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"Formulation and Evaluation of a Herbal Perfuming Lotion Enriched with Tamanu Oil and Mint Extract"

Kaustubh Newale, Radhika Ghumade, Pratham Patil, Arti Ingole, Dr.P.N.Sable
[1]*Student, Siddhi Collage of Pharmacy,Chikhali,Pune*
[2]*Student, Siddhi Collage of Pharmacy,Chikhali,Pune*
[3]*Student, Siddhi Collage of Pharmacy,Chikhali,Pune*
[4]*Assistant professor, Siddhi Collage of Pharmacy,Chikhali,Pune*
[5]*Principal, Siddhi collage of Pharmacy,Chikhali,Pune*

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ABSTRACT
A herbal moisturizing lotion was developed using a mix of natural oils, plant extracts, and gentle ingredients that help keep the skin soft, smooth, and protected. The main active ingredients — Tamanu oil, Jojoba oil, Rosewood essential oil, Aloe vera gel, Mint leaf extract, and Vitamin E — were chosen for their natural healing, moisturizing, and antioxidant benefits. To give the lotion the right feel and texture, ingredients like stearic acid, cetyl alcohol, and emulsifiers were used to make it creamy, stable, and easy to spread. After preparation, the lotion was tested for its look, pH, thickness, spreadability, and overall stability. The results showed that it had a smooth, pleasant, and non-greasy texture, making it suitable for regular use on the skin in both cosmetic and dermatological applications.

Keywords: (Herbal perfuming lotion, Natural oils , Plant extract ,Skin care , Eco-friendly formulation **)**

I. INTRODUCTION:

The skin is the largest organ of the human body and acts as a protective barrier against physical, chemical, and microbial agents. From a pharmacological perspective, it serves as both a target site and a route of drug delivery in topical formulations such as lotions, creams, and ointments.

The skin consists of three main layers:
Epidermis: The outermost layer, containing the stratum corneum, which regulates permeability and prevents water loss.
Dermis: The middle layer rich in collagen fibers, blood vessels, and nerves that support skin elasticity and nourishment.
Hypodermis (subcutaneous tissue): Provides insulation and cushioning.

In topical pharmacology, the stratum corneum is the key barrier controlling absorption. Lotions are formulated as oil-in-water emulsions that improve hydration, soften the skin, and facilitate penetration of active ingredients through this barrier. The active components, such as Tamanu oil and Mint leaf extract, act locally on the skin to produce anti-inflammatory, antimicrobial, antioxidant, and soothing effects without entering systemic circulation.

Thus, understanding the pharmacology of the skin is essential for developing effective lotion formulations that ensure proper absorption, stability, and targeted therapeutic action.
In recent years, there has been increasing interest in plant-derived ingredients for topical skincare owing to their diverse biological activities and lower risk of synthetic side effects. Among these botanicals, Calophyllum inophyllum oil (commonly known as Tamanu oil) and extracts of Mentha species (mint leaves) have shown promise in improving skin health through anti-inflammatory, antimicrobial, antioxidant, and wound-healing properties.

Tamanu oil is obtained from the nuts of Calophyllum inophyllum and has long been used in traditional medicine across tropical and subtropical regions for the treatment of wounds, burns, scars, and skin infections. Phytochemical studies have demonstrated that Tamanu oil contains fatty acids such as oleic, linoleic, palmitic, and stearic acids, along with resinous and phenolic compounds responsible for its biological effects. Recent studies have confirmed its antimicrobial, anti-inflammatory, and wound-healing activities, indicating potential use in cosmetic and therapeutic formulations.

Mint leaf extract, derived from plants belonging to the Mentha genus, is widely recognized for its cooling and soothing properties due to the presence of menthol and other volatile constituents. The extract exhibits antioxidant

International Journal of Pharmaceutical Research and Applications
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activity owing to its rich content of phenolic compounds and flavonoids, such as rosmarinic acid, which help in protecting the skin from oxidative damage and premature aging. Additionally, its mild astringent and antimicrobial actions make it beneficial for oily and acne-prone skin.

The combination of Tamanu oil and mint leaf extract in a lotion formulation can offer synergistic benefits, including enhanced antimicrobial, antioxidant, and soothing effects. This may result in an effective, natural-based cosmetic formulation suitable for skin protection, healing, and rejuvenation. Despite the growing evidence of individual benefits, limited research has been conducted on combined formulations, warranting further investigation into their physicochemical stability, safety, and therapeutic potential.

