



Phyto Cosmetic Formulation of Lip Balm from *Rosa damascena* P. Mill: Preparation and Quality Assessment

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Abstract

The present study focused on the formulation and evaluation of a phyto-cosmetic lip balm using *Rosa damascena* P. Mill. extract. Fresh rose petals were collected, authenticated, and subjected to hot water percolation to obtain an aqueous extract, which was deep purple in color and rich in phytochemicals including flavonoids, phenolics, and anthocyanins. The extract was incorporated into a lip balm base comprising beeswax, coconut oil, rose oil, and vitamin E. The final formulation was evaluated for physicochemical and performance parameters such as pH, melting point, spreadability, extrudability, and skin irritation. The product exhibited a smooth brownish-yellow texture with a pH of 5.8, which lies within the ideal range for topical applications. The melting point was 67°C, confirming formulation stability. No irritation was observed in skin irritability testing, indicating its safety. Texture analysis demonstrated favorable spreadability with firmness and shear work values of 2341.7 g and 2736.2 g/sec, respectively, while extrudability required only 149.8 g of force, confirming ease of application. These results suggest that the lip balm possesses desirable cosmetic attributes and potential therapeutic benefits due to the bioactive constituents of *Rosa damascena*. Further studies on stability, microbial safety, and consumer acceptability are recommended to advance this prototype toward commercialization.

Keywords: *Rosa damascene*, Formulation, Texture analyzer, Lip balm

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INTRODUCTION :

The demand for herbal cosmetics is rising swiftly due to their minimal side effects instead they enrich the body with nutrients. The fact that herbal cosmetics are created entirely of herbs makes them the best and have proven remarkable in the cosmetic industry. Growing scientific evidence shows plants possess vast active ingredients that not only calm or smoothen the skin but also restore, heal, and protect the skin. Natural cosmetics are those that do not contain chemically synthesized molecules, or On the other hand, phytoconstituents, which come from an environmentally friendly production technique, have a mild effect on the skin. China, South Korea, and other nations are at the forefront of the development of plant-based cosmetics. Leading nations in the creation of natural cosmetics include France, Japan, South Korea, and China. Later on, scientific investigation identified molecules that are actively present in plants that provide benefits. Plant extracts are mainly incorporated in cosmetic formulations for their phytochemical content and antioxidant properties. Growing demand for environmentally friendly natural products produced worldwide that has stimulated the development of natural cosmetics. One of the main draws of herbal

products is their perceived environmentally friendly production. Similar to lip balm, lip balm is a cosmetic product used to defend against harmful environmental conditions and prevent dry lips. The product features include resistance to temperature changes, a pleasant taste, safety, smooth application, good adhesion, and ease of intentional removal. The development of a lip balm with natural coloring involved creating a lip balm made from herbal ingredients. Lip balms are applied to the lips to protect them from harmful environmental factors and prevent dryness. While there is limited information on this specific formulation in cosmetic literature, comparisons to traditional lip balms are relevant due to their similar stick form. The product must also meet organoleptic and stability standards, including resistance to temperature fluctuations, pleasant flavor, safety, smooth application, adhesion, and easy removal. The selected plant material to develop lip balm are flowers of *Rosa damascena* P. Mill. It is assumed that Anthocyanin content may be the responsible content for the appearance of a particular dark red color. ¹. Mill, *Rosa damascena* P. The Damaskrose, commonly referred to as the flower king and a member of the Rosaceae family, It is invaluable and a captivating herb with modern pharmaceutical

importance, used in medicinal products.¹. Over 200 species of *Rosa* can be found worldwide. It is a significant crop that produces essential oils and is grown for its significant uses in the medicinal, flavoring, cosmetic, fragrance, and aromatic sectors.². Essential rose oil, rose concrete, rose absolute, distilled rose water, and rose absolute—all made from fresh petals—are frequently derived from this crop³.

Geographical distribution

Many countries around the world, including the country of Turkey, the country of Bulgaria, Iran, India, Saudi Arabia, China, Morocco, Egypt, and France, cultivate *Rosa damascena* P. Mill.

