A Phytopharmacognostical And Ethno Pharmacological Review Study On *Eclipta Alba* Linn.

[1]Dr. Shivani Sharma, [2]Dr. Deepak Verma,[3]Dr. Surinder Kumar Sharma,[4]Dr. Deeksha Kaul

[1,4]PG Scholar,[2]Assistant Professor,[3]H.O.D &Professor
[1]Department of Dravyaguna
[1]Dayanand Ayurvedic College, Jalandhar, India

ABSTRACT
In this modern era, many pharmaceutical companies and researchers are presently running extensive research on medicinal plants due to their potentiality. Medicinal plants are God's gift that greatly aid in the management of public health. *Eclipta alba* Linn. is a small herbaceous plant of family asteraceae, commonly called *Bhringraj*, found mainly in tropical and subtropical regions of India. *Bhringraj* is utilized in certain ailments from a very long time. Ethnobotanically, this medicinal herb is used in cuts and wounds, itching, diarrhoea, premature hair loss, graying of hair, snake bites, jaundice etc. Its various species are known on the name of *Bhringraj* which possess active phytochemical constituents that have been extracted from the different parts of the herb such as quercitine, ecliptine, wadelolactone, eclalbatin, oleanane, stigmasterol. *Bhringraj* shows numerous pharmacological actions like haemolytic anemia, anti viral, anti tussive, antibacterial, antifungal, diuretic, analgesic, anti inflammatory, hepatoprotective, anti venom, anti oxidant etc. This review article throws light on phytopharmacological evaluation of *Bhringraj* and its species through classical as well as modern studies.

KEYWORDS: *Eclipta alba*, medicinal plants, Ethnobotanical, Drug

AIMS AND OBJECTIVES

To enlist the review study on different types of *Bhringraj* described ethnobotanically i.e. white, yellow and blue varities and phytopharmacolgical connection of the traditional and scientific knowledge for future studies.

INTRODUCTION

Distribution / Habitat

It spreads as a common weed in several nations, including Thailand, China, India, and Brazil. *Eclipta alba* Linn. is a plant that grows along rivers, lakes and on the foothills of the *Himalayas* in India. In the nation's more tropical parts, it is usually found in waste places, marshy areas, hedges, and roadside spots. It may also be found in other eastern nations including Indonesia, Sri Lanka, the Philippines, Nepal, and Malaysia, where it thrives in clay and damp soil, paddy fields, water courses, tanks, and plain and hilly areas up north.[1]

MATERIALS AND METHODS

Collection of sample - The whole plant including roots of *Eclipta alba* were collected from the Herbal Garden of *Dayanand Ayurvedic* College, Jalandhar, Punjab. All of the plant parts were cleaned under running water, dried in the shade at room temperature.

Method of study – Transverse section of the root, stem of *Eclipta alba* is studied macroscopically by evaluating its organoleptic features. For macroscopically evaluation, thin section of root and stem is taken using blade and stained with Eosin, placed over a clean glass slide which is covered with a cover slip and observed under microscope. After analysing the sections in different magnifications different cells are identified.

Chemicals- All the chemicals used in the work were from Pharmacognosy laboratory of *Dravyaguna* department of *Dayanand Ayurvedic* College, Jalandhar, Punjab.

Botanical description

In *Ayurvedic* classics three varities are described under the name of '*Bhringraj*'. Botanically these varities identifies according to API are *Shweta Bhringraj* (*Eclipta alba* Linn.) Peeta *Bhringraj (Wedelia chinensis* Merill) and Shweta/*Neela Bhringraj* (*Tridax procumbens* Linn.).

S. no.	PART	*Shweta bhringraj (Eclipta alba* Linn.*)*[2]	*Peeta Bhringraj* (*Wedelia chinensis* Merill)[3]	*Ek dandi/ Shweta/Neela Bhringraj (Tridax procumbens* Linn.)[4]
1.	Leaves	Sessile to subsessile, opposite, often oblong, lanceolate, sub-entire, acute, strigose with hairs on both surfaces, 2.2–8.5 cm long, 1.2–2.3 cm wide.	Linear, oblong or oblong lanceolate, sharp apex, scratchy from repressed white hairs	simple, opposing, whole, hairy, exstipulate, and short-petioled Lanceolate-ovate leaves have a sharp apex and a base that is wedge-shaped. It has a long, unevenly serrated border and is 3 to 7 centimetres in length.