Purpose:

The purpose of this research is to develop and evaluate a herbal perfuming lotion formulated with natural plant-derived ingredients and essential oils that provide dual benefits of skin nourishment and pleasant fragrance. The study aims to explore the potential of herbal extracts and aromatic essential oils as safe, eco-friendly, and skin-compatible alternatives to synthetic chemicals and artificial perfumes commonly used in commercial lotions.

1. Formulating a stable, skin-friendly herbal lotion using natural oils, emulsifiers, and herbal fragrances.
2. Evaluating physicochemical parameters (such as pH, viscosity, spreadability, stability, and fragrance retention).
3. Assessing the moisturizing and sensory properties to determine consumer acceptability.
4. Comparing the performance of the herbal perfuming lotion with marketed synthetic perfumed lotions in terms of texture, fragrance retention, and skin compatibility.
5. Promoting the concept of green cosmetics by utilizing biodegradable, non-toxic, and sustainable natural materials for fragrance and skin care.

Objectives :

1. To formulate a herbal perfuming lotion using natural essential oils and plant extracts that provide both fragrance and skin benefits. Mi
2. To evaluate the physicochemical properties (pH, viscosity, spreadability, stability, etc.) of the developed herbal lotion to ensure its suitability for topical application.
3. To assess the perfuming characteristics of the lotion, including fragrance intensity, persistence, and consumer acceptability.
4. To determine the moisturizing and skin-conditioning effects of the herbal ingredients through laboratory and/or sensory evaluation methods.
5. To analyze the stability and compatibility of herbal actives and fragrance components under different storage conditions.
6. To compare the performance of the developed herbal perfuming lotion with that of a conventional synthetic formulation in terms of fragrance retention, texture, and user satisfaction.
7. To ensure the formulation's safety and dermatological acceptability, confirming that it is non-irritant and suitable for regular use.

To explore the potential of herbal perfuming lotions as a natural, eco-friendly, and multifunctional alternative to chemical-based cosmetic products

II. MATERIAL AND METHODS

MATERIALS

Sr. No.	Ingredients
1	Tamanu Oil
2	Jojoba Oil
3	Rosewood Essential Oil
4	Mint Leaf Extract
5	Aloe Vera Gel
6	Vitamin E
7	Glycerin
8	Stearic Acid
9	Cetyl Alcohol
10	Propylene Glycol
11	Methyl Paraben
12	Propyl Paraben
13	Perfume Agent

International Journal of Pharmaceutical Research and Applications
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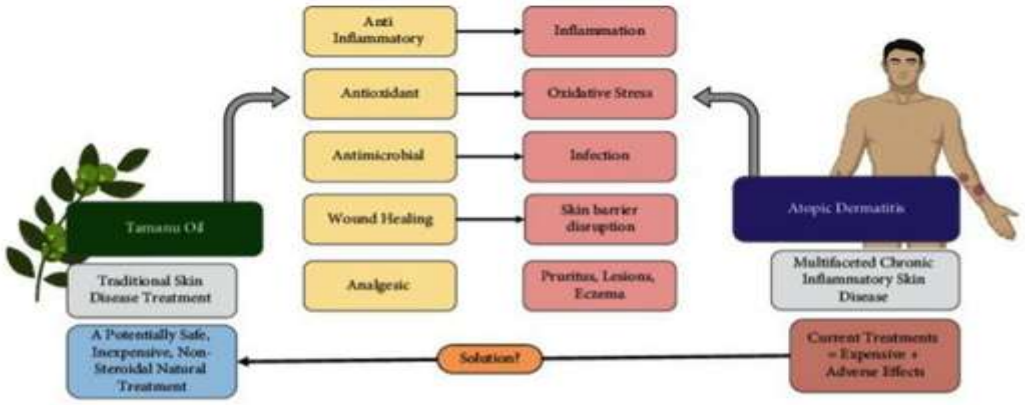
1 Tamanu Oil



Biological Source:

Tamanu oil is obtained from the dried nuts of Calophyllum inophyllum Linn., belonging to the family Clusiaceae (Guttiferae).

Geographical Source:

Native to tropical regions such as Southeast Asia, Polynesia, and coastal areas of India and Madagascar.

Morphological Description:

Tamanu oil is a thick, greenish-yellow oil with a characteristic nutty odor. It is obtained by cold pressing the dried kernels of the fruit.