Botanical description

Rosa damascena P. Mill. is a perennial dense shrub that can grow up to 50 years and is only 1-2 meters tall. The blooms are big and vivid. With five to seven leaflets, the leaves have a peculiar pinnate orientation. The shrub *Rosa damascena* P. Mill. has many uneven, strong prickles that are dilated at the base; five to seven stiff, ovate leaflets; an oblong flower-bud; sepals that are deflexed shortly after the flower petals have opened; an elongated tube that is frequently dilated at the top; pulpy, ovate fruit; calyx and peduncles that are grandiosely hispid and viscous; and light red flowers.^{4,5,6}

Phytochemical review:^{7,8,9,10}

The petals of *Rosa damascena* P. Mill contain a variety of compounds, including glycosides, flavonoids, terpenes, and anthocyanins. Key components include quercetin, kaempferol, carboxylic acid, and myrcene. The flower also contains fatty oils, tannins, and organic acids. In *Rosa damascena* essential oils, the primary compounds are nerol and kaempferol, with more than 95 micro and macro components identified. These include geraniols in 5.5–18%, 14.5–47.5% of β -citronellol and nonadecane (10.5–40.5%). Research on rose absolute reveals its main constituents as heneicosane, ethanol (0.00–13.43%), geraniol (3.71%), citronellol (9.91%), nonadecane (4.35%), and phenylethyl alcohol (78.38%). In rose hydrosol, the dominant components are geraniol (30.74%), citronellol (29.44%), phenylethyl alcohol (23.74%), and nerol (16.12%). Additionally, the flowers contain vitamins A, B3, C, D, and E. Because of its many active phytoconstituents, *Rosa Damascena* P. Mill exhibits a broad spectrum of pharmacological activities, which add to its therapeutic qualities. It exhibits anti-inflammatory, antimicrobial, analgesic, antioxidant, antidepressant, antibacterial, anticonvulsant, anticancer, antiviral, relaxant, and hypnotic effects. The plant contains phenolic compounds like phenylethyl alcohol, flavonoids, and terpenoids, which enhance its antibacterial efficacy against various strains, including *Staphylococcus aureus* and *E. coli*. Additionally, *Rosa damascena* demonstrates strong antioxidant properties, inhibiting lipid peroxidation and showcasing higher activity in fresh flowers compared to dried ones¹². Its vitamin C content supports anti-inflammatory effects, with studies showing significant reductions in rat paw edema at certain doses. Research also suggests potential

anti-aging benefits, as extracts can decrease mortality rates in *Drosophila melanogaster*, linked to its antioxidant properties¹³. Lastly, chloroform, aqueous, and ethanol extracts exhibit analgesic effects, attributed to flavonoids like kaempferol and quercetin, highlighting the therapeutic potential of *Rosa damascena** in various health applications.

MATERIALS AND METHODS:

Methodology:

It was divided into four phases

Phase I- Collection, Authentication & Processing of Plant material

Phase II- Preparation of extraction of plant material

Phase III- Formulation of lip balm

Phase IV- Evaluation of lip balm

Identification, Collection, and Authentication of Plants:

The flowers of the plant material were collected and authenticated by Dr. D. Stephen, Assistant Professor, Dept of Botany, The American College, Madurai. A voucher specimen (CVL/002/2023 dated 15.06.2023) was deposited in the Department of Pharmacognosy, PSG College of Pharmacy.

Preparation of extraction of natural colorant:¹⁴

The flowers of *Rosa damascena* P. Mill were washed in running tap water then the pollen was removed. The petals are separated and placed inside the beaker with water and heated at a controlled temperature. After 24 hours the solution is filtered with Whatman filter paper. Then the extracted solution is concentrated by placing it in a water bath and then it is closed with Aluminum foil to prevent the dye from further evaporation. The dried aqueous extract is shown in Fig 2. The color of the extract was a deep purple color.