2.	Roots	The main root has a well-developed cylindrical, greyish colour, with secondary branches.	lateral rootlets, narrow, elongated, rooted at nodes, and pale cream-colored	Taproot system
3.	Stem	Herbaceous, branching, sporadically roots at nodes, cylindrical or flat, rough from the white hairs, distinct nodes, colour greenish, sporadically brownish.	Reddish brown to brown in colour, cylindrical with conspicuous or bulged nodes, and with whitish appressed hairs present.	The stem is branching, decumbent, cylindrical and herbaceous.
4.	Flowers	This species may easily be recognised in the wild thanks to its tiny white flowers and opposing leaves. The single flower heads have white florets and are 6-8 mm (0.24-0.31 in) in diameter. The achenes are constricted and confined.	have a yellow colour and an axillary head.	It produces long peduncled heads of blooms all year long. Flowers are tiny, tubular, and hairy in white yellow. Capitulum is inflorescence
5.	Fruits	Brown achenial cypsella with one seed, cuneate shape, narrow wing, and warty excrescences.	The fruits have hairs on their roughly oval surfaces.	Fruit is a firm achene with stiff hairs covering it, and it has a white pappus that looks like a feather at one end
6.	Seeds	It is hairy, dark brown and not endospermic.	The approximately cylindric achenes are hairy.	Seeds lack endosperm and have a pendulous embryo.

Table no.01- Botanical description

Varieties of *Bhringraj*

***Nighantu* classification**	**Classical varieties of *Bhringraj***
Bhavprakashanighantu[5]	*Shweta bhringraj, peeta bhringraj*
Madanpala nighantu[6]	*Shweta bhringraj*
Raja nighantu[7]	*Shweta bhringraj, peeta bhringraj and neela bhringraj*
Shodhala nighantu[8]	*Shweta bhringraj, peeta bhringraj*
Kaiyadeva nighantu[9]	*Shweta bhringraj*
Priya nighantu[10]	*Shweta bhringraj, Krishna bhringraj*
Dhanwantri nighantu[11]	*Shweta bhringraj*

Table no.02-Varieties

MEDICINAL PROPERTIES

Medicinal plant	**Rasa (taste)**	**Guna (qualities)**	**Veerya (potency)**	**Vipaka (metabolic effect)**	**Effect on tridosha**
Shweta[12]	*Katu* (pungent), *Tikta* (bitter)	*Ruksha* (dryness), *Laghu* (Light)	*Ushna* (hot)	*Katu* (pungent)	pacifying *kapha dosha* and pacifies *vata dosha*
Peeta[13]	*Katu*(pungent) ,*Tikta*(bitter) ,*Kashaya*(astringent)	*Teekshna* (sharpness)	*Ushna*(hot)	*Katu* (pungent)	pacifying *vata* and *kapha dosha*
Ek dandi[14]	*Kashaya*(astringent), *Amla*(sour), *Tikta*(bitter)	*Guru*(heavy), *Snigdha*(unctuous)	*Sheeta* (cold)	*Katu* (pungent)	*Tridoshaghna*-pacifying all three *Doshas: Vata, Pitta* and *Kapha*

Table no.03 – Medicinal properties

Synonyms in different classical texts			
***Nighantu* classification**	***Shweta bhringraj (Eclipta alba* Linn.*)***	***Peeta bhringraj (Wedelia chinensis* Merill)**	***Ek dandi (Tridax procumbens* Linn.*)***
***Bhavprakasha nighantu*[15]**	*Bhringraja,bhringraj,markav,bhring,angarak,keshraj,bhringar,keshranjan*	**NA**	**NA**
***Madanpala nighantu*[16]**	*Bhringraj,markav,keshranjan, bhekraj,angark, ,bhringhav,suryavallabha*	**NA**	***NA***
***Raj nighantu*[17]**	*Markav, bhringraj, bhrinhav, keshranjan, pitripriyo, rangak, keshaya, kuntalvardhan*	*Swarnbhringaro,harivasa, haripriya,devpriya,vandniya,pavana*	*Mahaneela,neelak,mahabhringa,neelpushpa, shyamal*
***Shodhala nighantu*[18]**	*Jayavatya, sita bhring, Avanti, laxmipriya, jayanti, shwetapushpika*	*Peetapushpa, swarnbhringar, harivasa, haripriya, devpriya, vandniya, avanti, avantya, pitripriya*	Considered it as *white* variety of *Bhringraj*
***Kaiyadeva nighantu*[19]**	*Pankjata, bhringraj, bhringhav, keshranjan, bhringark, keshraj, bhekraj, mahaneela, ravipriya, markav,*	**NA**	**NA**
***Priya nighantu*[20]**	*Markav, bhringraj, bhringar, keshranjan*	**NA**	**NA**
***Dhanwantri nighantu*[21]**	*Bhringraj, bhringraj, markav, bhring, bhringark, bhringrenu,*	**NA**	**NA**

