

Review on Development of Poly-Herbal Hair Dye

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Abstract

Everyone likes to look young and intrigued, and hair plays a big part in improving one's image. Globally, graying hair is a big problem, especially for younger people. Premature graying is frequently the consequence of factors that negatively affect hair health, such as pollution, grime, severe temperatures, changes in lifestyle, stress, nutritional inadequacies, and hectic schedules. Because of this, many people look for techniques to cover up white or gray hair to look younger. Hair colors are frequently used for this reason, however, many of the synthetic dyes on the market contain dangerous chemicals, like ammonia and paraphenylenediamine, that can destroy hair and perhaps raise the risk of cancer. The creation of polyherbal powdered hair dyes from herbs found in our surroundings is the primary objective of this study. Herbal Hair colors are commonly utilized for this reason; be that as it may, numerous manufactured colors accessible on the showcase contain harmful chemicals, like paraphenylenediamine and alkali, which can harm hair and may indeed increment the chances of cancer. This inquiries about centers on the improvement of polyherbal powdered hair colors, which utilize herbs from our environment. Homegrown hair colors offer viable coloring without the unfavorable impacts of manufactured operators. We defined three distinctive versions using changing proportions of henna and indigo. Among these, formulation that employs the next extent of indigo, delivered the most excellent coloring impact, coming about in a brownish-black color that closely takes after common hair. The details were assessed for organoleptic properties, powdered characteristics, physico-chemical properties, and fixed tests. Each definition met all the assessment criteria. The color produced by F3 was a brownish black, imitating the normal dark hair color, which makes F3 the foremost compelling in terms of coloring. Subsequently, the F3 definition is recognized as the one with the foremost alluring coloring impact.

Keywords: Beautification, graying, herbal, nourishes, hair, hair scalp care

INTRODUCTION

Hair, or pili, could be a key characteristic highlight of all well-evolved creatures, covering most of the body's surface but for the palms of the hands, soles of the feet, and certain parts of the outside genitalia. The thickness and design of hair dispersion are impacted by hereditary and hormonal components. Hair on the head gives assurance from harm and hurtful sunbeams, whereas the hair on eyebrows shields the eyes from outside particles.

Hair coloring or hair coloring is the method of changing the natural color of hair. The essential reasons for this are corrective: to cover gray or white hair, to attain a color considered more in vogue or alluring, or to reestablish the first color after it has been changed by hairdressing medications or sun bleaching. Coloring hair can also give it a fuller, thicker appearance. Hair cases, selecting for semi-permanent hair color may be a great choice, because it not as it were upgraded the hair's quality but

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moreover makes it show up more beneficial.

Our hair is exposed to different natural components day by day, such as contaminated discuss, clean, extraordinary warm, and fluctuating temperatures, all of which can adversely influence hair wellbeing. When you color your hair, it makes a defensive layer that shields it from these natural dangers. Generally, normal natural substances were combined with metals, like copper, and pressed to create stronger or wealthier shades. In any case, drawn out utilization of such compounds on common hair can result in a few negative impacts, including skin aggravation, unfavorably susceptible responses, hair misfortune, dry scalp, and indeed skin cancers.

Advertising studies in India have found that numerous items promoted as “normal,” “secure,” and “viable” may still contain hurtful chemicals, like paraphenylenediamine (PPD), which may be a harmful engineered operator show in counterfeit colors at concentrations of 20–25%. On the other hand, normal colors are determined from plants, creatures, or insects without chemical preparation. Henna, for example, has been utilized in India for centuries to color hair and skin [1]. Graying hair is caused by components, such as hereditary qualities, push, destitute nutrition, and illness. The driving cause of early graying is heredity, and it is evaluated that by the age of fifty, half of the worldwide population will have 50% gray hair. Due to the destructive impacts of chemical-based hair colors, which can cause skin issues and other related well-being issues, characteristic home-grown colors are getting to be more prevalent. Today, numerous individuals are exceptionally cognizant of their appearance, and hair plays a noteworthy part in this. Homegrown cures, which have no destructive side effects, are broadly utilized for keeping up sound hair. Roughly 70% of individuals over 50 confront issues with hair misfortune and graying.

