tiglate, 5-hydroxymethyl-(2,2':5',2'')-

terthienyl agelate, 5-hydroxymethyl-(2,2':5',2'')-terthienyl acetate are Sesquiterpene lactones in *Eclipta alba* Hassk.



**Fig.12: chemical structure of Sesquiterpene lactones**<sup>[40]</sup>

Structures of some Sesquiterpene lactones:

A: [Germacranolides](#), B:

Heliangolides, C+D:

Guaianolides, E:

Pseudoguaianolides, F:

Hypocretenolides, G:

Eudesmanolides.

### 7. Terthienyl aldehyde:

Das A.*et.al.* showed that *Eclipta* a new terthienyl aldehyde from *Eclipta alba* Hassk.<sup>[41]</sup> Abhishek Gupta (2018) *et. al.* proved that *Ecliptal* is to be best drug for obesity, insulin resistance and related metabolic syndrome.<sup>[42]</sup>

### 8. Fatty alcohols:

Fatty alcohol contains Hentriacontanol, heptacosanol.

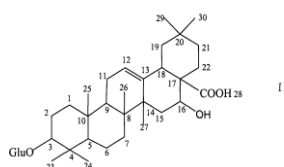
### 9. Volatile oils:

Volatile oil in *Eclipta alba* Hassk. consist of Heptadecane, 6,10,14-trimethyl-2-pentadecanone, n-hexadecanoic acid, pentadecane, eudesma-4(14),11-diene, phytol, octadec-9-enoic acid, 1,2-

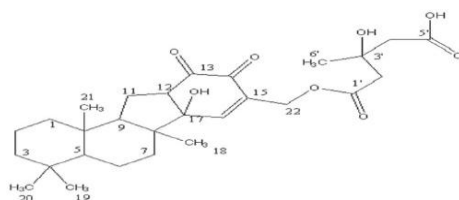
benzenedicarboxylic acid diisooctyl ester, (Z,Z)-9,12-octadecadienoic acid, (Z)-7,11-dimethyl-3-methylene-1,6,10-dodecatriene, (Z,Z,Z)-1,5,9,9-tetramethyl-1,4,7-cycloundecatriene

## 10. Saponins:

Saponins in *Eclipta alba* Hassk. are Eclalbatin (triterpene saponin), dasyscyphin C.



**Fig.13: chemical structure of Eclalbatin**<sup>[43]</sup>



**Fig.14: chemical structure of Dasyscyphin C**

IUPAC Name:  
(3S,4aR,6aS,11aR,11bR)-4,4,6a,8,11b-pentamethyl-1,2,3,4a,5,6,11,11a-octahydrobenzo[a]fluorene-3,7-diol

Molecular Formula:  $C_{22}H_{32}O_2$

Molecular Weight: 328.496 g/mol

## 11. Polyacetylinic compounds:

$\alpha$ -Terthienylmethanol, polyacetylenes, polyacetylene substituted thiophenes these are polyacetylinic compounds in *Eclipta alba* Hassk.

## 12. Phenolic acids:

*Eclipta alba* Hassk. is having a Protocatechuic acid, 4-hydroxy benzoic acid phenolic acid.

## WORLDWIDE ETHNOMEDICINAL USES OF *Eclipta alba* Hassk. :

*Eclipta alba* Hassk. is widely used in tropical and subtropical regions of India, China, Thailand and Brazil. *Eclipta alba* Hassk. has unique importance of ethno pharmacological perceptive. It is tremendously used by local practitioners, farmers, communities, tribes, villagers in the form of multidimensional purposes worldwide. Local practitioners of Mount Abu in Rajasthan, India leaves and flowers of it used for treatment of urinary problems, jaundice, asthma, and cough.<sup>[44]</sup> Local communities of Jabalpur Jattan, Gujarat district, Punjab, Pakistan Leaf paste of it is applied to treat allergy, athlete's foot and ringworm.<sup>[45]</sup> Santal tribe situated in Thakurgaon district, Bangladesh uses decoction of *Eclipta alba* with *Scoparia dulcis* and *Cynodon dactylon* in diabetic patients.<sup>[46]</sup> In Mansoor, Malegaon, India it is used as tonic and useful in enlargement of liver and spleen.<sup>[47]</sup> Tripura State, India, chakma tribe uses its leaf juice in hepatic disorders.<sup>[48]</sup> Tribal communities of Hanumangarh District, Rajasthan, India, extracted oil of Plant is used as hair tonic and orally Leaf extract is given with water for diarrhea.<sup>[49]</sup> Inhabitants of Thar Desert, India, Leaf extract of it is used in oil by applied to scalp before bedtime for insomnia.<sup>[50]</sup>