Table no.04-Synonyms

Karma

Medicinal plant	**Different ethno-pharmacological in different lexicon**						
	BPN[22]	**MPN[23]**	**DN[24]**	**SN[25]**	**KN[26]**	**RN[27]**	**PN[28]**
Shweta Bhringraj (Eclipta alba* Linn.*)	*Keshya*(Hair promoting growth),*Twachya*(Skin complexion),*Krimi*(Antimicrobial),*Shwasahara*(Anti asthmatic), *Kasahara*(cough depressing agent),*Shotha* (Anti inflammatory), *Ama*(Antioxidant), *Pandu* (Haemolytic anemia) *Dantya*(Dental health),*Rasayana*(Im	*Dantya*(Dental health),*Rasayana* (immunomodulatory),*Twachya* (Skin complexion),*Kushtha* (Skin disorders), *Netra roga* (Eye disorders), *Shiro arti*(Headache)	*Shotha* (Anti inflammatory), *Amadosha* (Antioxidant), *Pandu(*Haemolytic anemia), *Tawak vikara* (Skin disorders),*Hridroga* (Cardiovascular effects/Hypotensive effects), *Vishanashaka*(Anti venom)	*Kushtha* (Skin disorders), *Pandu* (Haemolytic anemia),*Keshaya(*Hair promoting growth),*Akshiroga*(Eye disorders)	*Dantya*(Dental health),*Twachya*(skin complexion),*Keshaya*(Hair promoting growth),*Rasayana*(immunomodulatory), *Kasahara*(cough depressing agent),*Krimihara*(Anti microbial), *Shwasahara*(Anti asthmatic), *Kushtha* (Skin disorders), *Shotha* (Anti inflammat	*Chakshushya*(Eye disorders),*Shopha*(Anti inflammatory) ,*Vishaghana*(Anti venom), *Kesharanjan*(Hair dying agent),	*Keshya*(Hair promoting growth), *Twachya* (Skin complexion),*Shothahara*(Anti inflammatory),*Pandu*(Haemolytic anemia), *Balya(*Muscle strength*)*, *Rasayana*(Immunomodulatory)

	munomodulatory),*Balya*(Muscle strength),*Kushtha* (skin disorders) , *Netra roga* (Eye disorders), *Shiroarti*(Headache)				ory),*Amadosha*(Antioxidant),*Pandu* (Haemolytic anemia)		
Peeta bhringraj (Wedelia chinensis* Merill*) & Ek dandi (Tridax procumbens* Linn.*)	Therapeutics considered same as that of white variety of *Bhringraj*			Therapeutics considered same as that of white variety of *Bhringraj*		Therapeutics considered same as that of white variety of *Bhringraj*	

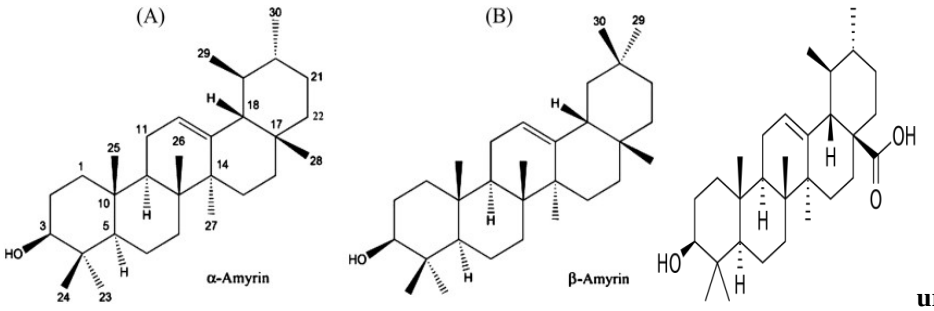
Table no.05- Karma of varieties of Bhringraj

Chief Phytoconstituents

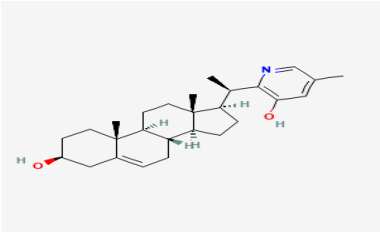
***Shweta Bhrigra (Eclipta alba* Linn.)**[29]*	***Peeta Bhringraj (Wedelia chinensis* Merill)** [30]	***Ek dandi (Tridax procumbens* Linn.)**[31]*
Alkaloids	Flavonoids	Alkaloids
Terpenoids	Steroids	Steroids
Glycosides	Alkaloids	Terpenoids
Coumestan	Saponins	Flavonoids
Sterol	Glycosides	Tannins
Flavonoids	Terpenoids	Glycosides
Fatty alcohols	Tannins	Saponins
Volatile oils	Phenols	Phenols
Saponins		Proteins
Polyacetylinic compounds		Carbohydrates
		Carotenoids

Table no.06- Chief phytoconstituents of varieties of Bhringraj

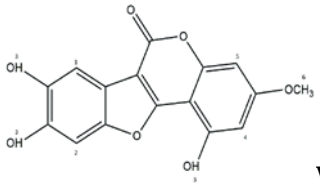
Major Chemical constituents structures derived from *Eclipta alba* (L.) [32]