Phytochemical Constituents:

Contains calophyllolide, inophyllums A–E, coumarins, flavonoids, xanthine's, linoleic acid, oleic acid, and stearic acid. These compounds contribute to the oil's healing, anti-inflammatory, and antioxidant activities.

2.Jojoba Oil

Biological Source:

Jojoba oil is a liquid wax obtained from the seeds of Simmondsia chinensis (Link) C.K. Schneid., family Simmondsiaceae.

Geographical Source:

Indigenous to the deserts of southern California, Arizona, and Mexico; cultivated worldwide for cosmetic applications.

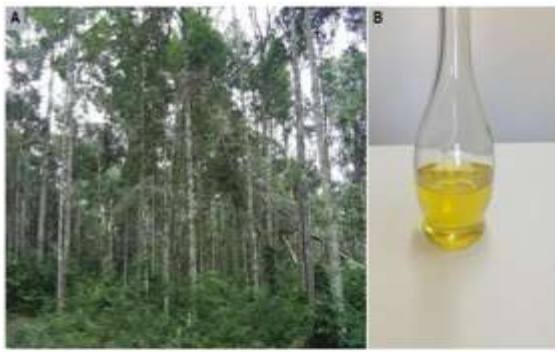
Morphological Description:

It is a clear, golden-yellow liquid with a faint nutty odor, chemically classified as a wax ester rather than a true triglyceride oil.

Phytochemical Constituents:

Contains long-chain monoesters of fatty acids and alcohols (e.g., eicosenoic acid, docosenoic acid), tocopherols (Vitamin E), and small quantities of sterols.

3. Rosewood Essential Oil



Biological Source:

Rosewood essential oil is obtained from the heartwood of Aniba rosaeodora Ducke, family Lauraceae.

International Journal of Pharmaceutical Research and Applications
Volume 10, Issue 6 Nov - Dec 2025, pp: 373-382 www.ijprajournal.com ISSN: 2456-4494

Geographical Source:
Native to the Amazon rainforest regions of Brazil, Peru, and French Guiana.

Morphological Description:
The oil is colorless to pale yellow with a floral, woody aroma. It is extracted by steam distillation of the heartwood.

Phytochemical Constituents:
Rich in linalool (80–90%), along with terpineol, geraniol, and nerol as minor components.

4.Mint Leaf Extract

Biological Source:
Obtained from the leaves of Mentha arvensis Linn. Or Mentha piperita Linn., belonging to the family Lamiaceae.

Geographical Source:
Widely cultivated in India, Europe, and other temperate regions.

Phytochemical Constituents:.
Contains menthol, menthone, menthyl acetate, flavonoids, tannins, and rosmarinic acid.

5.Aloe Vera Gel

Biological Source:
Obtained from the leaves of Aloe barbadensis Miller, family Liliaceae (Asphodelaceae).

Geographical Source:
Widely grown in tropical and subtropical regions of India, Africa, and America.

Phytochemical Constituents:
Contains aloins, aloin A and B, barbaloin, polysaccharides (glucomannans), anthraquinones, amino acids, and vitamins A, C, and E.

6. Vitamin E

Biological Source:
Naturally obtained from vegetable oils such as wheat germ oil, sunflower oil, and soybean oil; chemically known as Tocopherol, belonging to the fat-soluble vitamins group.

Phytochemical Constituents:
Contains α-, β-, γ-, and δ-tocopherols, which possess antioxidant activity.

7. Color (Natural Green Tint)
Biological Source:
Derived from chlorophyll pigments obtained from green plants such as Spinacia oleracea (spinach) or Artemisia species.

Phytochemical Constituents:
Mainly contains chlorophyll a and b, carotenoids, and xanthophylls.

8. Glycerin
Biological Source:
Can be obtained from plant oils (coconut, palm oil) or by hydrolysis of fats. It is a trihydroxy alcohol (glycerol).

International Journal of Pharmaceutical Research and Applications
Volume 10, Issue 6 Nov - Dec 2025, pp: 373-382 www.ijprajournal.com ISSN: 2456-4494

Phytochemical Nature:
Chemical formula – $C_3H_8O_3$; viscous, sweet-tasting, and hygroscopic liquid.
Commonly used in moisturizers, creams, and herbal lotions.

Pharmacological / Cosmetic Activities:

1. Tamanu Oil
- Promotes wound healing and skin regeneration.
- Exhibits anti-inflammatory, antibacterial, and antioxidant properties.
- Enhances skin barrier repair and reduces scarring.
- Commonly used in moisturizers, creams, and healing lotions for sensitive or damaged skin.