Local communities of Bundelkhand, Uttar Pradesh, India, decoction of plant is used to treat scorpion sting<sup>[51]</sup> In Africa whole plant of *Eclipta alba* is

used to ensure fetal development and facilitate childbirth.<sup>[52]</sup> Bhil, Pawara and Pardhi tribes in Satpuda Mountain of Nandurbar, Dhule and Jalgaon district of Maharashtra, India, leaves of plant *Eclipta alba* are administered with a cup of water for menorrhagia.<sup>[53]</sup> Local herbalists of Samba District of Jammu and Kashmir State, India, Whole plant is used in asthma, bronchitis, fever, gastric disorders, ulcers, wounds, sores, and in leucoderma too.<sup>[54]</sup> In Mandi Bahauddin District, Pakistan, local people uses leaf paste of plant for allergy, athlete's foot and ringworm.<sup>[55]</sup> Ethnic communities of Moradabad District, Western Uttar Pradesh, India, Leaf extract is applied to head for dandruff and to blacken gray hair.<sup>[56]</sup> Local people of Birbhum District in West Bengal, India, Fresh leaves with sesame oil used to cure baldness, elephantiasis, and headache.<sup>[57]</sup> Saperas community of Khetawas, Jhajjar District, Haryana, India uses *Eclipta alba* for treatment of snake bite.<sup>[58]</sup>

#### **PHYTOCHEMISTRY OF *Eclipta alba* Hassk.**

Phytochemistry is the branch of chemistry which deals with the study of phytochemical derived from plants their composition and process. Due to side effect of modern medicine, high cost of synthetic drug and effectiveness of plant remedies use of herbal drugs is increasing worldwide. Herbal drugs play essential role to treat as well as cure the diseases.

Common techniques used in the field of phytochemistry:

1. Extraction
2. Isolation
3. Structure elucidation and chromatography

Extraction is separation of medicinally active compounds of plant tissues using selective solvents through standard methods. Extracts can be used as best source of drug. *Eclipta alba* Hassk. is extracted in many solvents like ethanol, methanol, water, chloroform, petroleum ether, benzene for concluding that there is no adulterant material in it and it is standard drug.<sup>[59]</sup> Separation, identification, impurity detection and assay of herbal drugs in the extract are carried out by TLC, HPTLC, GLC, HPLC. Different physiochemical tests, phytochemical screening revealed presence of carbohydrates, cardio-glycosides, saponins, oils and fats, alkaloids, flavonoids, tannins and phenolic compounds, amino acids and quinones. TLC also shows the bluish fluorescence spot at R<sub>f</sub> 0.48 which proves the presence of wedelolactone which is main active compound.<sup>[60]</sup> some pharmacognostical studies carried out by Seetharam YN. *et.al.* and it is need of today's era to study *Eclipta alba* Hassk. for isolation and structural elucidation.<sup>[61]</sup> Three forms of *Eclipta alba* ( erect, semi-erect and prostrate) studied for morphological features, meiosis and phytochemicals which results in same number of chromosomes and prostrate form shows better than other forms of phytoconstituents and elements.<sup>[62]</sup> In brazil, specially coumarin containing plants including *Eclipta alba* Hassk. with other compounds like tannins, flavonoids shows antinociceptive, anti-inflammatory and bronchodilator activities.<sup>[63]</sup> Zainab A. *et.al* studied the different extractions of *Eclipta alba* Hassk. and characterize the phytochemical compounds present in it. <sup>[64]</sup> Phytochemical screening tests for

*Eclipta alba* Hassk. are as shown in table no. 4.