POINTS OF INTEREST OF NORMAL HAIR COLOR

- As a home-grown hair color, it has no side effects compared to engineered colors.
- The home-grown fixings are recognized for being non-toxic, and the bundling is free from chemicals, additives, fake colors, and scents.
- Homegrown hair color does not contain cruel chemicals like smelling salts, peroxide, or polyphenylene diamine.
- It is gentler on hair and more secure to utilize.
- It moreover gives food to the hair.
- Utilizing homegrown hair color is a great, speedy arrangement with no side effects [2].

MATERIALS AND STRATEGIES

Henna

- *Equivalent Words:* *Casearia multiflora*, *Lawsonia alba*, *Lawsonia speciosa*, *Lawsonia spinosa*, *Lawsonia*, and *Rotanthacombretoides*.
- *Natural Source:* The plant “*Lawsonia inermis*,” well known for its restorative and restorative excellencies. Henna takes off are characteristic sources of color for hands, feet, fingers, nails, and hair.
- *Family:* Lythraceae.
- *Geological Source:* The henna plant is local to Northern Africa, and it is additionally found in Western and Southern Asia.

Chemical Constituents

Lawsone (2-hydroxy 1,4-naphthoquinone), sugars (glycosides), and tannins (gallic acids).

Employment

- Henna makes a difference in repairing harmed hair strands and reestablishes the common acid–alkaline adjust of the scalp.

- It is a perfect option for coloring hair because it contains no chemicals, poisons, or smelling salts.
- Henna, moreover, secures hair from the sun and clean whereas fortifying it.
- It is viable in treating dandruff and scalp diseases.
- Henna is commonly utilized in makeup, hair care items, and as a color for hands [3].

Indigo

- *Natural Source*: Indigo gotten from a plant of *Indigofera tinctoria*.
- *Family*: Fabaceae.
- *Chemical Constituents*: Glycoside indane, indigotin, flavonoids, and tannins.
- *Employments*: Coloring operator and advance hair development.

Amla

- *Equivalent Words*: Emblica, Indian gooseberry, amla.
- *Organic Source*: This comprises dried, as well as new natural products of the plant “*Emblica officinalis*”.
- *Family*: Euphorbiaceae.
- *Chemical Constituents*: Vitamin C (ascorbic corrosive), alkaloids (phyllanthin), carbohydrates (pectin), hydrolysable tannins (emblicanin A & B).

Employment

- Condition your scalp.
- Advance solid hair development.
- Make strides in the tone of henna hair color.
- Minimize grays.
- Decrease dandruff [4].

Curry Leaves

- *Equivalent Word*: Kadipatta.
- *Organic Source*: Dried leaves of *Murraya koenigii* (L).
- *Family*: Rutaceae.
- *Chemical Constituent*: Phenols, flavanols, amino acids, and alkaloids.

Employment

- Curry takes off are wealthy in cancer prevention agents, vitamins C, and press.
- It can fortify the hair roots and avoid hair loss.
- Control the hair misfortune, repair the bunched up harmed hair, wealthy in folic corrosive, great for skin and hair [5].

Hibiscus

- *Equivalent Word*: Shoeblack plant, mahagua, mahoe, cotton rose, roselle, Jamaica roan.
- *Natural Source*: Green bush of *Hibiscus rosa-sinensis* flowers.
- *Family*: Malvaceae.
- *Chemical Constituents*: The phytochemical investigation appeared that *H. rosa-sinensis* contained tannins, anthraquinones, quinines, phenols, flavonoids, alkaloids, terpenoids, saponins, cardiac glycosides, protein, free amino acids, carbohydrates, reducing sugars, mucilage, fundamental oils, and steroids.

