



# Preparation of organic hair dye: formulation by an environment friendly process

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## Abstract

Henna, Mehndi is also known as *Lawsonia inermis*. It has been known as the natural source of the dye, besides having medicinal properties. Henna powder is made into a paste in water and used for skin decorations, tattooing and hair dyeing. Herbal based hair dyes are being preferred on large scale; due to the vast number of advantages it exerts to overcome the ill-effects of a chemical based hair dye. We have attempted to prepare and standardize this preparation to ensure its quality as well as stability aspects. The herbal dye was prepared in-house according to the proposed composition, using all the natural ingredients. The dye was evaluated for its organoleptic, physico-chemical and stability parameters. Today most of the human beings are very careful about their beauty and hairs play an important role in this. Herbal drugs without any adverse effects are used for healthy hair. Nearly 70% of human beings above 50 years struggle with the problem of balding and graying of hair.

**Keywords:** Henna paste, Color intensity, and. *Lawsonia inermis*.

## Introduction:

Henna (Mehndi) is the Persian name of a shrub known as *Lawsonia inermis*. It is native to Asia and the Mediterranean coast of Africa, however, now it has spread to other part of the world with warmer climate also. Henna leaves are harvested throughout the year, dried and ground to a fine powder for different applications including medicinal but largely as a cosmetics. Henna contains a pigment called Lawsone (2-hydroxy-1, 4-naphthaquinone) that bonds with the collagen and skin cells, keratin of fingernails and hair imparting dark black-brown coloring. Hair dyes include dyes modifiers, antioxidants, alkalizes, soaps, ammonia (NH<sub>3</sub>), wetting agents, fragrance, and a variety of other chemicals used in small amounts that impart special qualities to hair such as softening the texture or give a desired

As compared to the chemical based hair dyes, which cause skin and other skin related diseases, natural herbal dyes are being preferred nowadays [1]. Henna contains a pigment called Lawson\_(2-hydroxy-1, 4-naphthaquinone) that bonds with the collagen and skin cells, keratin of fingernails and hair imparting dark black-brown coloring. .Hair dyes include dyes modifiers, antioxidants, alkalizers, soaps, ammonia (NH<sub>3</sub>), wetting agents, fragrance, and a variety of other chemicals used in small amounts that impart special qualities to hair such as softening the texture or give a desired Action to the dye. The chemicals that are normally used in

the dye are amino compounds (4-amino-2-hydroxytoluene and m-Aminophenol). Metal oxides, such as titanium dioxide and iron oxide, are also often used as colorants in the process. Colorants are classified as being temporary or permanent. In temporary coloring the color can be washed from hair easily. Permanent coloring of hair involves addition of aromatic diamine or hydric phenols or polycompounds such as para phenylene di amine in the formulation. Continuous usage of such compounds containing dye on natural hair causes so many side effects such as skin irritation, erythema, loss or damage of hair and skin cancer. Other chemicals used in hair dyes act as modifiers, which stabilize the dye pigments or otherwise act to modify the shade. Antioxidants protect the dye from oxidizing with air. Most commonly used is sodium sulfite. Alkalizers are added to alter the pH of the dye formula, because the dye works best in a highly alkaline milieu. Ammonium hydroxide is a common alkalizer. Apart from these basic chemicals, many other chemicals are used to impart special qualities to a manufacturer's formula. [2]. Drugs from the plant sources are easily available, are less expensive, safe, and efficient and rarely have side effects [3]. In the present era of eco- conservation, the use of natural dyes has been revived and reviewed for the coloration of textiles and food materials [4, 5].

### **Ingredients Used In preparation of Herbal Dye**

#### **1) Henna**

its principle coloring ingredient of is lawsone, a red orange colored compound present in dried leaves of the plant in a concentration of 1 1.5% w/w. Lawsone acts as a non oxidizing hair coloring agent at a maximum concentration of 1.5% in the hair dyeing product. Other constituents in henna such as flavonoids and gallic acid act as organic mordants to the process of colouring. Carbohydrates give the henna paste a suitable consistency for adherence to the hair [6, 7]. Natural henna is usually hypoallergenic but allergic reactions occurred in mixed types including black henna. This occurs due to chemical compounds consisting of para-phenylenediamine, 2-nitro-4- phenylenediamine, 4-aminophenol and 3-aminophenol [8]. Henna has also antifungal activity against *Malassezia* species (causative organism of dandruff). Henna prevents premature hair fall by balancing the pH of the scalp and graying of hair. Henna leaf paste used for alleviating Jaundice, Skin diseases, Smallpox, etc. Extract of Henna leaves with ethanol (70%) showed significant hypoglycaemic and hypolipidaemic activities in diabetic mice [9, 10].