**Table no. 3 : Phytochemical screening tests**

Phytochemicals	Screening Tests
Carbohydrate	Fehling test
Phenols	Ferric chloride test
Flavonoids	Ammonia test
Alkaloids	Wagner's test
Steroids	Salkowski's test
Tannins	Lead acetate test
Saponins	Frothing test
Glycosides	Nitroprusside test
Amino acids	Ninhydrin test

### CLINICAL STUDIES OF *Eclipta alba* Hassk. :

**Toxicity test:** Singh B, et.al. studied the alcoholic extract of *Eclipta alba* for Hepatoprotective effect in rat and mice and found that minimum lethal dose was greater than 2.0 g/kg when given orally and intraperitoneally in mice.<sup>[65]</sup>

### Hepatoprotective Effect :

In vivo study done by Samudram P. et.al. indicates that Ethanolic extract from the leaves of *Eclipta alba* and seeds of *Piper longum* has got a potent hepatoprotective action against CCl<sub>4</sub> induced hepatic damage in rats.<sup>[66]</sup> The methanolic extract of leaves and the chloroform extract of roots of *Eclipta alba* showed considerable activities respectively causing 72.8% & 47.96% reduction of lysosomal enzyme and proved its Hepatoprotective activity.<sup>[67]</sup> Recently *In vivo* study done by K. Sateesh Naik (2018) proved that the components of *Eclipta alba* like

wedelolactone, demethylwedelolactone and saponins reduced fat deposition, mononuclear infiltration, and necrotic foci, and stimulated hepatocyte regeneration in the liver.<sup>[68]</sup>

### Immunomodulatory action :

By doing spatial habitual learning in mice it is proved that *Eclipta alba* can serve as a potential memory modulator.<sup>[69]</sup> Methanol extracts of whole plant of *E. alba* was used in swiss albino mice to evaluate the immunomodulatory activity at five dose levels using carbon clearance, antibody titer and cyclophosphamide immunosuppressant parameters the study showed significant increase in phagocytic index and antibody titre and the F ratios of the phagocytic index and WBC count were observed to be also significant.<sup>[70]</sup> Christyapita, D.et.al. shows the results that dietary intake of *E. alba* aqueous leaf extract enhances the non-specific immune responses and disease resistance of *O. mossambicus* against *A. hydrophila*<sup>[71]</sup> Archana A. et.al. proved that *Eclipta alba* is used as memory enhancer and will be better choice for stress induced memory impairment.<sup>[72]</sup> Mishra et.al. evaluate the leaf extract of *Eclipta alba* for its antidepressant effect in animal models of depression.<sup>[73]</sup> Ethanolic extracts of *Eclipta alba* shows significant memory enhancement which is useful as supportive adjuvant in treatment of dementia also *Eclipta alba* can be used for the management of Alzheimer's disease and other neurodegenerative disorders.<sup>[74]</sup>

### Hair growth effect :



As mentioned above  $\beta$ -sitosterol is responsible for hair rebuilding in androgenic alopecia.<sup>[36]</sup> *Eclipta alba* has been reported to possess hair growth-promoting activities.<sup>[75]</sup> Begum *et.al.* examined and proved that petroleum ether extract of *Eclipta alba* shows an effective standardized extract that modulates defects in keratinocyte differentiation in the hair follicles of nude mice by promoting the proliferation of epidermal basal cells and cells in the hair matrix.<sup>[76-77]</sup> According to Ram Kumar Roy the two formulations (i.e., CET1 and CET3) containing higher amounts of *E. alba* extract resulted in hairs of better quality, indicating its possible role in producing soft and silky hairs, this promising activity is due to the switching of hair follicle from telogen phase to anagen phase and retention of the late anagenic hair follicles as evidence by increased percentage population of hair follicles above 0.5 mm in the treated groups.<sup>[78]</sup>