Employment

- Hibiscus is profoundly compelling in advancing hair development.
- Wealthy in calcium, phosphorus, press, vitamin B1, vitamin C, riboflavin, and niacin, hibiscus makes a difference in bolstering thicker hair development and diminishing untimely graying.
- It is commonly utilized to control dandruff.
- Hibiscus is known for its antioxidant properties, creating anthocyanins, flavonoids, and other phenolic compounds.
- It can be utilized to revitalize and condition the hair [6].

Leaves of Tea

Camellia sinensis dried leaves serve as the biological source. Theaceae is the family.

- *Chemical Components*: Loaded with phytoestrogens, copper, selenium, and polyphenols.
- *Uses*: Tea's nutrients can help damaged hair regain its smoothness and gloss, and it can help avoid split ends.
- Tea could decrease hair loss.
- Using tea on a regular basis keeps hair lustrous and smooth.
- It encourages the growth of hair.
- It is generally accepted that applying black tea to the scalp and hair is safe.
- Black tea's caffeine may cause the hair shaft to become parched, which could result in a damaged, dry appearance [7].

Aloe vera

Gawar Patha is a synonym. The biological source is the dried latex of *Aloe barbadensis* miller leaves, which belong to the Asphodelaceae family. Anthroquinone glycoside and tannins are the chemical constituents.

- *Aloe vera* is good for the scalp and can be used to encourage hair growth and to treat hair loss.

Aloe emodin, which is found in *A. vera*, activates hair follicles and promotes hair growth. It also helps to relieve sunburn on the scalp.

- One natural mordant is *A. vera*.
- Its softening and moisturizing properties are well known [8].

Neem

The fresh leaves of the *Azadirachta indica* plant, which belong to the Melaceae family, are the biological source of neem.

- *Chemical Part*: Sodium nibinate, nimbidin, nimbidol, and *A. indica*.
- *Applications*: Assists in preventing your hair from prematurely appearing gray.
- It naturally hides gray hair.
- Antimicrobial agent [9].

Peel Orange

Orange or sweet orange are synonyms. Name in botany: *Citrus sinensis*. The Rutaceae family. Its biological source is the orange peel, which is the fresh or dried outer layer of the pericarp of ripe or almost ripe citrus sinensis fruits. Chemical elements include pectin, octanal, decanal, limonene, (S)-linalol, and essential alcohols, among others.

Uses

- Manage dandruff.
- Anti-inflammatory and antioxidant.
- Orange oil is used as a fragrance.
- Encourages hair growth [10].

Lemon Peel

Lemon, a citrus fruit, is rich in antioxidants, vitamin C, and essential minerals, making it highly beneficial for both the body and skin. It is also known to promote healthy hair. For centuries, people have used lemon as a natural method for achieving sun-kissed highlights. The acidity in lemon gradually lightens the hair by breaking down its pigment, and when exposed to UV light, it enhances the natural lightening effect of the sun [11]. The citric acid in lemons accelerates this process by breaking down hair pigment, revealing lighter shades underneath. To use this method, simply spray lemon juice onto your hair, comb it through for even distribution, and sit in the sun for at least an hour. Multiple sessions may be needed to see the desired results. However, keep in mind that frequent use of lemon juice can cause damage to your hair by weakening the cuticle, leading to dryness and brittleness.

Chemical Constituents

Limonene, Sabinene, Citronella, Linalool, Neral, Geranial, Ocimene, Myrcene.

Uses

- Helps remove scalp buildup.
- Boosts the immune system.
- The citric acid in lemon can even address underlying hair issues [12].

To create herbal hair dye, a variety of herbs were utilized as per the following formula (Tables 1 & 2):

Table 1. Ingredient composition for hair care formulations (F1, F2, F3).