#### **2) Amla**

**Amla** is rich in vitamin C, tannis, phosphorus, iron, calcium, Fe and amino acid. The fruit extract is useful for hair growth and reduce hair loss. [11]. Amla has antibacterial and antioxidant properties that can help to promote the growth of healthy and lustrous hair [12]. Whole fruit is used as an active ingredient of the hair care preparations. Henna is used for coloring hair as well as for cooling the scalp. Amla is an excellent addition to this as it is known to increase the pigmentation of hair and helping any other color stick to it. Extract fresh amla juice by grinding the fruit or squeezing out grated amla. Add enough henna powder to it to get a paste. At this point, you can also add some fenugreek powder, which is a spice known for increasing hair thickness. Once you get the desired consistency, apply the pack all over the scalp and along the length of hair. Cover with a shower cap and leave it on for about two hours before washing off with cool water.

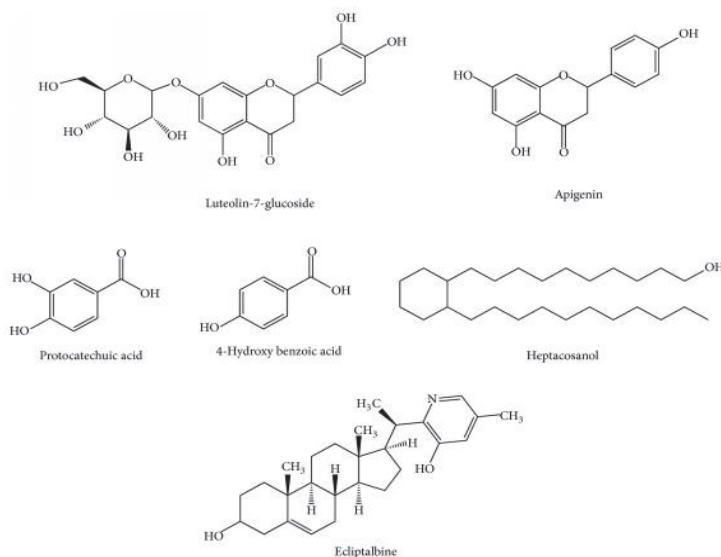
### 3) Reetha

Reetha or Soap nuts are also called as Arishtak in Ayurveda and “Soap nut tree” in India. It is well known for its traditional medicinal uses and is commonly used as a hair cleanser. Reetha is extensively used to make natural hair care products as it makes hair shiny, healthy and lustrous. It can be used on a daily basis to provide nourishment to the hair scalp and promote hair regrowth. Reetha powder can be mixed with warm water to form a paste which can be used to massage the scalp to help manage dandruff and also remove lice from the scalp due to its insecticidal property. The powder of Amla and Reetha can be applied to the hair to help control greying of hair and also stimulate better hair growth. Its fruit is rich in vitamin A, D, E, K, saponin, sugars, fatty acids and mucilage. Reetha extract is useful for the promotion of hair growth and reduced dandruff [13]. Extract of fruit coat acts as a natural shampoo, therefore is used in herbal shampoos in the form of hair cleanser.(14)

### 4) Coffee and Tea

Save yourself from the damage of chemical hair colouring by using coffee to darken hair. Rich in antioxidants, vitamins, proteins and other nutrients, coffee is good for dyeing hair light-brown, medium-brown or even dark-brown depending on the effective concentration of coffee. In hair colorants, herbs can be used in the form of powder, aqueous extract or their seed oil to impart shades of different colour varying from reddish brown to blackish brown. The herbal drugs like coffee powder obtained from its seeds are used as hair colorant. Being rich in polyphenols, selenium, copper, phytoestrogens, melatonin, tea also has been used in traditional Chinese medicine and in Ayurveda medicine has been used since long as hair colorant.

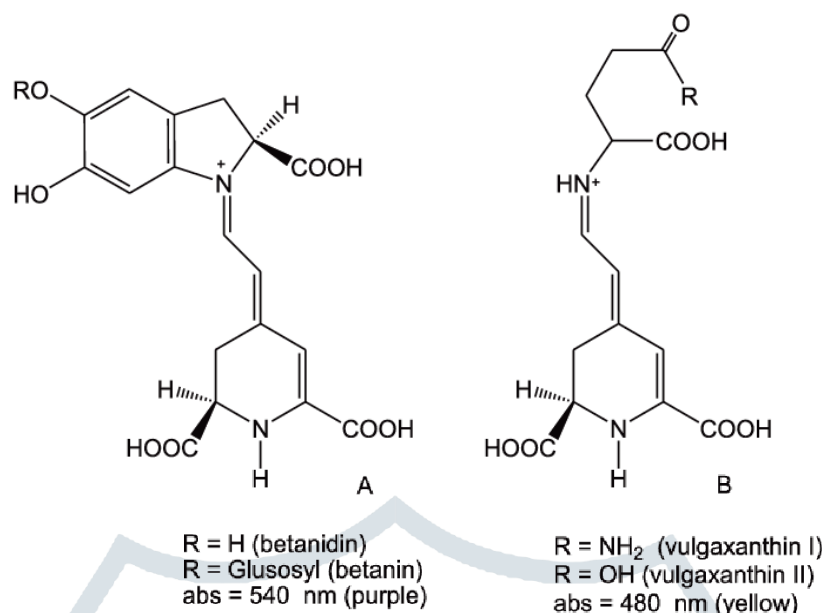
### 5) Bhringraj



Bhringraj is commonly used in ayurvedic remedies for hair to prevent hair loss, premature greying and promoting hair growth by stimulating blood circulation thereby revitalising hair follicles. Bhringraj will naturally enhance dark hair colour making hair darker because of the black dye content found in Eclipta Alba..Treatment with 5% of petroleum ether extract of bhringraj initiates greater number of hair follicles. The oil based extract of leaves has been used traditionally for improving hair growth and for imparting natural colour to grey hair. Neelibhringadi Tailam, mentioned in Ayurveda is suitable for promoting hair growth and