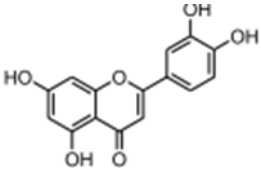
ursolic acid



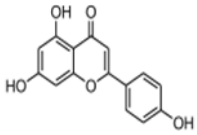
Ecliptalbine



Wadelolactolactone

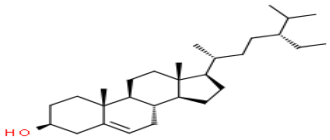


Luteolin

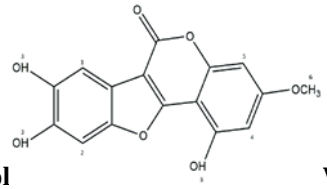


Apigenin

Chemical constituents derived from *Wedellia chinensis* Merill[33]

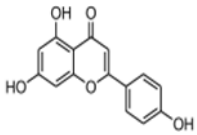


Sitosterol



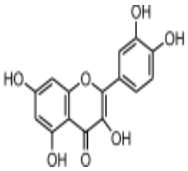
Wadelolactone

Luteolin

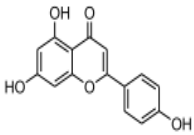


Apigenin

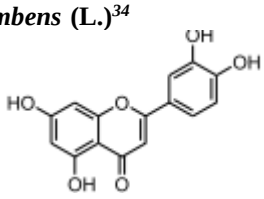
Chemical constituents derived from *Tridax procumbens* (L.)[34]



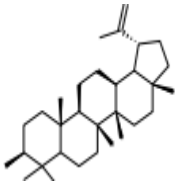
Quercitin



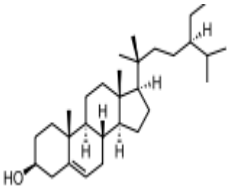
Apigenin



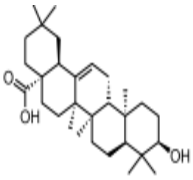
Luteolin



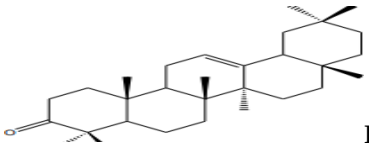
Beta-sitosterol



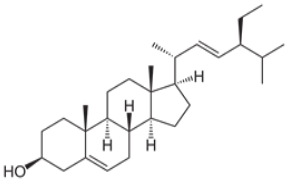
Lupeol



Oleanolic acid



Beta-amyrenone



Stigmasterol

PHARMACOLOGICAL ACTIONS

Shweta Bhringraj (Eclipta alba* Linn.*)

Anticancer activity[35]

Methanolic extract of *Eclipta alba* (L.) exhibits inhibition of proliferation of colon cancer cells in concentration dependent manner.

Antihyperlipidemic activity[36]

Oral administration of aqueous leaf extract to the rats in atherogenic diet-induced hyperlipidemic model resulted in a marked reduction in total cholesterol, triglycerides and total protein.

Analgesic effect[37]

The ethanol extract and the total alkaloids produce significant analgesic activity in all the different models of analgesia used. However, the total alkaloidal fraction was the most efficacious in all experimental models tested.

Anti inflammatory[38]

The methanolic extract administered by the oral route at a concentration of 100 and 200 mgkg-1 showed the significant dose dependent antiinflammatory activity in carrageenan and egg white induced hind paw oedema in rats.

Hair growth and Alopecia[39]

When applied topically to the shaved, denuded skin of male albino rats, petroleum ether and ethanolic extracts reduced hair growth time by half when compared to untreated control animals. In comparison to the control group, (47 ± 13). the quantitative examination of hair growth with petroleum ether extract (5%) revealed a greater number of hair follicles in the anagenic phase. (69 ± 4).

Hepatoprotective effect [40]

Aqueous leaf extract of *Eclipta alba* (L.) has been reported to possess the restorative potential so as to suppress the hepatotoxicity in the male albino rats.

***PEETA BHRINGRAJ (WEDELIA CHINENSIS* Merill)**

Antibacterial activity[41]

Wedelia chinensis leaves methanol extracts have a great potential as antibacterial agent to treat infectious diseases caused by a range of pathogenic bacteria.

Analgesic and anti inflammatory activity[42]

The additive and synergistic antioxidant activity of phytochemicals such as flavonoids, triterpenoids, steroids etc, present in Wedelia chinensis Merill are responsible for the analgesic and anti-inflammatory activity.

Anticancer activity[43]

Wedelia chinensis Merill extract's biological effects on prostate cancer in vivo studies revealed three active chemicals that inhibit the androgen receptor signalling pathway to be responsible for the anti-cancer action, and oral treatment of the extract prevented cancer tumour development. (SaiT CH et al 2009)

Wound healing activity[44]

The period of epithelialization was found to be shorter, the rate of wound contraction increased, the skin's breaking strength increased, and the dry weight and breaking strength of the granulation tissue all showed considerable wound healing activity. **(**Verma N et al 2008**)**

Ek dandi (Tridax procumbens* Linn.*)

Hepatoprotective activity[45]

The ethanolic extract and chloroform insoluble fraction of *Tridax procumbens* (L.) demonstrated antihepatotoxic action justifying its use in liver affection by exhibited hepatoprotective activity .