Figure 1: Aqueous rose extract

Formulation of lipbalm^{14,15}

Preparation of base:

The ingredients white beeswax, rose oil, coconut oil, vitamin E capsule, and rose extract were weighed in weighing balance. Beeswax was taken in a China dish and heated to about 65°C-75°C.

Preparation of oil:

In another beaker, coconut oil was taken and warmed to 65 °C -75°C Then vitamin E capsule and aqueous rose extract were dissolved into this mixture and heated gently

This mixture was added to the base mixture and stirred continuously. When the temperature fell to about 45°C this mixture was poured into the clean container.



Figure 2: Formulated lip balm

Table :1 Lip Balm Formula

S.NO	INGREDIENTS	QTY
1	White beeswax	7g
2	Coconut oil	20ml
3	Rose oil	1ml
4	Vitamin E capsule	800mg
5	Rose extract	1ml

Evaluation of lipbalm ^{14,15}

The prepared Sunscreen lip balm was evaluated for its Physicochemical properties. They are as follows,

Physical appearance/ visual inspection:

The lip balm's color and appearance were evaluated visually. The prepared formulations were assessed for particles, texture, and clarity.

Determination of pH:

The pH was adjusted using a standard buffer solution. A 0.5g sample of lip balm was dissolved in 50ml of distilled water, and its pH was then measured using a digital pH meter.

Melting point:

The melting point of the lip balm formulation was determined using a capillary tube filled with the lip balm. The temperature at which the lip balm completely melted was recorded.

Texture analysis: ^{16,17,18}

The basic idea behind a texture measurement system is to measure the response of a test sample after it has been physically deformed under controlled conditions. The mechanical characteristics of the sample, which correspond to particular sensory texture traits, produce the force response characteristics. Some basic tests must be carried out using techniques intended to reproduce such circumstances and distort samples in ways that mimic intricate human interactions. Tests

such as penetration, compression, shearing, extrusion, bending, fracturability, and tension are examples.

Spreadability test: ¹⁶

The lip balm base should apply smoothly without causing significant resistance and should not increase friction when rubbed. To assess spreadability, a spreadability device with a scale and two glass slides with pans on either side mounted on a pulley system was used. The excess sample was placed on the glass slide and left for five minutes to ensure uniform thickness. A 200g sample was placed in the pan, and spreadability was measured by the time it took for the two slides to separate.

It was calculated by using the following formula.

$$S = m \times l$$

m = weight tied on the upper slide

l = length of the glass slide

t = time in seconds

Extrudability test ^{16,17}

The extrudability of the lip balm formulation was evaluated based on the percentage of lip balm expelled from the tube after applying a specific load. Applying force to the product until it passes through an outlet—which could be one or more slots of holes in the test cell—is the process of a compression extrusion test. The product extrudes through these outlets after being crushed until its structure is upset.

Skin irritability: ¹⁸

It was done by applying the product on the skin for 10 minutes and skin irritability was

observed.

RESULT:

The lip balm was prepared and it was evaluated with different standard parameters. The product obtained was 16.8 g.



Figure 3: Finished Product Herbal Lib Balm

Evaluation of the lipbalm

Appearance and color:

The formulated lip balm has a brownish-yellow color with a smooth texture.

pH determination:

The pH of the lip balm was found to be 5.8, which is good for skin pH. The normal range for lip balm products is 4-6.5.

Skin irritability:

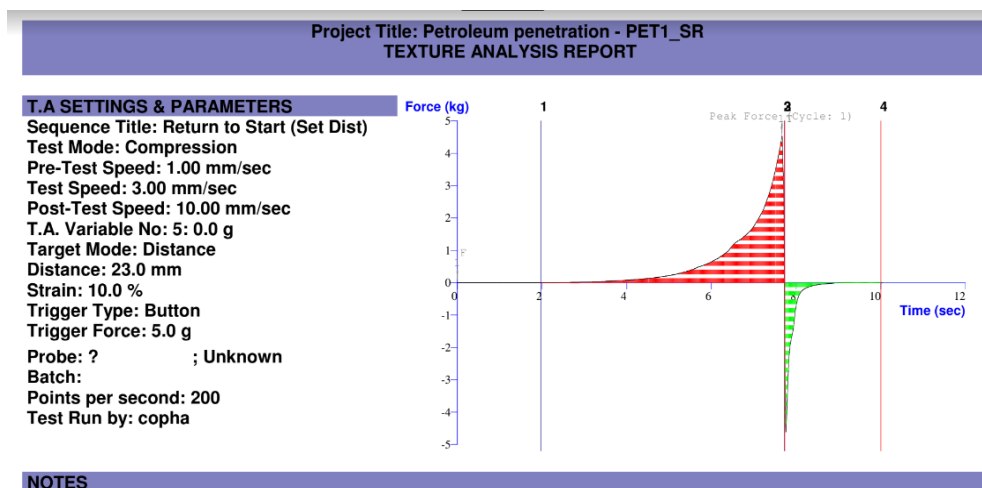
There is no irritancy noted when rubbed over the skin.
The reports are tabulated in Table No.: 2

Table 2: Evaluation Parameters & Results

Melting point	67°C
P ^H parameter	5.8
Colour and texture	Brownish-yellow and smooth
Skin irritability	No irritation

Texture analysis :**Spreadability Test:**

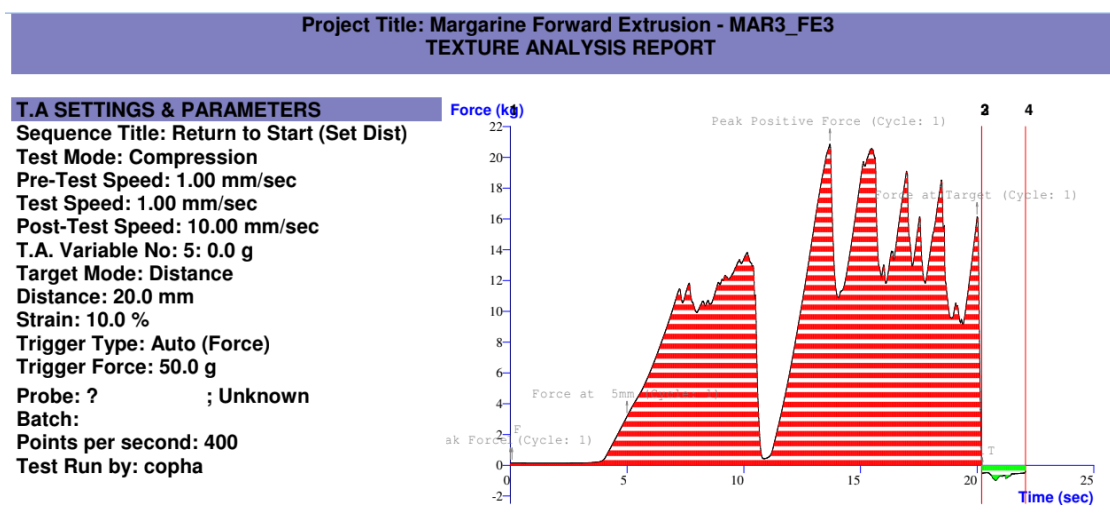
The effectiveness of a topical treatment and the application of a standard dosage of a medicinal formulation to the skin depend heavily on the lip balm's ability to spread evenly across the skin. After a minute, the spreading values, or the diameters observed for the formulations, were displayed in figure no. 6. The values indicate how easily the formulations spread out on the application surface when a little shear is applied. The findings indicated that the firmness and shear work were 2341.7 g and 2736.2 g/sec, respectively.

