

## KESHARAJA: HAIR VITALIZING HERBS

V.M. JADHAV\*, R. M.THORAT, V.J. KADAM and S. B. GHOLVE

Department of Quality Assurance, Bharati Vidyapeeth's College of Pharmacy,  
Sector 08, CBD Belapur, Navi-Mumbai – 400614, India

\*E-mail: [drvmjadhav\\_bvcop@rediffmail.com](mailto:drvmjadhav_bvcop@rediffmail.com)

**ABSTRACT :** Hair suffers aggression ; there can be some ailments to normal health of hair and cause trouble. The main problems associated with hair such as pigmentation problems ( Fading ) , dandruff and falling of hair ( Shedding ). Shedding of hair is a common and ever increasing problem in cosmetics as well as primary health care practice. It is a universal problem, having affected both sexes of all races to different extents for as long as mankind has existed. The herbs used in the hair care have a definite history in the system of Ayurveda. About 1000 kinds of plant extract have been examined with respect to hair growth. This review describes the use of some natural products for hair growth promotion, plant parts used, chemical composition, the active responsible for effect and with a brief description of major use.

**KEY WORDS :** Hair , Alopecia , Medicinal Plant , Herbal Formulation.

### INTRODUCTION

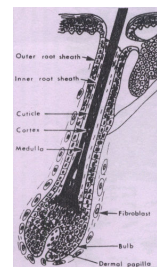
Hair is one of the vital parts of the body derived from ectoderm of the skin, is protective appendages on the body and considered accessory structure of the integument along with sebaceous glands, sweat glands and nails<sup>1</sup>. They are also known as epidermal derivatives as they originate from the epidermis during embryological development<sup>2-4</sup>.

Each hair grows in three cyclic phases :

#### 1. Anagen ( Growth phase ) –

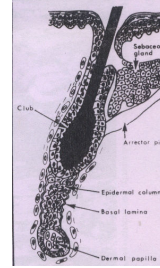
The anagen phase can be as short as 2 years to as long as 8 years.

Approximately 80% of hair is usually in anagen phase.



## 2. Catagen ( Involution ) -

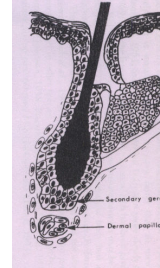
In the catagen phase, the growth activity ceases and hair moves to the next phase, catagen phase is between 10-14 days.



## 3. Telogen ( Resting phase ) -

The Telogen phase is a state at which the hairs move into resting state.

This phase lasts for 90-100 days<sup>5</sup>.



In general, 50-100 hairs at random are shed everyday. An increase of more than 100 hair per day constitutes a state of hair loss or alopecia, albeit it could be temporary<sup>6</sup>.

Ayurveda has described hair disease in three words, which are as under

1. **Khalitya** : Means loss of hairs
2. **Palitya** : Means prematured hair graying
3. **Indralupta** : Means alopecia areata, totalis, universalis<sup>7-8</sup>

Various factors contribute to hair fall / loss. Genetic predisposition and hormonal factors predominantly contribute to the above. Various disease state such as typhoid, malaria, jaundice etc., also cause hair fall, although temporarily. The use of chemotherapeutic agents also cause hair fall<sup>6</sup>. The telogen/ anagen effluvium is considered to be the reason for hair fall / loss. Hair fall/ loss cause a very stressful state of mind for hair fall sufferers. In females, the hair fall causes a major concern especially in India. Androgens are considered to be one of the most important causes for alopecia apart from a variety of other factors<sup>9</sup>.

The patents claim that the effect are due to stimulation of the hair follicle or scalp metabolism, possibility due to an acceleration of blood circulation, activation of dermal papilla, antitestosterone action or increased nutrition to the hair follicles through accelerated blood flow but the mechanism are not yet clear<sup>10-11</sup>.

Natural products in the form of herbal formulations are available on the market and are used as hair tonic, hair growth promoter, hair conditioner, hair-cleansing agent, antidandruff agents, as well as for the treatment of alopecia and lice infection<sup>12</sup>.