(Saraf S, Dixit VK, Hepatoprotective activity of Tridax procumbens part II. Fitoterapia. 1991; 62:534-536.)

Anti microbial activity[46]

Methanolic extracts of leaves shows antibacterial activity by disc diffusion method revealed that there is a broad spectrum activity on gram positive, negative organisms respectively. The highest activity was shown in S. Typhi S. flexneri and least activity on E.coli.

Anti-arthritic activity[47]

Property similar to indomethacin, *Tridax procumbens* (L.) shows anti-arthritic activity at doses of 250 and 500 mg/kg. In female SD rats given FCA-induced arthritis, the ethanolic extract drastically changed the pathogenesis and had antiarthritic action.

R. Ramesh Petchi, C. Vijaya & S Parasuraman: Anti arthritic activity of ethanolic extract of Tridax procumbens in Sprague Dawley rats.

Anticancerous Property[48]

On A549 cells, the plant's ethanol and acetone leaf extract displayed anticancer action (human lung cancer cell line).

Vishnu Priya, Srinivasa Rao. Evaluation of anticancer activity of Tridax procumbens leaf extracts on A549 and HEP G2 cell lines. AsianJ Pharm Clinical Research. 2015; 8(3):129-132

Immunomodulatory activity[49]

The impact of extract and fraction on cellular and hormonal immunity was examined in vitro and in vivo. The findings addressed the phytoconstituents responsible for *Tridax procumbens* Linn. immunomodulatory capability and show the ability of the flavonoidal and saponin fraction to affect both cell-mediated and hormonal components of the immune system.

(Agarwal S, Khadese S, Talele G. Bioactive immunomodulatory fraction from Tridax procumbens. Science Alert. 2010; 3:120-127)

Fig.1Image of whole *bhringraj* plant

Fig.2 Image of root of *bhringraj* plant

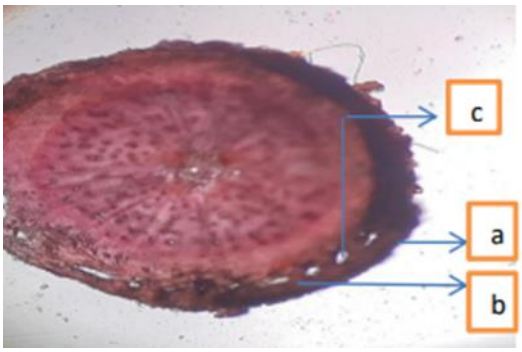


Fig.3 a)Periderm b)Secondary cortex c)Air spaces

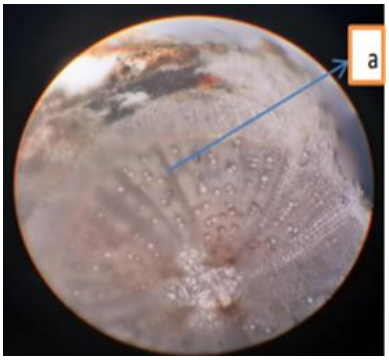


Fig.4 a)Medullary rays

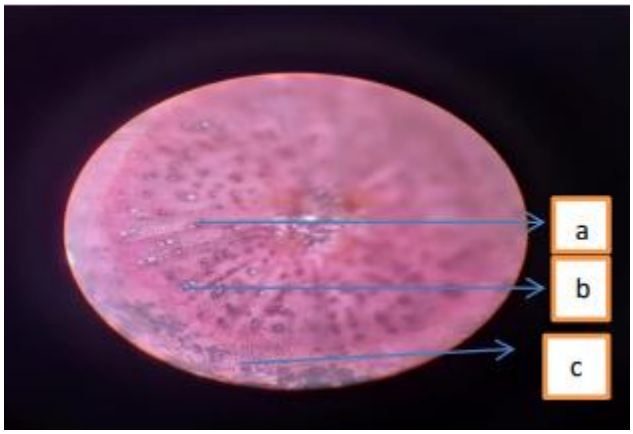


Fig.5 a) Xylem b)Phloem c) Stone cells

T.S of root of *Eclipta alba* Linn. at magnification SP 4X.10 Fig.3 and SP10X.25 Fig.4,5 respectively

