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Original Article

Formulation and Evaluation of Natural Lipstick from Delonix Regia

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ABSTRACT

Lipstick has long been used to enhance both the color and shine of lips, functioning as a cosmetic that blends pigments, oils, waxes, and emollients to add color, texture, and protection. This research was conducted to create natural lipsticks using color pigments sourced from the petals of Delonix regia. The lipsticks produced were assessed for their sensory characteristics, such as ease of application, hardness, shine, and gloss, revealing them to be aesthetically pleasing products that effectively enhance beauty. The formulation consisted of natural components, including Delonix regia petals, carrot root, olive oil, and ripe shikakai fruit powder. To address the negative effects linked to synthetic lip products, this study concentrated on formulating a herbal lipstick that minimizes or eliminates side effects. The petals of Delonix regia not only offer a vibrant color but also possess various health benefits, such as antifungal, antibacterial, antioxidant, anti-inflammatory, antimalarial, wound healing, and anticancer properties. Furthermore, this formulation functions as a natural moisturizer, making it advantageous for healing chapped lips.

Keywords: Herbal Lipstick, Delonix regia, Sunflower Oil, Natural Colorants, Lip Care, Natural Cosmetics

INTRODUCTION

Delonix regia is a flowering plant species within the Fabaceae family, specifically classified under the subfamily Caesalpinioideae. Indigenous to Madagascar, it is celebrated for its lacy leaves and striking orange-red flowers that bloom in the summer. Known in English as the royal poinciana, flamboyant tree, or flame of the forest, this plant is frequently grown as an ornamental tree in tropical areas worldwide. The flowers of Delonix regia are especially remarkable for their size and beauty, consisting of four large, spreading petals that can grow up to 8 cm (3 inches) long, exhibiting shades from scarlet to orange-red. Additionally, there is a fifth upright petal, referred to as the standard, which is slightly larger and often embellished with yellow and white markings. These exquisite flowers typically emerge in corymbs along the branches and at their ends. A naturally occurring variety, known as flavedo (Bengali: Radhachura), exhibits yellow flowers. The plant produces long, green pods that mature into dark-brown, woody structures, measuring up to 60 cm (24 inches) in length and 5 cm (2 inches) in width. Each pod contains small seeds, averaging around 0.4 grams (6.2 grains) each. The aesthetic appeal and unique characteristics of Delonix regia make it an interesting candidate for exploring its potential applications in cosmetic formulations, such as natural lipsticks. Lipstick is a cosmetic product designed to add color and texture to the lips. Typically composed of pigments, oils, waxes, and emollients, lipstick provides a variety of effects, from matte to glossy finishes. It enhances the lips' appearance, offering a pop of color while also providing moisture and protection. Available in a wide range of shades and formulations, lipsticks can vary in texture (creamy, matte, liquid) and longevity (long-lastin, hydrating). Some lipsticks may also contain additional benefits, such as sun protection or nourishing ingredients.

Lipstick comes in various types, each with distinct formulations and finishes. Here are some common types:

Bullet Lipstick: Traditional stick form, often creamy and easy to apply. Available in matte, satin, and glossy finishes.

Relevant conflicts of interest/financial disclosures: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Liquid Lipstick: Comes in a tube with a wand applicator, often long-lasting and can have matte or glossy finishes. Some are transfer-proof.

Gloss: Provides a high-shine finish and is usually lightweight. It can be sheer or pigmented.

Stain: Offers a more natural, long-lasting color that fades evenly. Typically, lightweight and may not require frequent reapplication.

Lip Balm: Combines color with hydration, usually providing a sheer tint. Great for a more natural look.

Crayon: A chunky pencil that combines the convenience of a lipstick with the precision of a lip liner. Available in various finishes.

Matte Lipstick: Provides a flat, non-shiny finish and often has a more pigmented look. Usually long-lasting but can be drying.

Cream Lipstick: Offers a creamy texture with a satin finish. It's moisturizing and comfortable to wear.

Metallic Lipstick: Features a shiny, metallic finish that reflects light, creating a bold and eye-catching look.

Sheer Lipstick: Offers a light wash of color and is often moisturizing, making it perfect for a more natural appearance.

Each type has its unique benefits and can be chosen based on personal preference, occasion, or desired look.

Herbal lipsticks offer several advantages over conventional lipsticks, primarily due to their natural ingredients. Here are some key benefits:

1. Natural Ingredients

- **Gentler on Skin**: Herbal lipsticks are typically free from synthetic chemicals, making them less likely to irritate sensitive skin.

2. Hydration

- **Moisturizing Properties**: Many herbal lipsticks contain natural oils and butters (like shea butter or coconut oil) that keep lips hydrated and prevent dryness.

3. Nourishing

- **Rich in Nutrients**: Herbal lipsticks often contain vitamins and antioxidants from plant extracts, which can nourish and protect the lips.

4. Environmentally Friendly

- **Sustainable Practices**: Many brands prioritize eco-friendly sourcing and packaging, making herbal lipsticks a more sustainable choice.

5. Cruelty-Free Ethical Considerations: Many herbal lipsticks are not tested on animals, aligning with cruelty-free practices.