#### **Anti-diabetic activity:**

Jaiswal N. *et.al* concluded that the ethanolic extract of *Eclipta alba* shows a significant antihyperglycemic activity and has a promising advantageous effect on diabetes-associated with renal dysfunction. This is happening through the inhibition of alpha-glucosidase and aldose reductase, respectively.<sup>[79]</sup> Coumestans in *Eclipta alba* wedelolactone and desmethylwedelolactone as major components with apigenin, luteolin, 4-hydroxybenzoic acid and protocatechuic acid as minor constituents exhibited maximum hepatoprotective activity and is the active fraction for hepatoprotective activity of *Eclipta alba* leave.<sup>[80]</sup> J.

Ananthi evaluated that the oral administration of *Eclipta alba* shows antihyperglycemic effect of due to activities of liver hexokinase and gluconeogenic enzymes such as glucose-6-phosphatase and fructose 1,6-bisphosphatase in the liver of control and alloxan-diabetic rats.<sup>[81]</sup>

#### **Anti-oxidant activity :**

Monali Patel (2016) *et.al.* examined that hydro-alcoholic extract of *Eclipta alba* effectively scavenged free radicals at all different concentrations and showed potent antioxidant potency and effects were in a dose-dependent manner.<sup>[82]</sup> Baldi A.(2013) proved the result that ethanolic extracts of *E. alba* had promising antioxidant potential in comparison to ascorbic acid and justify free radical scavenging activity and therapeutic applications of *E. alba* in different systems of medicines.<sup>[83]</sup> Ramesh V. *et.al.* (2011) observed that the combined ethanolic extract of *Eclipta alba* and *Piper longum* exerts more antioxidant activity than when they were given separately and may serve as a useful adjuvant as an electron donor capable of neutralizing free radicals in several clinical conditions associated with ROS damage.<sup>[84]</sup>

#### **Anti-bacterial activity :**

Pandey M.K. (2011) studied that extracts of *Eclipta alba* was effective against different bacteria, this can be used to treat various diseases like pimples, typhoid, food borne infections, UTI, sore throat and nosocomial infections.<sup>[85]</sup> Karunambighai A.(2013) *et.al* stated that the antibacterial activity of *Eclipta alba* might be due to the presence of active compounds in it against the growth of

bacteria.<sup>[86]</sup> A. Ray et.al. proved that eclalbasaponin separated from *Eclipta alba* is effective against both gram positive and gram negative bacteria, this study give detailed information about antibacterial activity against *B.subtilis* and *P. aeruginosa*.<sup>[87]</sup>

#### **Anti-inflammatory action:**

S. Sureshkumar et.al. (2005) proved the anti-inflammatory activity of *Eclipta alba* which is attributed to the presence of phytopharmacophore and also it may be due to the synergistic effects of various active compounds in the plant.<sup>[88]</sup> Muthu Kumaran Peraman et.al. studied that ethanolic and aqueous extracts of the leaf of *Eclipta alba* have demonstrated considerable anti-inflammatory activity.<sup>[89]</sup>

#### **Analgesic effect :**

Sawant M. et. al. proved by Experimental study that the ethanol extract of *Eclipta alba* shows good analgesic activity when given in doses of 250 mg/kg and 500 mg/kg administered orally and the data obtained also verified that the chloroform soluble portion of the ethanol extract that is considered for total alkaloids shows good analgesic activity at doses of 150 mg/kg.<sup>[90]</sup>

#### **Nephroprotective effect :**

Dungca, N. T. P. (2016) studied(*In vivo*) and suggested that the methanolic extract of *Eclipta alba* play a role in the treatment of ROS-mediated pathologies such as gentamicin-induced nephrotoxicity.<sup>[91]</sup>

#### **Hypotensive effect :**

Rangineni V. et. al. (2007) examined that encapsulated *Eclipta alba* leaf

powder supplementation (3 g/day in three equal doses) did not show any detrimental side effects in the mildly hypertensive subjects, so it is effective against oxidative stress in mild hypertensives and thereby minimizing further hypertension associated micro and macro vascular complications.<sup>[92]</sup>