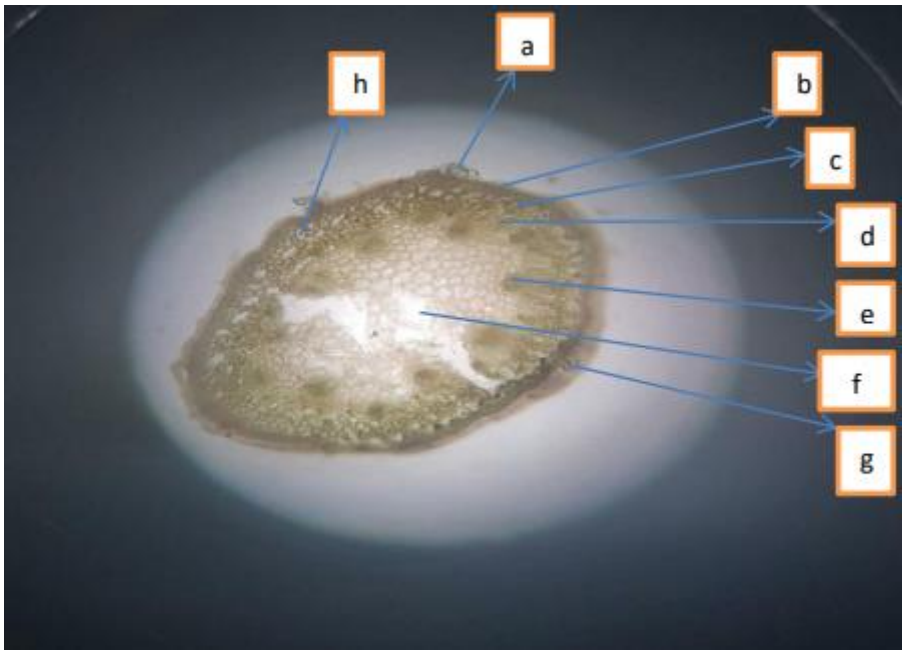


Fig.6 T.S. of stem of *Eclipta Alba* Linn. at magnification SP4X.10 respectively

a) Glandular trichomes b) Epidermis c) Cortex d) Pericyclic fibres e) Vascular bundles f) Pith g) Covered trichomes h) Air spaces

Fig.7 Image of whole plant of peeta Bhringraj

Fig.8 Image of whole plant of ek dandi

DISCUSSION

In the pharmaceutical sector, the white form of *Bhringraj (Eclipta alba* Linn.) is well-known for encouraging hair development. Locally known as "*peeta Bhangara,"* the yellow species of *bhringraj* is scientifically known as *Sphagneticola calendulacea*, family:

Asteraceae (family of sunflowers), synonyms: *Wedelia chinensis* Merill, *Complaya chinensis, and Solidago chinensis*. In several *Ayurvedic* books, including *Sodhal Nighantu, Raj Nighantu, and Nighantu Adarsh* another form of *Bhringraj*, known botanically as *Tridax procumbens* Linn., was also recorded. All varieties are used in a similar manner in ethnobotany. Ethnobotanically, *Bhringraj* is beneficial for conditions like *Pandu* (haemolytic anaemia), *Netra roga* (eye disorders), *Hridroga* (cardiovascular effect), *Dantya* (dental health), *Skandan* (blood coagulant), *Shotha* (anti-inflammatory) and *Rasayana* (immunomodulatory). Each variety is a member of the Asteraceae family. When we compare the phytochemistry on the basis of chief Chemical constituents derived from varieties looks similar i.e.Wadelolactone, Luteolin, Apigenin, Beta-sitosterol, Luteolin, Quercitin, Lupeol, Oleanolic acid, Beta-amyrenone, Stigmasterol.

CONCLUSION

Bhringraj and its varieties grow naturally and are widely available. The medicinal plant is described as having wonderful therapeutic properties in ethnobotanical and *Ayurvedic* literature. Apart from them, it is mostly used for hair growth globally and also has medicinal potential for treating liver, skin, cardiac, dental, and anaemia diseases. Other *Bhringraj* types can be substituted in the pharmaceutical or cosmetic sectors. In comparison to *Eclipta alba* Linn., *Wedelia chinensis* Merill *and Tridax procumbens* Linn. produce more in less time and have greater rates of survival in the wild.