A number of herbal products have been acclaimed with hair growth- promoting activity<sup>13</sup>. The traditional system of medicine in India acclaims a number of herbal drugs for hair growth promotion. The article present a review of those used more frequently.

### 1. *Hibiscus rosa-sinensis* Linn ( Malvaceae )

**Parts used :** Leaves & Flowers

#### **Chemical constituents :**

Flavonoids; Anthocyanins and Cyaniding-3,5-diglucoside, Cyaniding-3-sophoroside-5-glucoside, Quercetin-3,7-diglucoside, Quercetin-3-diglucoside<sup>14</sup>.

It is a glabrous shrub widely cultivated in the tropics. It is well accepted that the leaves and flowers of *Hibiscus rosa-sinensis* have hair growth promoting and antigreying properties<sup>15-16</sup>. In India, the herbal products in the market intended for hair growth include the extract of various parts of *Hibiscus rosa-sinensis*. Adhirajan et al. reported that the leaf extract of *Hibiscus rosa-sinensis* has a potential effect on maintaining the hair growth in-vivo and in-vitro methods<sup>17</sup>.



### 2. *Cuscuta reflexa* Roxb ( Convolvulaceae)

**Part used :** Stems

#### **Chemical constituents :**

Cuscutin, Cuscutalin,  $\beta$ -Sitosterol, Luteolin, Bergenin & Kaempferol<sup>18</sup>.

It is a leafless, twinning, parasitic dodder with slender long yellow stems distributed in tropical and temperate region and common throughout India. It is commonly known as amarbel. Dixit et al. reported hair growth activity of *Cuscuta reflexa* Roxb. Stem through the periodic transformation of hair follicle from telogen to anagen phase<sup>19</sup>.



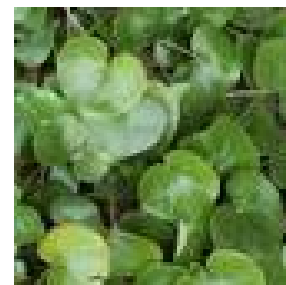
### 3. *Asiasari radix* (Aristolochiaceae)

**Parts used :** Roots & Rhizomes

**Chemical constituents :**

Safrole (18.4%), Methyl eugenol (18%), 3-methoxytoluenes & 3-benzodioxole derivatives<sup>20</sup>.

*Asiasari radix* is the root and / or Rhizome of *Asiasarum heterotropoides* (Aristolochiaceae). Rho et al. suggested that the *Asiasari radix* extract has hair growth promoting potential, and this effect may be due to its regulatory effects on both cell growth factor gene expression<sup>21</sup>.



### 4. *Ocimum gratissimum* Linn ( Lamiaceae)

**Part used :** Leaves

**Chemical constituents :**

Essential oil : Eugenol, Carvacrol, Nerol & Eugenol methyl ether<sup>22</sup>.

It is an herb found throughout India. Orafidiya et al. investigated the efficacy of the leaf essential oil of *Ocimum gratissimum* Linn. ( Ocimum oil ) in promoting hair growth in cyclophosphamide-induced hair loss and concluded that ocimum oil may be capable of enhanced normal hair growth and promoting follicular proliferation in cyclophosphamide-induced hair loss<sup>23</sup>.



### 5. *Ginseng radix* ( Araliaceae )

**Parts used :** Roots & Stems

**Chemical constituents :**

Ginsenosides, Essential oil : Sesquiterpenes, Polyacetylenes, Polysaccharides, peptidoglycans, Steroid, Choline, Vitamin- B, C, E, Fatty acid, Carbohydrates, Amino acids<sup>24</sup>.

It is an important crude drug that has been used from ancient time to improve constitutional tendencies to poor body condition, to promote appetite, to



increase vitality and to reduce over sensitivity to cold. Matsuda et al. indicated that *Ginseng radix* possesses hair growth promoting activity and that G-Rb1, may be one of the active constituents of *Ginseng radix* in the mouse vibrissal hair follicle organ culture model<sup>25</sup>.