2. Jojoba Oil
- Acts as a natural emollient and skin moisturizer.
- Regulates sebum production and provides a non-greasy texture.
- Possesses antioxidant and anti-inflammatory effects.
- Improves skin elasticity and enhances product stability.

3. Rosewood Essential Oil
- Exhibits antimicrobial, antioxidant, and mild analgesic properties.
- Provides skin conditioning, enhances cell regeneration, and imparts fragrance.
- Widely used in aromatherapy, lotions, perfumes, and anti-aging products.

4. Mint Leaf Extract
- Acts as a cooling and refreshing agent due to menthol content.
- Exhibits antiseptic, antibacterial, and anti-inflammatory properties.
- Helps soothe skin irritation, redness, and itching.
- Commonly used in lotions, creams, and gels for its cooling and deodorizing effects.

5. Aloe vera Gel
- Acts as a natural moisturizer and skin healer.
- Possesses anti-inflammatory, antioxidant, and antimicrobial properties.
- Promotes wound healing, reduces dryness, and improves skin elasticity.
- Frequently used in moisturizers, sunscreens, and soothing gels.

6. Vitamin E
- Functions as a natural antioxidant that protects skin lipids from oxidation.
- Promotes skin repair, reduces oxidative stress, and delays aging.
- Enhances skin smoothness and elasticity.
- Commonly included in anti-aging creams, lotions, and sunscreens.

7. Colour (Natural Green Tint)
- Provides natural coloration to cosmetic formulations.
- Exhibits antioxidant and detoxifying properties.
- Safe alternative to synthetic colorants.

8. Glycerine
- Acts as a humectant, attracting moisture from the environment to the skin.
- Prevents dryness and irritation by maintaining hydration.
- Provides smoothness and softness to the skin surface.

9. Stearic Acid
- Acts as a thickening agent and stabilizer in emulsions.
- Enhances cream consistency, spreadability, and provides a smooth texture to formulations.
- Functions as a surfactant and emulsifying agent, helping in the formation and stabilization of oil-in-water emulsions.
- Exhibits mild emollient properties, aiding in skin softening and moisture retention.
- Considered non-irritant and biocompatible, making it suitable for dermatological applications.

10.Cetyl Alcohol
- Acts as an emollient, forming a protective barrier on the skin to prevent transepidermal water loss.
- Serves as a viscosity enhancer and co-emulsifier, improving product stability and texture.
- Provides lubrication and smooth application in creams and lotions.

11.Propylene Glycol
- Functions as a humectant, attracting and retaining moisture in the skin, thus preventing dryness.

International Journal of Pharmaceutical Research and Applications
Volume 10, Issue 6 Nov - Dec 2025, pp: 373-382 www.ijprajournal.com ISSN: 2456-4494

- Acts as a solvent for various active ingredients, improving their dispersion and absorption.
- Exhibits mild antimicrobial activity and enhances preservative efficacy.

12. Phenoxyethanol + Ethylhexylglycerin (with Methyl & Propyl Paraben)

- Exhibits antibacterial and antifungal properties, preventing microbial growth and spoilage.
- Enhances product shelf-life and safety without altering skin pH.
- Ethylhexylglycerin potentiates the activity of phenoxyethanol by disrupting microbial cell membranes.
- Parabens act as bacteriostatic agents, effective against a wide range of microorganisms.

13. Perfume Agent

- Enhances sensory appeal and user acceptance of cosmetic formulations.
- Some perfume blends also exhibit mild antibacterial or soothing effects due to volatile aromatic components.

14. Distilled Water

- Serves as a solvent and vehicle for aqueous ingredients in formulations.
- Provides hydration and helps in even dispersion of actives.
- Essential for maintaining lotion consistency and purity.

Methods of Preparation :

- The lotion was prepared using the emulsion method, comprising oil and aqueous phases:

1. Phase A (Oil phase): Stearic acid, cetyl alcohol, and oils (Tamanu, Jojoba, Rosewood) were melted together at 70 ± 2 °C.
2. Phase B (Water phase): Distilled water, Glycerin, Propylene glycol, Aloe vera gel, and Mint extract were heated separately at the same temperature.
3. Emulsification: The aqueous phase was slowly added to the oil phase under continuous stirring to form a uniform emulsion.
4. Phase C (Cooling phase): After cooling to below 40 °C, Vitamin E, preservative mixture, perfume, and natural color were incorporated.
5. The lotion was stored in sterilized containers and evaluated for various parameters.