REFERENCES

1 kumar Paliwal N. World Journal of Pharmaceutical and Life Sciences WJPLS.
2 Ayurvedic Pharmacopeia of India Part 1, volume -2 First Edition, the Controller of Publications Civil Lines, Delhi. Page No. 21-24.
3 Krishna Priya. A, Shincymol. V.V, pharmacognosy of peetha Bhringaraja (Wedelia chinensis (osbeck) merrill), ijapr | July 2019 | Vol 7 | Issue 7
4 A comprehensive review of a healing herb: Tridax procumbens linn.
5 Commentary by Padmshri Prof. Krishna Chandra Chunekar, Edited by Dr. G.S. Pandey, Bhavprakash nighantu, Guduchyadi varga, Bhringraj, shlok no.-239, Chaukhambha bhartiya academy, Varanasi, Edition 2010, page no.414
6 Editor khemraj shrikrishandass, Madanpala nighantu, Abhyadi varga, Bhringraj, shlok no.37-38, page no.43. khemraj shrikrishandass parkashan Mumbai, edition March 2008.
7 Translated by Dr. Indradeva Tripathi, introduction by Acharya Vishwanatha Dwivedi, Raja nighantu of Pandit Narahari, Shathavadi varga,shlok no.138-140,page no. 89, Chaukhamba Krishnadas Academy,Varanasi, Edition 2016.
8 Commentator Prof. Dr. Gyanendra Pandey, Editor Prof. R.R.Dwivedi, Sodhala nighantu, Lakshmnadi varga, shlok no.370,371,372 page no.132,Edition first, 2009, Chaukhamba Krishnadas Academy,Varanasi.
9 Edited by acharya Priyavrata Sharma and translated by Dr. Guruprasada Sharma, Kaiyadeva nighantu, Aushadhi varga, Bhringraj, shlok no.1573-1575, Chaukhambha orientalia, Edition 1979, page no.637.
10 Acharya Priyavrata Sharma, Priya nighantu Editor Chaukhambha Surbharti Parkashan, Shatpushpadi Varga, bhringraj, shlok no.144-146, page no. 102-103, Edition 2018
11 Edited by acharya Priyavrata Sharma and translated by Dr. Guruprasada Sharma, Dhanwantri nighantu, karveeradi varga, Bhringraj, shlok no.10-11, page no.122-123, Chaukhambha Orientalia, First edition1982.
12 Medicinal use of Bhringraja (Eclipta alba hassk.): a review article, Dr. Vikram Sidh and Dr. Omprakash Sharma, wjpmr, 2019,5(7), 39-40, ISSN 2455-3301.
13 Ayurveda Pharmacopoeia of India,1st edition, Government Of India, Ministry of Health and Family Welfare, Part 1,Vol 6.
14 Ankita J, Jain A. Tridax procumbens (L.): A weed with immense medicinal importance: A review. International journal of pharma and bio sciences. 2012 Jan;3(1):544-52.
15 Commentary by Padmshri Prof. Krishna Chandra Chunekar, Edited by Dr. G.S. Pandey, Bhavprakash nighantu, Guduchyadi varga, Bhringraj, shlok no.-239, Chaukhambha bhartiya academy, Varanasi, Edition 2010, page no.415
16 Mudrak and editor khemraj shrikrishandass, Madanpala nighantu, Abhyadi varga, Bhringraj, shlok no.37, khemraj shrikrishandass parkashan Mumbai, edition March 2008, page no.43.
17 Translated by Dr. Indradeva Tripathi, introduction by Acharya Vishwanatha Dwivedi, Raja nighantu of Pandit Narahari, Shathavadi varga,shlok no.138-140,page no. 89, Chaukhamba Krishnadas Academy,Varanasi, Edition 2016.
18 Commentator Prof. Dr. Gyanendra Pandey, Editor Prof. R.R.Dwivedi, Sodhala nighantu, Lakshmnadi varga, shlok no.491, page no.92, Edition first, 2009, Chaukhamba Krishnadas Academy,Varanasi.
19 Edited by acharya Priyavrata Sharma and translated by Dr. Guruprasada Sharma, Kaiyadeva nighantu, Aushadhi varga, Bhringraj, shlok no.1573-1574, Chaukhambha orientalia, Edition 1979, page no.637.
20 Acharya Priyavrata Sharma, Priya nighantu, Shatpushpadi Varga, Bhringraj, shlok no.144,146, page no. 102-103,Editor Chaukhambha Surbharti Parkashan, Edition 2018.
21 Edited by acharya Priyavrata Sharma and translated by Dr. Guruprasada Sharma, Dhanwantri nighantu, karveeradi varga, Bhringraj, shlok no.10, page no.122, Chaukhambha Orientalia, First edition1982
22 Commentary by Padmshri Prof. Krishna Chandra Chunekar, Edited by Dr. G.S. Pandey, Bhavprakash nighantu, Bhringraj, shlok no.-241, Chaukhambha bhartiya academy, Varanasi, Edition 2010, page no.415
23 Mudrak and editor khemraj shrikrishandass, Madanpala nighantu, Abhyadi varga, Bhringraj, shlok no.38, page no.43. khemraj shrikrishandass parkashan Mumbai, edition March 2008.
24 Translated by Dr. Indradeva Tripathi, introduction by Acharya Vishwanatha Dwivedi, Raja nighantu of Pandit Narahari, Shathavadi varga,shlok no.141, page no. 89, Chaukhamba Krishnadas Academy,Varanasi, Edition 2016.