#### 6. *Aloe vera* L. (Liliaceae)

**Part used :** Leaves

##### **Chemical constituents :**

Barbaloin ( 15-40% ), Hydroxyaloin ( 3% ), Mucilage ( Glucose, Galactose, Mannose, Galacturonic acid ), Aloe-emodin, Aloesone, Aloctin A and B<sup>26</sup>.

*Aloe vera* L. or *A. barbadensis* gel is used traditionally for hair loss and for improvement in

hair growth following alopecia. Inaoka et al. reported that aloenin is the major constituent responsible for promoting hair growth without irritating the skin<sup>27</sup>.



#### 7. *Rosmarinus officinalis* Linn ( Labiatae )

**Parts used :** Leaves & Flowers

##### **Chemical constituents :**

Volatile Oil ( 1-2% ) : Borneyl acetate, Borneol, Cineole, Camphene,  $\alpha$ -pinene, Rosemarinic acid,  $\alpha$  &  $\beta$  amyryns, Betulins &  $\beta$ -Sitosterol<sup>28</sup>.

It is an aromatic herb surrounded by tradition and legends but with improvement

culinary, medicinal and cosmetic properties. In folk medicine it is used to stimulate growth of hair as a rinse.

Rosmarinic acid have antioxidant effect<sup>29</sup>.



#### 8. *Lawsonia alba* L. ( Lythraceae )

**Parts used :** Leaves & Seeds

##### **Chemical constituents :**

Coumarins, Naphaquinones (Lawson), Flavonoids, Sterols, Tannins, Xanthones, Laxanthones &  $\beta$ -ionone of the essential oil<sup>30</sup>.

It has been cited as a growth accelerator and was used in an ancient Egyptian formula to cure the loss of hair.

The incidence of contact dermatitis appears to be extremely rare with the use of henna. Henna leaf have anti-inflammatory & antiallergic effect<sup>31</sup>.



**9. *Ginkgo biloba* ( Ginkgoaceae )****Part used :** Leaves**Chemical constituents :**

Lactones ( 6% ) : Diterpenoids , Ginkgolides A, B, C, Bilobalide-A, Flavonols ( 24% ) : Kaempferol, Quercetin, Isorhamnetin<sup>32</sup> .



Kobayashi et al. investigated that *Ginkgo biloba* leaf extract promote hair regrowth, through combined effects on proliferation and apoptosis of the cells in the hair follicule thus suggesting potential as a hair tonic<sup>33</sup> .

**10. *Tridax procumbens* L. ( Compositae )****Part used :** Leaves**Chemical constituents :**

Flavonoid : Procumbenetin<sup>34</sup> , 1.7% Fumaric acid,  $\beta$ -sitosterol, Alkalodies, Tannin<sup>35</sup> , Luteolin, Glucoluteolin, Quercetin, Isoquercetin<sup>36</sup> .



*Tridax procumbens* L. is found as weed throughout India. Pathak et al. investigated hair growth promoting activity of *Tridax procumbens* promotes the growth of hair<sup>37</sup> .

**11. *Sophora flavescens* ( Leguminous plants )****Part used :** Roots**Chemical constituents :**

Alkalods: Oxymatrine, Matrine, Losmatrine, Sophoranol, Sophocarpine, Bioflavones : Norkurarinone, Kuraridinol, Sophoraflavanone, Formoronetin & Fatty acids<sup>38</sup> .



Roh et al. found that the extract of dried roots *Sophora flavescens* has out standing hair growth promoting effect. *Sophora flavescens* extract induced mRNA levels of growth factors such as IGF-1 and KGF in dermal papilla cells, suggesting that the effect of *Sophora flavescens* extract on hair growth may be mediated through the regulation of growth factors in dermal papilla cells. In addition the *Sophora flavescens* extract revealed to possess potent inhibitory effect on the type II 5 Y-reductase activity<sup>39</sup> .