S. N.	Ingredients	F1	F2	F3
1.	Henna	25 gm	15 gm	10 gm
2.	Indigo	–	10 gm	15 gm
3.	Amla	3 gm	3 gm	3 gm
4.	Curry leaves	3 m	3 gm	3 gm
5.	Tea leaves	5 gm	5 gm	5 gm
6.	Hibiscus	5 gm	5 gm	5 gm
7.	<i>Aloe vera</i>	2 gm	2 gm	2 gm
8.	Neem	3 gm	3 gm	3 gm
9.	Orange peel powder	2 gm	2 gm	2 gm
10.	Lemonpeel powder	2 gm	2 gm	2 gm

METHODOLOGY

- All the ingredients were procured from the local market in Tumakuru and online shopping platforms.
- The collected herbal materials were thoroughly dried.
- Each ingredient was finely ground and sifted through a 80 number sieve to ensure a smooth powder consistency.
- The ingredients were measured according to the recommended proportions and carefully mixed to achieve a uniform blend [13].

Table 2. Organoleptic characteristics of samples F1, F2, and F3.

S. N.	Parameters	F1	F2	F3
1.	Color	Greenish	Greenish brown	Brownish black
2.	Odor	Characteristic	Characteristic	Characteristic
3.	Texture	Fine	Fine	Fine
4.	Appearance	Powder	Powder	Powder

ADVANTAGES

- *Gentler on the Scalp and Hair:* Herbal hair dyes are typically free from harsh chemicals, like ammonia, parabens, and others, commonly found in conventional dyes. This makes them milder on the scalp, reducing the risk of irritation or damage to the hair. For example, henna, a widely used herbal dye, not only colors the hair but also nourishes and strengthens it.
- *Nourishing Properties:* Many herbal dyes are packed with natural ingredients that provide nourishment to the hair. Ingredients, such as henna, indigo, and amla not only give color but also enhance hair health by boosting shine, strengthening hair strands, and helping to reduce hair fall.
- *Reduced Risk of Allergic Reactions:* Herbal hair dyes generally have a lower chance of causing allergic reactions compared to chemical alternatives. With fewer synthetic ingredients, they tend to be safer for those with sensitive skin or allergies.
- *Environmentally Friendly:* Herbal hair dyes are biodegradable and do not contribute to the buildup of harmful chemicals in the environment. The plant-based ingredients used in these dyes make them a more eco-conscious choice compared to synthetic hair dyes.
- *Long-Lasting, Natural Appearance:* Unlike some chemical dyes, which can result in an artificial look, herbal dyes usually provide a more natural color and tend to fade gradually without leaving harsh root lines. For example, henna imparts a rich red-orange hue that fades evenly over time [14].

DISADVANTAGES

- *Limited Range of Colors:* Herbal hair dyes, such as henna, typically offer a narrow range of colors, like red, orange, or brown. Achieving lighter shades, such as blonde or more vibrant colors, may be challenging without adding chemicals, which might be unappealing to those who prefer a broader color spectrum.
- *Messy Application and Staining:* Certain herbal dyes, particularly henna, can be messy to apply and may stain the skin, clothing, or other surfaces. The application process may also be more time-consuming compared to chemical dyes, which are often quicker and more straightforward.
- *Inconsistent Results:* Herbal hair dyes can sometimes yield unpredictable results, especially when combined with other natural ingredients. The final color may vary depending on factors like hair type, processing time, and the quality of the herbal product used.
- *Longer Processing Time:* Unlike chemical dyes, which typically require less time, herbal hair dyes may need to remain on the hair for several hours to achieve the desired color depth. This can be inconvenient for those with busy schedules.
- *Potential Hair Dryness:* Some herbal dyes, especially henna, may leave hair feeling dry and brittle due to their astringent properties. While henna does provide conditioning benefits, frequent use without adequate moisturizing may result in hair damage.
- *Possible Allergic Reactions to Specific Herbs:* Though herbal dyes are generally considered safer, some individuals may still experience allergic reactions to herbs used in the dye. For instance, some people may be allergic to henna or other additives, like essential oils, that are sometimes mixed with herbal dyes [15].

TESTS FOR POWDER CHARACTERISTICS

Angle of Repose

The angle of repose refers to the maximum angle between the surface of a pile of powder and the horizontal. To measure it, a required amount of dried powder is placed in a cylinder tube with open ends, which is positioned on a flat surface. A funnel is raised to form a heap of powder. The height and radius of the heap are recorded. The angle of repose can then be calculated using the following formula [16].

$$\tan \theta = \tan^{-1}(h/r),$$

where:

θ = angle of repose.

h = height of the heap.

r = radius of the base.