for providing natural colour to grey hair. Bhringraj is used in the preparation of various oil, shampoo, hair dye *etc.*(15)

## 6) Beetroot



Beetroot can be used as a natural alternative to hair dye. It will prevent your hair from the harmful chemicals the hair dyes contain. It acts as a temporary dye that you can choose. You can even customize it as per your required shade and tone. Beetroot is consist of multiple biologically active phytochemicals including betalains in (betacyanin and betaxanthins) ,flavonoids, polyphenols, saponins, and inorganic nitrate; it is also a rich source of diverse minerals such as potassium ,sodium, phosphorus, calcium, magnesium, copper, iron ,zinc and manganese .Beetroot is used for hair growth due to the carotenoids present in it, (16) Beetroot powder is a versatile ingredient that can be used to revitalize your scalp and promote hair growth. Applying a beetroot powder paste on the scalp and leaving it overnight allows the beneficial nutrients to deeply penetrate the hair roots, strengthening them from within. This treatment can help combat hair loss, dandruff, and scalp dryness, ultimately leading to healthier and more resilient hair. Regular use of beetroot powder can result in improved hair texture and enhanced shine.

## 7) Almond Oil

Almond oil comes from pressing the seeds of the almond tree (almond nuts) . Almonds have been valued in many ancient cultures for their healing and health properties, including high levels of protein, omega-9 fatty acids, and vitamin E. These properties suggest that almond oil can improve the shine and strength of your hair. Almond oil can make hair stronger and less prone to split ends, which means your hair growth won't be slowed by losing hair that becomes damaged.



## 1. MATERIALS AND METHODS

For the preparation of herbal hair dye, we have selected seven important ingredients such as Henna, Amla, Reetha, Coffee or Tea, Bhringraj, Beetroots, and Almond oil. Bhringraj, Amla and Henna leaves were collected from the herbal garden of PKV and it were shade dried and coarsely powdered. They were authenticated for their quality in the Pharmacology lab of the Institute. Reetha, coffee, tea, all in the powdered forms were taken from the authorized stores of the local market in the powdered form. Organic Beetroot were grate and shade dried and coarsely powdered then all the ingredients were mixed uniformly to prepare a homogenous formulation. At last add almond oil keep this formulation for 3, 4 hrs and then apply on hairs.



The composition of the formulation is reflected in the Table 1.

**Table 1. Ingredients of the herbal hair dye.**

Sr.No.	Ingredients	Quantity
1	Henna	60 %
2	Amla	20 %
3	Reetha	15 %
4	Coffee / Tea	10 %
5	Bhringraj	15 %
6	Beetroot	15 %
7	Almond Oil	4%

### Organoleptic Evaluation

Organoleptic characteristics for various sensory characters like color, taste, odour etc. was carefully noted down [17 - 19]. as illustrated in Table 2 The raw drugs and powders were separately studied by organoleptic and morphological characters like color, odour, texture and appearance

**Table 2. Organoleptic evaluation of herbal dye.**

Sr.No	Parameters	Results
1.	Colour	Greenish brown
2.	Odour	Characteristic
3.	Texture	Fine
4.	Appearance	Powder

**Application of hair dye**

The pack, which is in the form of powder, should be used weekly on wet hair, forming a paste of in water with optimum consistency. It should be applied evenly on the hair with the help of a brush, covering the roots to the hair tip. The scalp should be covered. It should be left for 2-3 hours on the scalp for complete drying. Then it should be removed by washing with plain water (20)

**Result:-**

The prepared herbal hair dye contains all the goodness of natural ingredients. Apart from acting as a hair dye, this formulation, because of the perfect blend of herbals, also acts as a hair growth promoter, hair nourisher, conditioner and anti-dandruff agent as well. Henna acting as the base powder, acts as the universal hair dye as it used for its colouring properties throughout the globe. It is also beneficial in the removal of excess oil from the scalp and conditions the hair well. Reetha restores the health of dull, dry, and damaged hair. Bhringraj aids in improving the circulation of blood flow at the root of the hair by providing more nutrients to support hair growth.

**Conclusion:-**

- The raw materials used to prepare hair dye and the final product is totally biodegradable.
- Herbal hair dye is very simple to use and a highly economical hair dyeing process.
- The composition and mode of preparation is environmental friendly.

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