Rakesh C. Verma et.al. (2012) studied and concluded that *Eclipta alba* and *Boerhaavia diffusa* are notably effective remedies against hypertension, also, these herbs are taken together gives better results than any of the individual herbs was obtained in the study.<sup>[93]</sup>

#### **Anticancer activity :**

N.K. Yadav et.al. (2017) proved through *In vitro* and *In vivo* studies, *In vitro* study showed that alcoholic extract of *Eclipta alba* was found to be most active in most of the cancer cell lines but it significantly induced apoptosis in human breast cancer cell lines (MCF 7 and MDA-MB-231) by disrupting mitochondrial membrane potential and DNA damage, also this study evaluated its effect on different *In vivo* toxicity parameters.<sup>[94]</sup> H. Chaudhary et.al. (2011) tested (*In vitro*) effect of hydroalcoholic extract of *Eclipta alba* in HepG2, A498 and C6 glioma cell lines which shown to possess anti-proliferative, apoptotic and anti-invasive activities.<sup>[95]</sup> H. Chaudhary et.al.(2013-14) also proved ( *in vitro* and *In vivo*) that hydroalcoholic extract of *Eclipta alba* could significantly inhibit multidrug resistance gene encode P-glycoprotein expression and suggest that hydroalcoholic extract of *Eclipta alba* is a novel anticancer and potent multidrug resistance reversal agent and may be a potential adjunctive agent for tumor

chemotherapy.<sup>[96-97]</sup> Arya, R. K. *et. al.* reported that the chloroform fraction of *Eclipta alba* reduces breast tumor growth *In-vitro* and *In-vivo* by selectively regulating the expression of Hsp60 along with altering the other members of intrinsic apoptotic pathway without having any toxic side effects.<sup>[98]</sup> Panghal, M. *et.al.*(2011) observed that treated oral cancer patients were neutropenic and prone to secondary infection of microbes in this condition medicinal plant *Eclipta alba* act as effective antimicrobial agent to check the secondary infections in treated cancer patients.<sup>[99]</sup> Neha Chauhan *et. al.* observed that extracts like ethyl acetate, methanol and water causes growth arrest and apoptosis in lung cancer cells and the growth inhibitory effects were found to be considerable.<sup>[100]</sup> Anjali Singh *et.al.* (2015) examined that the methanolic extract of *Eclipta alba* extract increased the life span of Ehrlich Ascites Carcinoma treated mice and restored the hematological parameters as compared with the Ehrlich Ascites Carcinoma bearing mice.<sup>[101]</sup>

#### Anti-anaphylactic effect :

Patel, M. *et.al.*(2009) observed that the anti-anaphylactic activity of alcoholic extract of *Eclipta alba* with two different doses of 250 and 500 mg/kg was studied by using different animal models such as effect on mast cell degranulation using rat mesentery, passive cutaneous anaphylaxis using rat, by measuring leakage of Evans blue dye in skin, passive paw anaphylaxis using rat by measuring the paw volume by plethysmometer and its anti-anaphylactic activity was due to its membrane stabilizing potential, inhibition of

antigen induced histamine release, and inhibition of release of various inflammatory mediators.<sup>[102]</sup>

#### AYURVEDIC ASPECTS OF BHRUNGRAJ (*Eclipta alba* Hassk.):

##### Synonyms of Bhrungraj :

*Markava, Keshranjan* – helps to relieve grey hairs.

*Bhringraj* – helps to make hairs silky and shiny like that of peacock.