Tapped Density

Tapped density refers to the bulk density measured after mechanically tapping a container filled with a powder sample. Initially, the powder's volume or mass is recorded. The container is then tapped mechanically for 1 minute, and volume or mass readings are taken until no significant changes in volume or mass occur [17].

Tapped density = mass/tapped volume

Bulk Density

Bulk density refers to the ratio of the mass of a powder to its bulk volume. To measure it, a specific quantity of dried powder is placed into a 50 ml measuring cylinder and filled to the 50 ml mark. The cylinder is then dropped onto a hard surface from a height of 1 inch at 2-second intervals. The volume of the powder is measured, and its weight is recorded. This process is repeated multiple times to calculate the average bulk density [18].

Bulk density = mass/bulk volume.

Patch Test

- Clean a small area of skin on the inner forearm or behind the ear using alcohol.
- Apply a small amount of the product from the tube and allow it to dry without rinsing.
- Wait for up to 48 hours, observing the area for any reactions caused by the ingredient [19].

RESULT AND DISCUSSION

The arranged homegrown hair color contains all the goodness of characteristic fixings. Separated from acting as a hair color, this definition, due to the idealized mix of herbs, acts as a hair development promoter, hair nourisher. Henna may be a great coloring operator. Indigo gives a normal dark color to the hair. Amla advances hair development. Curry takes off and makes a difference to hold the normal color. Tea clears out to keep hair delicate and sparkling. Hibiscus makes a difference to halt hair misfortune. Neem makes a difference in controlling the untimely graying of hair. *Aloe vera* decreases frizziness and makes the hair smoother. Orange peel delays untimely turning gray. Lemon peel quickens the blend of collagen and speeds up the development of hair. Organoleptic assessment discoveries uncovered that the color is smooth and wonderful, noticing powder. Physicochemical parameters reflected that the damp substance was ostensible, pH was found unbiased to suit the prerequisites of distinctive scalp sorts. Cinder esteem was found to be substantial, meaning the presence of inorganic radicals in suitable amounts. Test for phytoconstituents was also done, which appears to define colors as are full pack of constituents that are genuine nourishers for the hair. Fix test uncovered negative effects for irritancy, redness, and swelling as the herbs in their natural form without utilization of manufactured additives. From the over perceptions, it has been meant that since the definition is constituted with happening dried homegrown fixings, there are nearly negligible conceivable outcomes of the disintegration of the detailing, as there's no dampness-containing substance in either crude or prepared form. The definition was kept for one month at room temperature to watch the changes in its color, scent, surface, and appearance. The detailing was found to be stable. Since it may be a normal homegrown-based detailing, it is free from the ill-effects of alkali-based chemical colors.

In any case, the standard utilize of it gives voluminous, smooth, and well colored hair. Its persistent utility appears to have eminent impacts afterward. Since normal fixings are known for their non-toxic, non-habit shaping properties and no chemicals, additives, fake colors or fragrances have been consolidated within the pack, the chances of its corruption are nearly near to negligible. This leads to an expanded rack life with steady fixings [20–21].

CONCLUSIONS

The poly-herbal powdered hair dye provides a gentle and effective way to color the hair. One of the key advantages of using herbal-based cosmetics is their non-toxic nature. This natural herbal hair colorant is suitable for individuals of all ages. Made from locally sourced herbs, the poly-herbal hair dye

offers excellent coloring results without any harmful side effects, making it a cost-effective solution.

The developed formulations were assessed based on organoleptic properties, powdered characteristics, physicochemical properties, and patch tests. All the formulations satisfied the necessary evaluation criteria. The results suggest that by modifying the proportions of the colorants, a natural black shade can be attained for gray or white hair. This natural herbal hair colorant is both safe and advantageous for individuals of all ages, offering an effective and mild solution for hair dyeing with minimal adverse effects.

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