**12. *Citrullus colocynthis* Schrad ( Cucurbitaceae )****Part used :** Fruits

**Chemical constituents :**

Resinous Glycosides ( Colocynthin & Colocynthitin ), Phytosterol Glycoside, Citrullol, Pectin, Albuminoides, Cucurbitacins-Cucurbitacin E & I<sup>40</sup>.

Dixit et al investigated of *Citrullus colocynthis* promotes the growth of hairs. Also found least hair growth initiation and completion time, maximum number of hair follicles in

anagenic phase. 5 $\alpha$ -Reductase has been implicated as one of the major causes of hair loss. It may be rewarding if studies tounfold the mechanism of action of herbal extracts are undertaken using this bed<sup>41</sup>.

**13. Emblica officinalis ( Euphorbiaceae )**

**Part used :** Fruits

**Chemical constituents :**

Alkaloids (Phyllantidine, Phyllantine), VitaminC, Gallotannis (5%), Carbohydrates ( 14% ), Pectin, Minerals, Phenolic acid, Gallic acid, Ellagic acid, Phyllemblic acid, Emblicol, Amino acid ( Alanine, Aspartic acid, Glutamic acid, Lysine, Proline )<sup>42</sup>.

Gupta et al investigated increase in hair growth acivity of *Emblica officinalis* . It holds the promise of potent herbal alternative for minoxidil. Also suggest excellent results of hair

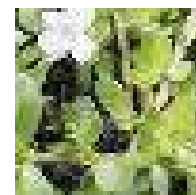
growth in formula prepared by cloth pouch boiling method{*Emblicaofficinalis*(Euphorbiaceae), *Bacopa monnieri* (Scrophulariaceae), *Trigonella foenumgraecum* ( Leguminosae ), *Murraya koenigii* ( Rutaceae )}<sup>43</sup>.

**14. Bacopa monnieri ( Scrophulariaceae )**

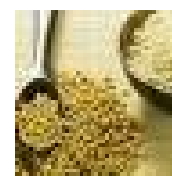
**Part used :** Whole Plant.

**Chemical constituents :**

Alkaloids ( Brahmine, Herpestine ), Saponins ( Monnierin, Hersaponin, Bacoside A, A<sub>3</sub>, B ), Steroids ( Stigmasterol,  $\beta$ -Sitosterol )<sup>44</sup>.

**15. Trigonella foenumgraecum ( Leguminosae )**

**Part used :** Seeds.



**Chemical constituents :**

Flavonoids: Quercetin, Luteolin, Saponins : Diosgenin, Tigogenin, Gitogenin, Trigonelline, Protein (26%), Fats(6%), Carbohydrates: Galactomannan (44%)<sup>45</sup> .

**16. *Murraya koenigii* ( Rutaceae )**

**Part used :** Leaves

**Chemical constituents :**

7,4<sup>1</sup>-diOMe Vitexin, 4<sup>1</sup>-OMe Kaempferol, Vanillic acid, Syringic acid, p-coumaric acid<sup>46</sup> .

**17. *Nardostachys jatamansi* ( Valerianaceae )**

**Parts used :** Rhizomes & Roots.

**Chemical constituents :**

Volatile Essential Oil ( 0.5-2% ) : Jatmansone, Sesquiterpenoid( 0.02-0.1%), Spirojatamol, Patchouli alcohol, Jatamol A & B, Jatamansic acid, Nardostachone, Nardol<sup>47</sup> .



It is erect perennial herb, Grows in watery land and in south Himalays. Ali et al reported that *Nardostachys jatamansi* having hair growth activity<sup>48</sup> .

**18. *Eclipta alba* ( L ) Hassak ( Asteraceae )**

**Part used :** Whole plant

**Chemical constituents:**

Flavonoids & isoflavonoids : Wedelolactone, Desmethylwedelolactone, Triterpene glycosides & Saponins : Eclalbasaponins I-VI,  $\beta$ -amyrin<sup>49</sup> .