*Bhringar, Mahaneel, Ravipriya, Angaraka, Pitrupriya, Suryavarta.*

##### Types :

There are three types of *Bhrungraj* according to *Raj-nighantu*<sup>[103]</sup>, which are

१. *Shwet Bhrungraj* (white)

२. *Peet Bhrungraj* (yellow)

३. *Neel Bhrungraj* (blue)

##### *Raspanchaka of Bhrungraj* <sup>[104]</sup> as follows :

a) *Rasa- katu, tikta.*

b) *Virya- ushna*

c) *Vipaka- katu*

d) *Guna- laghu,ruksha*

e) *Karma-dipan, pachan, yakritottojaka*

##### API standards of Bhrungraj :

For identity, purity and strength following standards are given in API<sup>[4]</sup>,

Foreign matter	Not more than 2%	Appendix 2.2.2.
Total Ash	Not more than 22%	Appendix 2.2.3.
Acid-insoluble ash	Not more than 11%	Appendix 2.2.4.
Alcohol-soluble extractive	Not less than 5 %	Appendix 2.2.6.
Water-soluble extractive	Not less than 15 %	Appendix 2.2.7.

##### Therapeutic use of Ayurveda :

In ayurveda *Bhrunraj* is used by different ways for different reasons. *Bhrunraj* is very important medicinal plant in the field of Ayurvedic therapeutics. It gives potent and valuable results for many diseases and for many conditions. Properties explained in ayurveda can be proved experimentally with the help of bioinformatics and biotechnology. Following are some special effects and clinical uses of *Bhrunraj* which are stated in ancient science.

1. “ ये मासमेकं स्वरसं पिबन्ति दिने दिने भृंगराज समुत्थम्।  
क्षीराशिनस्ते बलवीर्य युक्ताः  
समाः शतं जीवितमाप्नुवन्ति ॥ ”

अष्टांग हृदय उत्तरस्थान ३९\१६२

As stated in above *shloka* According to *Ashtang Hrudaya* oral administration of *Bhrunraj swarasa* daily for one month gives improvement of *bala* and *virya* means vigor and vitality improvement and increase in the resistance power.<sup>[105]</sup>

2. “ मार्कवः कटुस्तिक्तो रुक्षोष्ण  
अक्षिशिरो अर्तिहृत्।  
कफवातहरो दन्त्यः त्वच्यः  
केश्यो रसायनः ॥  
हन्ति कास कृमि श्वास कुष्ठ  
शोफ आमपाण्डुता । ”

कैयदेव निघण्टु ओषधि वर्ग १५७५

- अक्षिशिरो अर्तिहृत् – relief from pain of head and eyes.
- कफवातहरो – kaphavatashamak.
- दन्त्यः – improve health of teeth and gums.
- त्वच्यः – cure skin diseases
- केश्यो – helps to make hairs silky and shiny

- रसायनः – rejuvenation
- हन्ति कास कृमि श्वास कुष्ठ शोफ आमपाण्डुता – treats cough, worm, asthma, skin disorders like vitiligo, swelling and digestive disorders.

*Kaiydev nighantu* explain above properties which give idea about multidimensional effects of *Bhrunraj*. He explained *Bhrunraj* in *ausadhi varga*. These all effects show how *Bhrunraj* is useful for total body health.<sup>[106]</sup>

3. “ भृंगराजस्तु चक्षुष्यः  
तिक्तोष्णाः केशरंजनाः।  
कफशोफ विषघ्नाश्च

तत्र नीलो रसायनः ॥ ”

राजनिघण्टु शताव्हादि वर्ग १४१

As said in above *shloka Raj nighantu* explain some properties of *Bhrunraj* in *Shatahwadi varga*.<sup>[103]</sup> Which are as follows,

- चक्षुष्यः – improve eye health and maintain it.
- विषघ्न – helpful in toxic effects or give antitoxic effects.

4. “ भृंगारः कटुकः तीक्ष्णो  
रुक्षोष्ण कफवातनुत्।

केश्यः त्वच्यः कृमि  
श्वास कास शोथामपाण्डुता॥

दन्त्यो रसायनो बल्य  
कुष्ठ नेत्र शिरो अर्तिनुत् । ”

भावप्रकाश निघण्टु गुडूच्यादि वर्ग ४२९

According to *Bhavprakashkara*, *Bhrunraj* is explained under *Guduchyadi varga*. All properties of *Bhrunraj* are same as that of *Kaiydev nighantu*.<sup>[107]</sup>