6. Variety of Shades

- **Natural Pigments**: Herbal lipsticks often use natural dyes, offering a unique range of colors that can be just as vibrant as synthetic options.

7. Reduced Risk of Allergies

- **Less Likely to Cause Reactions**: With fewer synthetic ingredients, there's a lower chance of allergic reactions or sensitivities.

8. Long-Lasting Moisture

- **Comfortable Wear**: The moisturizing properties help keep lips feeling comfortable throughout the day, rather than drying them out.

9. Multi-Functional Use

- **Dual Purpose**: Some herbal lipsticks can double as lip balms, providing color while also moisturizing.

10. Support for Natural Brands

- **Conscious Consumerism**: Choosing herbal products often supports smaller, natural brands committed to ethical and sustainable practices.

Overall, herbal lipsticks can be a great choice for those looking for a healthier, more natural alternative to conventional cosmetics.

Fig No 1 Delonix regia

Formula **Table No 1**

Sr. No	Ingredients	Quantity Given (gm)	Quantity Taken (gm)	Importance
1.	Sunflower Oil	13	0.6	Blending agent
2.	Paraffin wax	29	1.3	Glossy and hardness
3.	Bees wax	37	2.0	Glossy and hardness
4.	D.regia extract	0.8	0.004	Colouring agent
5.	Shikakai powder	14	0.75	Surfactant
6.	Rose water	1	0.05	Flavouring Agent
7.	Aloevera	0.1	0.02	Antioxidant

Sunflower Oil

Paraffin wax

Bees wax

Shikakai powder

Rose water

Aloevera

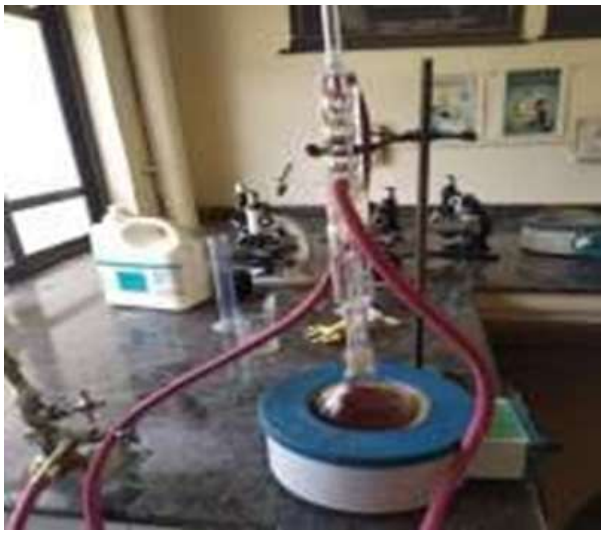

Fig No 2 Extraction of Colour Pigments

Extraction Procedure

The coarsely powdered seeds of Delonix regia (100 gm), which were dried in the shade, underwent extraction with methanol at a temperature of 60-80ºC for a duration of 6 hours. Once the extraction process was finished, the defatted extract was filtered while still hot through Whatman filter paper (No.10) to eliminate any potential impurities. The extract was then concentrated via vacuum distillation to decrease its volume to one-tenth; the concentrated extract was placed in a 100 ml beaker, and the excess solvent was evaporated using a water bath. A dark reddish extract was obtained in the end. This concentrated extract was subsequently stored in desiccators to eliminate any remaining moisture. Finally, the dried extract was packed into an airtight glass container for further experimentation.

METHODOLOGY

Melt the oils and waxes in a crucible with a melting point ranging from 75 to 78 degrees Celsius while stirring. Next, incorporate the remaining ingredients, excluding the extract. Once the mixture cools to 42 degrees Celsius, add the extract and then pour the mixture into a mold.

Process

1. Start with Abundance

Begin by filling the tank with the primary ingredient in your formulation. For most products, this will be a water or oil base, ensuring a stable foundation for the batch.

2. Add Ingredients

Incorporate oil-soluble ingredients first, as they may take longer to dissolve. Mix thoroughly to ensure they

are evenly distributed before adding any additional ingredients.

3. Utilize Heat

Although not always necessary, warming the batch can help facilitate blending. Generally, warmer ingredients mix more easily, but remember that some materials, like cellulose, may dissolve better in cold water.

4. Raise the Mixing Temperature

When working with emulsions or solids needing to be melted, heat the batch to about 10°C above the highest melting point of your ingredients. For most emulsions, aim for a temperature between 75°C and 80°C.

5. Add Fragrances and Preservatives Last

To prevent degradation from heat, introduce sensitive ingredients like fragrances and preservatives at the end of the process, once heating and cooling are complete.

6. Incorporate Color Early

Add colorants early in the formulation process and compare against a color standard. This allows for easy adjustments and minimizes waste if changes are needed.

7. Neutralize at the End

If your formulation requires neutralization (e.g., for gels or Carbomer), do this as the final step. This helps reduce air incorporation and stabilizes the formula.