It is a common weed growing throughout India on waste ground. Thakur et al investigated that  $\beta$ -sitosterol and wedelolactone responsible for hair growth activity.



$5\alpha$ -reductase inhibition contributes in treatment of androgenic alopecia.  $5\alpha$ -reductase inhibition by  $\beta$ -sitosterol has been well documented in this study<sup>50</sup>

**Daniel et al** also reported the following herbs for hair growth activity<sup>51</sup> :



**19. *Indigofera Tinctoria* ( Papilionaceae )**

**Part used :** Whole Plant

**Chemical constituents :**

Apigenin , Kaempferol, Luteolin, Quercetin<sup>52</sup>.



**20. *Vitex negundo* Linn ( Verbenaceae )**

**Part used :** Leaves

**Chemical constituents :**

Aucubin aginuside, Alkaloids : Nishindine, Hydrocotylene, Glyoflavonoids, Orientin, Isoorientin, 5-Hydroxy, 3,6,7,3<sup>1</sup>,4<sup>1</sup> pentamethoxy flavone<sup>53</sup>.



**21. *Terminalia bellerica* ( Combretaceae )**

**Part used :** Whole plant

**Chemical constituents :**

$\beta$ -Sitosterol, Gallic acid, Ellagic acid, Ethyl gallate, Galloyl glucose, Chebulagic acid, Cardiac glycoside, Bellaricanin<sup>54</sup>.



**22. *Gmelina arborea* ( Verbenaceae )**

**Part used :** Fruits

**Chemical constituents :**

Gmelofuran, Gmelinol, Hentriacontanol,  $\beta$ -Sitosterol<sup>55</sup>.



**23. *Centella asiatica* Linn ( Hydrocotylaceae )**

**Part used :** Whole Plant

**Chemical constituents :**

Triterpenoid Saponins ( Madecassoside 0.7-5% , Asiaticoside 0.1-0.6% ), Aglycones ( Asiatic acid 0.1-0.5%, Madecassic acid 0.5-0.8% )<sup>56</sup>.



**24. *Cardiospermum halicacabum* Linn ( Sapindaceae )**

**Part used :** Whole Plant



**Chemical constituents :**

Flavones ( Apigenin, Acacetin, 7-O Me apigenin, 7,4<sup>1</sup>-diOMe apigenin, 3<sup>1</sup>,4-diOMe luteolin ), Phenolic acid ( Melitotic, *p*-coumaric, Ferulic acid ), Cyanolipid<sup>57</sup>

The herbs *T. procumbens* and *E. alba* belongs to the compositae family, found as weed through India and used in the indigenous system of medicine for the treatment of variety of human ailments, particularly liver disorders, wound healing and as hair growth promoters.

Dixit et al. investigated hair growth activity of a mixture of *Eclipta alba* hassk, *Citrullus colocynthis* shrad and *Tridax procumbens* Linn<sup>19</sup>.

Jain et al. investigated the hair growth activity of almond oil, til oil and coconut oil preparation containing ariel part of *Zizyphus jusaba*, *Cuscuta reflexa*, *Citrus burgamia*, *Lagenaria sicaraia*, *Hibiscus rosa-sinensis* and *Allieum cepa*, seed of *Trigonella foinum- graceum* and fruits of *Embelica officinalis*<sup>58</sup>.

Following are the marketed herbal formulation..

**Table 1 : Marketed Herbal Formulation<sup>59</sup>**

Sr. No.	Manufacture Formulation Content	Product name
1.	Amla, Bringgraj	Keshamrit Oil
2.	Bhringgraj, Godanti	Nutrich Capsule
3.	Vacha, Jevanti	Keshmitra Tablet
4.	Bhringgraj, Godanti	Nutrich Capsule
5.	Tulsi, Neem	Sidha Shampoo
6.	Chamomile, Rosemary	Regrow Massage Oil
7.	Amla, Bhringgraj	Saini Herbal Hair Conditioner
8.	Amla, Heena	Shyamla Shampoo
9.	Ashwagandha, Shatawari	Kesh Vardan Capsule
10.	Amla, Bhringgraj	Kesh Rakshe Oil
11.	Amla, Jatamansi	K-7 Taila Oil
12.	Brahmi, Bhringgraj, S. indicum	Hibril Oil
13.	Brahmi, Bhringaraj, L. innermis	Hairvit Oil
14.	Hibiscus rosa sinenis, E. alba, O. sanctum	Hairich Capsule & Oil
15.	Amla, Bhringaraj, Brahmi	Chirayu Herbal Oil
16.	Amla, Bhringaraj, Guduchi	Hairbac Tablets