Formulation Table

Phase	Ingredients	F1	F2	F3
A) Oil Phase	Stearic acid	0.6	0.5	0.6
	Cetyl alcohol	0.3	0.3	0.3
	Emulsifying wax	1.2	1.5	1.2
	Tamanu oil	0.9	1 ml	0.8
	Jojoba oil	0.9	1 ml	0.8
	Rosewood oil	0.3	0.5	0.8
	Propyl paraben	0.06	0.06	0.06
B) Water Phase	Distilled water	21.75	20.58	21.33
	Glycerin	0.9	1 ml	0.8
	Propylene glycol	0.6	0.5	0.6
	Mint leaf extract	0.5	1 ml	0.5
	Aloe vera gel	1.5	1.5 ml	2 ml
	Methyl paraben	0.06	0.06	0.06
C) Cooling Phase	Vitamin E	0.05	0.2	0.15
	Perfume agent	0.5	0.4	0.2
	Total Volume	30 ml	30 ml	30 ml

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III. EVALUATION PARAMETERS

1.Organoleptic Characters-

Parameter	Observation / Description
Appearance	Smooth, uniform, semi-solid emulsion
Color	Depends on ingredients (usually white or off-white)
Odor	Characteristic pleasant fragrance (may vary with essential oils or perfume used)
Consistency	Medium viscosity — easily spreadable, non-greasy
Texture	Soft, creamy, smooth to touch
Feel on Skin	Non-sticky, moisturizing, leaves soft sensation after application
Phase Separation	No visible separation of oil and water phases on standing
pH (supportive test)	Usually between 5.0–6.5, suitable for skin

2. pH Determination
Instrument: Digital pH meter.
Procedure: pH of 10% lotion dispersion in distilled water was measured at room temperature.
Acceptable Range: 5.0–7.0 (skin-compatible).
Purpose: To confirm the lotion's suitability for topical application and skin compatibility.

3. Spreadability Test
Method: Slip and drag method using glass slides.
Formula: $S = M \times L \div T$
Purpose: To determine how easily the lotion spreads on the skin

4. Stability Studies
Conditions:
Room temperature (25 ± 2 °C)
Elevated temperature (40 ± 2 °C)
Refrigerated condition (4 ± 1 °C)
Duration: 1–3 months.
Parameters observed: Phase separation, color, odor, and pH changes.
Purpose: To evaluate the physical stability and shelf-life of the lotion.

5.Washability
This test involves washing applied herbal lotion with water.

6.Homogeneity
The foemulation were evaluated for homogeneity using visual inspection and physical assessment.

7.Irritation / Patch Test (Skin Compatibility Test)
Method: Patch test on 10–20 healthy volunteers on the forearm.
Observation: Redness, itching, or irritation after 24 hours.
Purpose: To confirm product safety and dermatological acceptability.

IV. RESULT AND DISCUSSION

1.Physical Appearance

Sr.No	Parameters	F1	F2	F3
1.	Colour	White	White	White
2.	Odour	Pleasant Fregrance	Pleasant Fregeance	Pleasant Fregrance
3.	Appearance	Better	Great	Good

Discussion: From the above observation table we can conclude that F2 have ideal physical characteristics.

2.PH determination

International Journal of Pharmaceutical Research and Applications
Volume 10, Issue 6 Nov - Dec 2025, pp: 373-382 www.ijprajournal.com ISSN: 2456-4494

Sr.No	Parameter	F1	F2	F3
1.	pH	6.6	5.5	6.4

Discussion: : All formulations showed pH values in the range of 6.4–6.6, which are within the normal skin pH range (5.0-6.5). This indicates that the formulations are non-irritant and suitable for topical application. F2 exhibited an ideal pH closest to that of normal skin.

3. Spreadibilty

Sr. No	Parameter	F1	F2	F3
1.	Spreadibilty	Spreads easily	Spreads well	Spreads well

Discussion: The spreadability of the formulations decreased in the order F2 > F3 > F1. F2 showed the best spreadability, suggesting a smoother texture and easier application, likely due to a balanced oil-to-emulsifier ratio. Good spreadability is crucial for uniform sunscreen coverage and pleasant skin feel.

4.Washibility

Sr. No	Parameter	F1	F2	F3
1.	Washibilty	Moderate	Excellent	Good

Discussion: Formulation F2 was easily washable, indicating proper emulsification and stability of the formulation. F1 and F3 required more effort to wash off, possibly due to higher oil content or lower emulsifier efficiency. An easily washable formulation improves user comfort and acceptability.