Lipstick

Additional Tips

- **Document Your Process**: Keep detailed records of each formulation for consistency and future reference.
- **Conduct Small Batch Tests**: Experiment with small batches first to refine your process and ingredient ratios.
- **Implement Quality Control:** regularly check ingredients and final products to ensure quality and stability**.**

Table No 2: The following test was performed on flower extract of Delonix Regia And Sunflower Oil.

Phytochemial Test	Generalized principal test	Result	
		Delonix Regia	Sunflower Oil
Alkaloids	Mayer's Test	+	+
Carbohydrates	Molisch's Test	+	-
Flavonoids	Sodium Hydroxide Test	+	+

Phenol	Bromine Water Test	-	+
Saponins	Frothing Test	+	+
Tannins	Ferric Chloride Test	+	-
Steroids	Salkowski Test	+	+
Terpenoids	Libermann-Burchard Test	+	-

Evaluation of Lipstick

1. Melting Point

Determining the Melting Point: The melting point is a critical parameter for formulating lipstick, as it indicates the maximum safe storage temperature. To find the melting point, we used the capillary tube method for 1187 lipstick formulations:

- **Procedure:**

1. A glass capillary tube, open at both ends, was filled with 50 mg of melted lipstick.
2. The capillary tube was chilled in ice for 24 hours.
3. A water-filled beaker was placed on a heating plate equipped with a magnetic stirrer.
4. A thermometer was inserted into the beaker, ensuring it was deep enough to measure the temperature of the melting lipstick.
5. We slowly heated the water while stirring, monitoring the temperature until the lipstick began to melt.

This process provided accurate data on the melting point, ensuring the formulation's stability under storage conditions.

2. Breaking Point

Determining the Breaking Point: The breaking point measures the maximum load that lipstick can withstand before fracturing, reflecting its durability.

- **Procedure:**

1. A herbal lipstick that was prepared was held in a support socket, set horizontally at a distance of one inch from the edge.
2. We gradually increased the weight applied to the lipstick, adding a predetermined amount (10 g) at intervals of 30 seconds.
3. The breaking point was recorded when the lipstick fractured under the applied load.

This evaluation helps assess the lipstick's structural integrity and its ability to withstand everyday use.

Summary

These evaluations—melting point and breaking point—are essential for ensuring the quality and performance of lipstick formulations, guiding formulation adjustments and product development.

3. pH Determination Test

The pH levels of the herbal lipstick formulations were evaluated using both a digital pH meter and pH testing strips. This combination method guarantees precise measurement of the formulations' acidity or alkalinity, which is essential for ensuring product stability and compatibility with the skin.

4. Skin Irritation Test

To evaluate the consistency of the protective layer in the lipstick formulation, a glass slide was used for repeated applications of the lipstick. The following criteria were used to assess performance:

- **Good:**
  - Consistent application
  - No fragmentation or deformation
  - Flawless application with no distortion
- **Intermediate:**
  - Consistent application
  - Leaves a few fragments
  - Good application but slight distortion present
- **Bad:**
  - Uneven application
  - Leaves many fragments
  - Difficult to apply and significantly distorted

Table No. 3 Evaluation parameter of Delonix Regia lipstick

Sr no	Evaluation Parameters	Inferences
1	Color	Orange Reddish color
2	pH	6.8
3	Skin irritation	No
4	Melting point	70
5	Breaking Point	30.5
6	Force of application	Good
7	perfume stability	+++
8	Surface anomalies	No
9	Aging Stability	Smooth
10	Texture	Smooth

RESULTS & DISCUSSION

- In this study, various natural ingredients were utilized to formulate herbal lipsticks and ointments, incorporating a natural colorant derived from the petals of *Delonix Regia*. The impact of these ingredients on key evaluation parameters was systematically investigated.
- The prepared lipsticks were evaluated according to the formulations outlined in Table 1. Among the three formulations tested, herbal lipstick NL1 emerged as the best performer based on the evaluation criteria.
- The findings suggest that NL1 not only meets the aesthetic and functional requirements but also exhibits minimal to no side effects. This formulation demonstrated optimal local effects on the lips, highlighting its suitability for use.
- Overall, this investigation underscores the potential of herbal ingredients in cosmetic formulations, providing a safe and effective alternative to conventional lip products

CONCLUSION

The formulation of herbal lipstick using natural ingredients, particularly the colorant derived from *Delonix Regia* petals, has proven to be a successful endeavor. Among the tested formulations, herbal lipstick NL1 stood out for its superior performance across various evaluation parameters. This formulation not only demonstrated excellent cosmetic properties—such as color consistency and application smoothness—but also exhibited minimal side effects, making it a safe choice for users. The results indicate that herbal lipsticks can provide effective and aesthetically pleasing alternatives to conventional products, harnessing the benefits of natural ingredients for healthier lip care. In summary, the study supports the viability of herbal lipsticks as both effective and safe cosmetic products, promoting a

shift towards more natural formulations in the beauty industry.

Future Scope

Bringing a drug to market is a lengthy process that involves careful coordination, a clear comprehension of the project's particular requirements, risk management, and expertise. The launch of new products is an exhilarating moment for pharmaceutical companies as well as the patients they assist. Given the rise in regulations, challenges in the supply chain, and the FDA approval process, it is crucial to find a dependable and knowledgeable partner

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