## CONCLUSION

Alopecia, a dermatological disorder that has been recognized for more than 2000 years. It is common problem that has affected men and women. It is investigated through many treatment are on offered including natural or synthetic based products , but natural product are continuously gaining popularly and the use of plant extract in formulation. Because synthetics based product may cause human health hazard with several side effects. In the future it is possible that many new plants extract of commercial significance will be identified.

## REFERENCES :

1. Ebling, F. I. G., The biology of hair, *Dermatol. Clin.*, 5 , 1987, 467-481.
2. Cash, T. F., The Psychology of hair loss and its implication for patient care, *Clin, Dermatol*, 19 , 2001; 161-166.
3. Messenger, A. G., Medical management of male pattern hair loss, *Int. J. Dermatol*, 39, 2000; 585-586.
4. Stough, D., Stenn, K., Haber, R., Parsley, W. M., Vogel, J. E., Whiting, D. A.& Washenik, K., Psychological effect, Pathophysiology and management of androgenetic alopecia in men, *Mayo. Clin. Proc*, 80 [10] , 2005 ; 1316-1322.
5. Ralf, P.& George, C., The biology of hair follicles, *New Engl, J. Med.*, 341, 1999; 491-497.
6. Bertolino, A. P., Klein, L. M.& Fredberge, L. M., Biology of hair follicles, In *Dermatology in General Medicine*, TB Fitzpatrick, AZ Eisen, K Wolf, IM Fredberg, KF Austen editors; 1993; Mc Graw Hill Inc, New York, 289-293.
7. Sastri, S., *Madhavanidanam* [ Chukamba Publications, Varanasi, 2003 ] ; 202-205.
8. Gupta, K. A., *Astangahrdayam* [ Chukamba Publications, Varanasi, 2003 ] ; 534-535.
9. Bagatell, C. & Bremner, W. J., Androgens in men- uses and abuses, *New Engl, J. Med.*,334, 1996; 707-715.
10. Kameyama, S., Application and Consideration of medicinal Plants for hair care, *Product. Frag. J.* ,23, 1995; 28-34.
11. Lee, O. S., Kang, H. H.& Han, S. H., Oriental herbs in Cosmetics, *Cosmet Toiletries*,112, 1997; 57-64.
12. Olsen, E. A., Androgenetic alopecia, In : EA, Olsen, ed. *Disorders of Hair growth, Diagnosis and Treatment*, New York; MC Grow Hill, Inc ; 1993 : 257-287.
13. Takahashi, T., Kamiya, T.& Yokoo, Y., Proanthocyanidines from grape seeds promote proliferation from mouse hair follicle cells in vitro and convert hair cycle in vivo, *Acta Derm Venereol*, 78, 1998; 428-432.
14. Gupta, A. K., Tandon, N. & Sharma, M., *Quality Standards of Indian Medicinal Plants*, Vol-2, Indian Council of Medical Research, New Delhi, 2005: 132.