5. “ धात्रीतिलान्  
भृंगराजोविमिश्रान् ये  
भक्षयेयुर्मनुजाः क्रमेण।  
ते कृष्णकेशा

विमलेन्द्रियाश्च निर्व्याधयो वर्षशतं भवेयुः॥ ”

भैषज्यरत्नावली

Bhaishajyaratnavali told that use of Bhrungraj with *haritaki* (*Terminalia chebula*) and *til* (*Sesamum indicum*). will results in black hairs and purify all sensory organs. It also gives diseased free life for 100 years.<sup>[108]</sup>

6. According to *Nighantu aadarsh*, *Bhrungraj* is explained under *Sahdevyadi varga* and is very useful for liver disorders, due to this it can cure hepatomegaly, splenomegaly, jaundice, piles, ascites. Indirectly it results in healthy physical health and increase in *bala* (strength) and *virya* (power).<sup>[109]</sup>

As explained above in Ayurveda, *Bhrungraj* is very useful medicinal plant which can be used in many diseased conditions and even in healthy persons too. So, we said that all properties which are proved by modern sciences using modern technology are basically mentioned in ancient *nighantus* and *Sanhitas*. Ayurveda also explains the medicinal plant standardization norms in *Charaka Sanhita* with the help of that controversy is avoided and *Bhrungraj* plant authentication can be done easily.<sup>[110]</sup> Here, in table no. 5, therapeutic uses of *Bhrungraj* are given in view of different *Acharyas*.

**Uses of *Bhrungraj* in different ways in field of research :**

**DOSE :**

According to API standard dose of Bhrungraj formulations are<sup>[4]</sup>-

1. 3 - 6 ml of the drug in juice form.
2. 12 - 36 g. of the drug in powder form for decoction

#### IMPORTANT FORMULATIONS :

Bhrugmalakadi Taila, Bhrungaraja Taila, Nili-Bhrungadi Taila, Bhrungarajasav, Tekarjja marica.<sup>[4]</sup>

Some other formulations and their clinical research are as follows-

In *Rasashastra* and *Bhaishajya kalpana* *Bhrungraj swarasa* specifically used as *shodhan dravya* i.e. purifying agent for *Gandhaka* like substances.<sup>[111]</sup> *Bhrungraj* is having *Ruksha* and *Ushna guna* which is opposite to *Drava guna* so, it can be used to treat diseases in *pitta guna vrudhi* like *Amlapitta*. This is clinically proved by Hemant Pol *et.al.* that *Bhrungraj* is capable of reducing *Drava Guna* of *Pitta* in *Amlapitta*.<sup>[112]</sup>

In ancient science *Eclipta alba* in many areas used as anti-epileptic drug, as the juice of leaves of it is pounded with garlic and pepper for epilepsy. From this formulation S. Muke *et.al.*(2018) performed *In vitro* and *In vivo* study done on coumarin nasal formulation and proved that (*In vitro*) formulation is non-irritant in hen's egg test chorioallantic membrane (HET-CAM) assay, (*In vivo*) studied and proved in mice on the basis of neuronal changes which were assessed by hematoxylin and eosin and Nissl staining technique.<sup>[28]</sup> *Shadbindu tail* is important formulation in ayurveda containing *Bhrungraj swarasa* which is used for respiratory diseases, migraine, ophthalmic related problems, dental related problems and many more purposes.<sup>[113]</sup> *Shadbindu tail* is studied for its standardization by doing HPTLC



fingerprint, it contains wide range of phytochemical components which is indicating possible compounds of matrix which may be responsible for its therapeutic activity.<sup>[114]</sup> *Kumari Tail* is medicated oil in which *Bhrungraj* is important ingredient used for the diseases of female reproductive system mainly tubal blockage.<sup>[115]</sup> Shukla K. *et.al.* proved in their clinical research that intrauterine i.e. *Uttar Basti* of *Kumari Tail* gives tremendous results for tubal blockage with an remarkable rate

of conception.<sup>[116]</sup> *Navayasa Rasayana* is medicine told by *Chakradatta* used in *kusth* (skin diseases) and maximum composition of *Bhrungraj* is present in it.<sup>[117]</sup> Charmi S. *et. al.* proved in *Ekkakushthta* (psoriasis) *Navayasa Rasayana* with tablet *Medhya Rasayana* and *Dhatryadhyo Lepa* gives very effective results in clinical trial on 94 patients for 3 months follow up by 1 month.<sup>[118]</sup>