25 Commentator Prof. Dr. Gyanendra Pandey, Editor Prof. R.R.Dwivedi, Sodhala nighantu, Lakshmnadi varga, shlok no. 398,page no.264,Edition first, 2009, Chaukhamba Krishnadas Academy,Varanasi.
26 Edited by acharya Priyavrata Sharma and translated by Dr. Guruprasada Sharma, Kaiyadeva nighantu, Aushadhi varga, Bhringraj, shlok no.1575, Chaukhambha orientalia, Edition 1979, page no.637.
27 Acharya Priyavrata Sharma, Priya nighantu, Shatpushpadi Varga, Bhringraj, shlok no.145, page no. 102 Editor Chaukhambha Surbharti Parkashan, Edition 2018
28 Edited by acharya Priyavrata Sharma and translated by Dr. Guruprasada Sharma, Dhanwantri nighantu, karveeradi varga, Bhringraj, shlok no.11, page no.123, Chaukhambha Orientalia. First edition1982
29 Mithun NM, Shashidhara S, Vivek Kumar R. Eclipta alba (L.) A review on its phytochemical and pharmacological profile. Pharmacologyonline. 2011;1(1):345-57.
30 Shamama B, Avijit M, Saumya D. Wedelia chinensis (asteraceae)-an overview of a potent medicinal herb. World Journal of Pharmaceutical Research. 2017 Apr 15;6(6):488-96.
31 Dr. S. G. Pawar and A.M. Patil Department of Botany Research Centre, Yashwantrao Mohite College of Arts, Science and Commerce. A review and preliminary phytochemical screening of Tridax procumbens as important medicinal plants, International journal of scientific research.
32 Jahan R, Al-Nahain A, Majumder S, Rahmatullah M. Ethnopharmacological significance of Eclipta alba (L.) hassk.(Asteraceae). International scholarly research notices. 2014
33 Meena AK, Rao MM, Meena RP, Panda P. Pharmacological and phytochemical evidences for the plants of Wedelia Genus–A Review. Asian Journal of Pharmaceutical Research. 2011;1(1):7-12.
34 Bhagat VC, Kondawar MS. A comprehensive review on phytochemistry and pharmacological use of Tridax procumbens Linn. Journal of Pharmacognosy and Phytochemistry. 2019;8(4):01-10.
35 Chaudhary R, bainsal N, kaur T, Eclipta alba-a powerful traditional medicinal herb. plant cell biotechnology and molecular biology. 2020 dec 10:99-106
36 Chokotia LS, vashistha P, sironiya R, matoli H. pharmacological activities of Eclipta alba (l.). International journal of Research and Development in Pharmacy and Life Sciences. 2013 Jun;2(4):499-502.
37 Sawant S, Issac JC, Narayanan M, Analgesic studies on total alkaloids and alcohol extracts of Eclipta alba (Linn.) Hassk, Phytotherapy Research, 2004, 10, 111-112.
38 Sawangjaroen N, Subhadhirasakul S, Phongpaichit S, Siripanth C, Jamjaroen K, Sawangjaroen K, The in vitro anti-giardial activity of extracts from plants that are used for self-medication by AIDS patients in southern Thailand, Parasitol Res, 2005, 95(1), 17- 21.
39 R. K. Roy, M. Thakur and V. K. Dixit, “Hair growth promoting activity of Eclipta alba in male albino rats,” Archives of Dermatological Research, vol. 300, no. 7, pp. 357–364, 2008.
40 Thirumalai T, David E Therasa S, Elumalai E K, Restorative effect of Eclipta alba in CCl4 induced hepatotoxicity in male albino rats, Asian Pacific Journal of Tropical Disease, ,2011, 304-307
41 Darah I, Lim SH, Nithianantham K. Effects of methanol extract of Wedelia chinensis osbeck (asteraceae) leaves against pathogenic bacteria with emphasise on Bacillus cereus. Indian journal of pharmaceutical sciences. 2013 Sep;75(5):533.
42 Bhargava, K.K & T.R. Seshadri, "Chemistry of Medicinal Plants: Eclipta alba and Wedelia calendulacea". Journal of Research of Indian Medicine. Vol. 9, No. 1 (1974), pp. 915.
43 Nomani I, Mazumder A, Chakrabarthy GS. Wedelia chinensis (Asteraceae)—An overview of a potent medicinal herb. Int. J. Pharm. Tech. Res. 2013;5:957-64.
44 Nitin Verma1*, R.L.Khosa1, Vipin Kumar Garg2. Wound Healing Activity Of Wedelia Chinensis Leaves, Pharmacologyonline (2008) 2:139-145.
45 Agrawal S, Mohale D, Talele GS. Pharmacological activities of Tridax procumbens (Asteraceae). Medicinal Plants-International Journal of Phytomedicines and Related Industries. 2010;2(2):73-8.
46 Muthusamy R, Vasu K, Kanagaraj L, Ponnampallam D, Wilson B. Phytochemical screening and antibacterial activity of methanol extract of Tridax procumbens. Int. J. Pharm. Bio. Sci. 2013;3(1):521-4.
47 Petchi RR, Vijaya C, Parasuraman S. Anti-arthritic activity of ethanolic extract of Tridax procumbens (Linn.) in Sprague Dawley rats. Pharmacognosy Research. 2013 Apr;5(2):113.
48 Priya V, Rao S. Evaluation of anticancer activity of Tridax procumbens leaf extracts on A549 and HepG2 cell lines. Asian J Pharm Clin Res. 2015;8(3):129-32.
49 Agrawal S, Khadase S, Talele G. Bioactive immunomodulatory fraction from Tridax procumbens. Asian journal of biological sciences. 2010;3(3):120-7.