5.Irritancy test:

Sr.No	Parameter	F1	F2	F3
1.	Irritancy	Mild	Nil	Nil

Discussion: No signs of redness or itching were observed for F2 and F3, indicating they are non-irritant to the skin. Mild irritation in F1 might be due to a higher concentration of certain essential oils or actives. Thus, F2 is considered safe for regular use.

6.Homogeneity:

Sr. No	Parameter	F1	F2	F3
1.	Homogeneity	Not Good	Excellent	Good

Discussion: All formulations were homogeneous, but F2 showed the best uniformity with no visible lumps or phase separation. Good homogeneity ensures consistent distribution of active ingredients and stability over storage.

V. DISCUSSION

This study focused on developing and assessing a herbal perfuming lotion that blends natural oils—Tamanu, Jojoba, and Rosewood—with plant extracts such as Aloe vera gel and Mint leaf extract, along with Vitamin E for its antioxidant benefits. The goal was to create a product that not only nourishes and protects the skin but also offers a refreshing natural fragrance, providing a sustainable alternative to chemical-based lotions.The formulated lotion showed favorable physical and chemical properties, including a smooth, uniform texture and stable structure with a pH value close to that of healthy human skin (5.5–6.5). These qualities suggest that the formulation is skin-friendly and suitable for

International Journal of Pharmaceutical Research and Applications
Volume 10, Issue 6 Nov - Dec 2025, pp: 373-382 www.ijprajournal.com ISSN: 2456-4494

regular use. Ingredients like stearic acid and cetyl alcohol helped achieve a rich, creamy feel and improved spreadability, while humectants such as propylene glycol and glycerin ensured proper moisture retention, giving the lotion a pleasant, non-greasy texture.Phytochemical analysis highlighted the presence of several bioactive components: calophyllolide and inophyllums from Tamanu oil, linalool from Rosewood oil, menthol and rosmarinic acid from Mint extract, and aloins and polysaccharides from Aloe vera. Together, these compounds contribute to the lotion's antioxidant, anti-inflammatory, and antimicrobial effects. Their combined activity likely improved the product's ability to soothe, protect, and hydrate the skin.When compared with commercial synthetic perfumed lotions, the herbal lotion demonstrated comparable performance in terms of stability and consumer acceptability. It retained its fragrance well, showed no phase separation, and remained free from microbial contamination during short-term stability testing. An added advantage was the absence of artificial fragrances, parabens, and other harsh chemicals—except for mild preservatives used in minimal concentration.The findings align with previous studies by Banerjee et al. (2022) and Mishra et al. (2023), which reported that herbal lotions formulated with essential oils enhance skin hydration and antioxidant activity. Similarly, Herdianty and Wijayanto (2023) showed that Aloe vera-rich lotions exhibit long-lasting moisturizing and stability comparable to commercial brands.In summary, the current research reinforces the potential of herbal-based formulations to deliver multiple skin benefits—moisturizing, healing, and perfuming—while maintaining environmental and dermatological safety. Future studies should include extended stability assessments, clinical skin compatibility testing, and advanced formulation approaches such as nanoemulsion or liposomal delivery systems to further optimize absorption and sensory qualities.

VI. CONCLUSION

The study developed and evaluated a herbal perfumed lotion made from a blend of natural oils, plant extracts, and gentle stabilizers designed to nourish the skin while adding a pleasant fragrance. The formulation, which included Tamanu oil, Jojoba oil, Rosewood essential oil, Aloe vera gel, Mint extract, Vitamin E, glycerin, and distilled water, proved highly effective in moisturizing, soothing, and protecting the skin while supporting its natural healing process.

Stabilizing agents like stearic acid, cetyl alcohol, and propylene glycol gave the lotion a smooth consistency, and preservatives such as phenoxyethanol and ethylhexylglycerin ensured it remained safe and free from microbial contamination. Testing showed that the lotion had the right pH, viscosity, and spreadability, along with lasting fragrance and excellent user comfort. It was stable, gentle, and pleasant to apply—demonstrating its potential as a safe, natural, and effective skincare and perfuming product.

Future research could focus on long-term stability, detailed clinical testing, and innovative approaches like nano-delivery systems to enhance its performance and market potential. Overall, this herbal perfuming lotion offers an eco-friendly, natural alternative to synthetic cosmetics by combining therapeutic skin care with a refreshing sensory experience.

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