15. Nadkarni, A. K., India Material Medica, Popular Prakashan Pvt. Ltd., Bombay, 1954: 631.
16. Kumar, S., Kumar, V. S., Sharma, A., Shukla, Y. N.& Singh, A. K., Traditional Medicinal Plants in Skin Care, Central Institute of Medicinal and Aromatic Plants, Lucknow; 103.
17. Adhirajan, N., Ravikumar, T., Shanmugasundram, N.& Babu, M., In-vivo and in-vitro evaluation of hair growth potential of Hibiscus rosa –sinensis L, J. Ethanopharmacol, 88, 2003 ; 235-239.
18. Khare, C. P., Encyclopedia of India Medicinal Plants, Springer-verlag Berlin Heidelberg, New York, 2004: 177.
19. Adhirajan, N., Dixit, V. K.& Gowri, C., Development and evaluation of herbal formulation for hair growth, India Drugs, 38 (11), 2001 ; 559-563.
20. Hirokatsu, E.& Kitaura, T., Volatile Constituents of Asiasari radix, Koryo, Jorupen oyoli, Seiya Kagaku ni Kansww Toronkai Koen Yoshishu Vol-48, 2004: 7-9.
21. Rho, S. R., Park, J. S., Hwang, S. L., Lee, I. H., Chang, S. Y.& Rang, M. H., The hair growth promoting effect of Asiasari radix extract and it's molecular regulation, J. Dermatol Sci, 38, 2005; 89-97.
22. Khare, C. P., Encyclopedia of India Medicinal Plants, Springer-verlag Berlin Heidelberg, New York, 2004: 335.
23. Orafidiya, L. O., Agbani, E. O., Adelusola, K. A., Lwalewa, E. O., Adebajji, O. A., Adediran, E. A. F.& Agbani, N. T., A study on the effect of essential oil of Ocimum gratissimum Linn, On Cyclophosphamide induced hair loss, International Journal of Aromatherapy, 14 (3), 2004; 119-128.
24. Daniel, M., Medicinal Plants Chemistry and Properties, Oxford and IBH Co. Pvt. Ltd., New Delhi, 2006 : 116.
25. Matsuda, H., Yamazaki, M., Asanuma, Y.& Kuma, M., Promotion of hair growth by Ginseng radix on cultured mouse vibrissal hair follicles, Phytoter. Res, 17, 2003; 797-800.
26. Daniel, M., Medicinal Plants Chemistry and Properties, Oxford and IBH Co. Pvt. Ltd., New Delhi, 2006 : 173.
27. Inaoka, Y., Fukushima, M.& Kuroda, H., Hair tonics containing aloenin, Jpn. Kokai, Tokkyo koho, 1988, 3: J P 63198615.
28. Daniel, M., Medicinal Plants Chemistry and Properties, Oxford and IBH Co. Pvt. Ltd., New Delhi, 2006 : 68.
29. Aruoma, O. I., Spencer, J. P.& Rossi, R., An evaluation of the antioxidant and antiviral action of extracts of Rosemary and Provencal herbs, Food Chem. Toxicol, 34, 1996, 449-456.
30. Khare, C. P., Encyclopedia of India Medicinal Plants, Springer-verlag Berlin Heidelberg, New York, 2004: 281.
31. Garcia, O. J. C., Tenon, M.& Bellido, J., Contact allergy to henna, Int. Arch, Allergy, Appl. Immunol, 114, 1997; 298-299.