**Figure 4: Texture analyzer graph of annotated properties of tube content Spreadability test**

Test ID	Batch	Firmness g	Work of Shear g.sec	Distance 1 mm	Force 2 g	Time 1 sec	Peak Force (Cycle: 1) kg	Positive Area (Cycle: 1) kg.sec	Negative Area (Cycle: 1) kg.sec
Start Batch Unknown	Unknown								
QUERCITIN NEW1	Unknown	2341.770	2736.261	2.245	190.920	7.720	2.342	2.739	-0.371
End Batch Unknown	Unknown								
Average:	Unknown (F)	AVERAGE("BATCH")	2341.770	2736.261	2.245	190.920	7.720	2.342	-0.371
S.D.	Unknown (F)	STDEV("BATCH")	0.000	0.000	0.000	0.000	0.000	0.000	0.000
C.V.	Unknown (F)	STDEV("BATCH")/AVERAGE("BATCH")*100	0.000	0.000	0.000	0.000	0.000	0.000	0.000
End of Test Data									

Figure 5: Spreadability Value**Extrudability Test:**

The lip balm was evaluated using a Texture analyzer for extrudability and the results obtained are shown in Figure: 6.
The required force to extrude the formulation was 149.8g.

**Figure 6: Texture analyzer graph of annotated properties of tube content extrudability test**

Test ID	Batch	Firmness	Force 1	Distance 1	Time 1	Peak Positive Force (Cycle: 1)	Peak Force (Cycle: 1)	Positive Area (Cycle: 1)	Negative Area (Cycle: 1)	Force at Target (Cycle: 1)	Force at 5mm (Cycle: 1)
		g	g	mm	sec	kg	kg	kg sec	kg sec	kg	kg
		Mean F 1:2	Force 1	Distance 1	Time 1	Peak Positive Force (Cycle: 1)	Peak Force (Cycle: 1)	Area F-T 1:2	Area F-T 3:4	Force at Target (Cycle: 1)	Force at 5mm (Cycle: 1)
Start Batch Unknown	Unknown										
LIP BALM EXTRUDABI	Unknown		149.893	121.740	20.225	20.868	0.158	175.424	-1.189	16.096	3.177
End Batch Unknown	Unknown										
Average:	Unknown (F)	AVERAGE("BATCH")	149.893	121.740	20.225	20.868	0.158	175.424	-1.189	16.096	3.177
S.D.	Unknown (F)	STDEV(P)("BATCH")	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
C.V.	Unknown (F)	STDEV(P)("BATCH")/AVERAGE("BATCH")*100	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
End of Test Data											

Figure 7: Extrudability Value

DISCUSSION:

A personal care product—herbal lip balm—was successfully formulated using the natural colorant extracted from the petals of *Rosa damascena* P. Mill. The formulation process involved the integration of aqueous rose extract with natural excipients such as beeswax, coconut oil, rose oil, and vitamin E, aiming to enhance the product's aesthetic and therapeutic qualities.

The phytochemical richness of *Rosa damascena*, particularly its phenolic and flavonoid content, contributes to the formulation's potential antioxidant, anti-inflammatory, and antimicrobial benefits. The evaluation parameters confirmed favorable physicochemical properties: a pH of 5.8 (ideal for lip application), a smooth brownish-yellow appearance, and no observed skin irritation, indicating safety for topical use.

Texture analysis showed good spreadability and extrudability, with firmness and shear work values of 2341.7 g and 2736.2 g/sec respectively, while the force required for extrusion was 149.8 g. These results suggest the lip balm can be easily applied with minimal effort and maintains structural integrity. The product yielded 16.8 g, confirming the stability of the formulation process.

Overall, the formulation exhibited satisfactory performance in standard evaluation tests. However, advanced quality control and stability studies are recommended to ensure shelf-life, microbial safety, and batch-to-batch consistency before commercialization.

CONCLUSION

The study successfully demonstrated the development of a herbal lip balm utilizing *Rosa damascena* extract, combining cosmetic appeal with potential therapeutic benefits. The formulation was found to be physically stable, non-irritant, and user-friendly in terms of spreadability and extrudability. Given the increasing consumer demand for natural and safe cosmetic products, this formulation holds promise for further development and market introduction. Future studies focusing on preservative efficacy, consumer acceptability, and long-term stability will be instrumental in advancing this prototype to a commercial product.

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