## RESULT AND DISCUSSION :

**Table no.4. Therapeutic uses of *Bhrungraj***

Nighantu/ Sanhita properties	कैयदेव निघन्तु	राजनिघन्तु	भावप्रकाश निघन्तु	भैषज्यरत्नावली	निघंटु आदर्श	अष्टांग हृदय
1. अक्षिरोग	+	+	-	-	-	-
2. शिरोरोग	+	-	-	-	-	-
3. कफहर	+	+	+	-	-	-
4. वातहर	+	-	+	-	-	-
5. दन्त्य	+	-	-	-	-	-
6. त्वच्यः	+	-	+	-	-	-
7. केश्य	+	+	+	+	-	-
8. रसायन	+	+	-	-	-	-
9. कास	+	-	+	-	-	-
10. कृमि	+	-	+	-	-	-
11. श्वास	+	-	+	-	-	-
12. कुष्ठ	+	-	-	-	-	-
13. शोफ	+	+	+	-	-	-
14. आम	+	-	+	-	-	-
15. पाण्डुता	+	-	+	-	-	-
16. विषघ्न	-	+	-	-	-	-
17. विमलेन्द्रिय	-	-	-	+	-	-
18. निर्व्याध	-	-	-	+	-	-
19. शतायु	-	-	-	+	-	+
20. यकृत रोग	-	-	-	-	+	-
21. प्लीहारोग	-	-	-	-	+	-

22. कामला	-	-	-	-	+	-
23. अर्श	-	-	-	-	+	-
24. उदर	-	-	-	-	+	-
25. बल	-	-	-	-	+	+
26. वीर्य	-	-	-	-	+	+

As mentioned in above table, Dravyaguna a branch of ayurveda explains therapeutic importance of Bhrungraj. Which includes valuable pharmacological activities for diseased persons also shows properties of it which are useful in healthy person. We have also explained different researches in modern sciences which are based on molecular level. Same way We stated researches on Bhrungraj in ayurveda which follows ayurveda principles. We have to find bridge between ayurveda and modern science to study detailed pharmacokinetic and pharmacodynamic actions of Bhrungraj. We also accept our ancient ayurveda principles as well as correlate them to bimolecular level. As discussed above many *In vitro* and *In vivo* studies carried out for life threatening diseases like cancer, same way our *Acharyas* also put up many pharmacological activities in front of us which we have to evaluate by using modern laboratory techniques.

#### CONCLUSION:

Above study gives us idea about to give modern way to Ayurveda. By proving our principles with the help of new facts, new techniques it is time to show the world that ayurveda has best solutions. All researches carried out in modern sciences for *Bhrungraj* as important medicinal herb have link with ayurveda which we have to put in front of the world. As there are many limitations to allopathic drugs, herbomedicine is being

best option for diseased free as well as healthy life. *Bhrungraj* is very essential drug as it is useful in diseased and healthy both conditions. As bird's view is an elevated view of an object from above, by studying all details about *Bhrungraj* here we kept the multidimensional view of it. This review concluded that *Bhrungraj* has special ethno pharmacological values, pharmacodynamic and pharmacokinetic effects, valuable chemical constituents and standardization of it. Which we can use for further study too. Researchers also proved by many clinical studies that *Bhrungraj* can be best medicinal plant against incurable diseases like cancer, cardiovascular diseases, and liver diseases. We can also use *Bhrungraj* for memory enhancing activity, stress induced alterations. *Bhrungraj* is best option for cosmetic purpose as it can be useful in hair coloring as well as baldness. This review article gives all views of *Bhrungraj* which can be useful for future study planning about different aspects of it.

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