32. Daniel, M., Medicinal Plants Chemistry and Properties, Oxford and IBH Co. Pvt. Ltd., New Delhi, 2006 : 92.
33. Kobayashi, N., Suzuki, R., Koide, C., Suzuki, T., Matsuda, H. & Kubo, M., Effect of leaves of Ginkgo biloba on hair regrowth in C<sub>3</sub>H strain mice, *Yakugaku zasshi*, 113, 1993; 718-724.
34. Mohammad, A., Earla, R.& Ramidi, R., A new flavonoids from the aerial parts of Tridax procumbens Linn , *Fitoterapia*, Vol 72, Iss 3, March 2001, 313-315.
35. Edeoga, H. O., Okwu, D. E., Mbaebie, B. O., Phytochemical constituents of some Nigeran medicinal plants, Africa, *Journal of Biotechnology*, Vol 4 [7], July 2005, 685-688.
36. The Wealth of India, Vol – X, CSIR, New Delhi, 1976, 292.
37. Saraf, S., Pathak, A. K. & Dixit, V. K, Hair growth promoting activity of Tridax procumbens, *Fitoterapia*, 62, 1991; 495-498.
38. [http://www.mdidea.com/products/herbs extract/sophoraal/data.html](http://www.mdidea.com/products/herbs%20extract/sophoraal/data.html).
39. Roh, S. S., Kim, C. D., Lee, M. H., Hwang, S. L., Rang, M. J.& Yoon, Y. K., The hair grow promoting effect of Sophora flavescens extract and it's molecular regulation, *J. Dermatol. Sci*, 30, 2002; 43-49.
40. Kapoor, L. D., Handbook of Ayurvedic Medicinal Plants, CRC. Press, LLC, 1990; 122-123.
41. Roy, R. K., Thakur, M., Dixit, V. K., Development and evaluation of polyherbal formulation for hair growth promoting activity, *Journal of Cosmetic Dermatology*, 6, 2007; 108-112.
42. Kapoor, L. D., Handbook of Ayurvedic Medicinal Plants, CRC. Press, LLC, 1990; 175-176.
43. Lipi, P., Suryaprakash, B. N., & Pande, M. S., Development and evaluation of herbal formulations for hair growth, *E-Journal of Chemistry*, Vol-5, No-1, Jan 2008; 34-38.
44. Daniel, M., Medicinal Plants Chemistry and Properties, Oxford and IBH Co. Pvt. Ltd., New Delhi, 2006 : 123.
45. Daniel, M., Medicinal Plants Chemistry and Properties, Oxford and IBH Co. Pvt. Ltd., New Delhi, 2006 : 122.
46. Daniel, M., Medicinal Plants Chemistry and Properties, Oxford and IBH Co. Pvt. Ltd., New Delhi, 2006 :26.
47. Kapoor, L. D., Handbook of Ayurvedic Medicinal Plants, CRC. Press, LLC, 1990; 239.
48. Ali, M. < IND > [ Singh, Vijender < IND > ] Phhytoconstituents and hair stimulant formulation from Nordostachys jatamansi, 5<sup>th</sup> International congress on Traditional Asian Medicine, Halle [ Saale ] August 2002, 18-24.
49. Williamsom, E. M., Major Herbs of Ayurveda, Churchill Livingstone, London, 2002, 126-128.
50. Roy, R. K., Thakur, M., Dixit, V. K., Hair growth promoting activity of Eclipta alba in male albino rats, *Arch Dermatol Res*, 2008, 300; 357-364.
51. Daniel, M., Medicinal Plants Chemistry and Properties, Oxford and IBH Co. Pvt. Ltd., New Delhi, 2006 :227.

52. Khare, C. P., Encyclopedia of India Medicinal Plants, Springer-verlag Berlin Heidelberg, New York, 2004: 263.
53. Daniel, M., Medicinal Plants Chemistry and Properties, Oxford and IBH Co. Pvt. Ltd., New Delhi, 2006 :79.
54. Khare, C. P., Encyclopedia of India Medicinal Plants, Springer-verlag Berlin Heidelberg, New York, 2004: 450.
55. Daniel, M., Medicinal Plants Chemistry and Properties, Oxford and IBH Co. Pvt. Ltd., New Delhi, 2006 :152.
56. Khare, C. P., Encyclopedia of India Medicinal Plants, Springer-verlag Berlin Heidelberg, New York, 2004: 139.
57. Daniel, M., Medicinal Plants Chemistry and Properties, Oxford and IBH Co. Pvt. Ltd., New Delhi, 2006 :167.
58. Patni, P., Varghese, D., Balekar, N., Jain, D. K., Formulation and evaluation of herbal hair oil for alopecia management, *Planta Indica*, 2 [ 3 ], 2006, 27-30.
59. Rathi, V., Rathi, J. C., Tamizharasia, S., Pathakb, A. K., Plants used for hair growth promotion, *Pharmacognosy Reviews*, Vol-2, Issue 3, Jan 2008, 185-187.

\*\*\*\*\*