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## Research Article

# Formulation and Evaluation of Herbal Cream Containing Cassia Fistula Linn Flower and Capra Aegagrus Hircus Milk for Periorbital Hyperpigmentation

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## ABSTRACT

Periorbital hyperpigmentation is a common cosmetic issue that can be driven by factors like age, genetics, and lifestyle. This study aimed to develop and evaluate a herbal cream incorporating Cassia fistula linn flower powder and Capra aegagrus hircus milk powder, chosen for their skin health benefits, to address this issue. Cassia fistula linn offers anti-inflammatory and tyrosinase-inhibiting properties, while Capra aegagrus hircus milk brings moisturizing and nourishing effects, making them an ideal combination for targeting pigmentation and improving skin texture. The cream was formulated using an emulsification process with beeswax, liquid paraffin, and borax, tested for pH, viscosity, spreadability and microbial safety. Results showed the cream maintained a skin-friendly pH range of 5.4-6.8 and demonstrated good spreadability and easy application. Microbial tests confirmed the absence of Escherichia coli and Staphylococcus aureus, indicating safe use. Sensory evaluation received positive feedback on texture, odour and skin feel, highlighting its appeal. Overall, this herbal cream shows promise as a natural, effective option for periorbital hyperpigmentation, with minimal risk of side effects compared to conventional treatments. Further research could help verify its effectiveness across a wider audience.

## INTRODUCTION

This project delves into the rich tradition and modern relevance of herbal medicines, particularly in skincare, where natural ingredients offer both therapeutic and cosmetic benefits. For centuries,

herbs have played a central role in health practices, forming the backbone of healing systems like Ayurveda, Traditional Chinese Medicine (TCM), and Unani. These traditions emphasize plant-based remedies, with many of their herbal therapies still

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revered for their inherent healing properties. Recently, interest in herbal products has surged, driven by a perception that natural ingredients are safer, gentler, and less likely to cause side effects than synthetic alternatives. In this context, our project investigates *Cassia fistula* (Indian laburnum) and *Capra aegagrus hircus* (goat) milk in a cream formulation targeting periorbital hyperpigmentation, an issue often challenging to address effectively with synthetic products alone. *Cassia fistula*, known as the golden shower tree, has been valued in Ayurvedic medicine for centuries, with its parts used for numerous health benefits. The flower itself is rich in

anthraquinones, chrysophanic acid, and flavonoids, which contribute to its anti-inflammatory, antioxidant, and tyrosinase-inhibiting properties. Inflammation and oxidative stress are key factors in skin aging and hyperpigmentation, especially around the delicate eye area. By reducing inflammation and neutralizing free radicals, *Cassia fistula* can help restore a more even skin tone, potentially diminishing dark circles. Additionally, chrysophanic acid's inhibition of tyrosinase, a melanin-producing enzyme, may further reduce pigmentation.

## MATERIALS

**Table 01: Uses of ingredients**

Ingredients	Uses
Cassia fistula Linn flower powder (Aragwadha pushpa) Capra aegagrus hircus milk powder	Herbal drug
Bees wax Liquid paraffin	Oil Phase
Borax	Water Phase
Rose water	Flavoring Agent
Methyl paraben, Propyl paraben	Preservative

## AUTHENTICATION

The plant material collected was identified and authenticated by Dr. M Devika, Principal, Sarada Vilas College, Krishnamurthypuram, Mysuru.

## METHOD OF PREPARATION

### Collection and Preparation of Cassia fistula Flower Powder

Fresh *Cassia fistula* flowers were collected, cleaned to remove any dirt, and dried in a shaded area to retain active compounds. The dried flowers were then finely ground and sieved to ensure uniform particle size for use in the cream formulation.

### Preparation of Oil Phase

The oil phase was prepared by weighing beeswax and liquid paraffin, which were melted in a water bath at 70°C. This mixture was stirred until completely melted and homogeneous, then

removed from heat and allowed to cool slightly for further steps.

### Preparation of Water Phase and Emulsification

Borax was dissolved in distilled water to form a borax solution. This solution was slowly added to the melted oil phase while stirring continuously, forming a creamy consistency through emulsification, essential for the stability of the final product.

**Incorporation of Active Ingredients:** A paste of *Capra aegagrus hircus* milk powder was prepared by mixing with warm water. This paste, along with the *Cassia fistula* flower powder, was added to the emulsified base and stirred thoroughly to ensure even distribution of active ingredients. Five formulations were prepared by adding different amounts of *Cassia fistula* flower powder.





**Figure 01: Herbal cream formulation**

### Addition of Preservatives and Rose Water

A preservative blend of methylparaben and propylparaben was added to the cream base to ensure microbial safety. Rose water was added as a natural fragrance, enhancing the cream's sensory appeal. All ingredients were mixed until fully incorporated.

### Packaging and Storage

The prepared cream was transferred to clean, airtight containers, labeled with product details, and stored in a cool, dry place away from sunlight. This ensured the cream's freshness and stability, maintaining its quality over time.

## EVALUATION TESTS

### Physical Test

The cream's color, odor, and consistency were examined visually. The color and texture were checked by applying it to the skin, while the odor was assessed by mixing the cream in water and observing the resulting fragrance.

### Percentage Yield

The cream's percentage yield was calculated by comparing the final product weight to the total weight of raw materials. This calculation helps evaluate the efficiency of the formulation process and ensures quality and consistency.

### pH Measurement

The cream's pH was measured with a digital pH meter by placing a sample in a beaker and inserting the glass electrode. The pH value was recorded

three times, and the average was reported, ensuring compatibility with skin pH.

### Viscosity Measurement

The cream's viscosity was assessed using a Brookfield Viscometer with spindle no. 1 at 25°C, recording readings at various speeds. This measurement ensures the cream's consistency and spreadability, key properties for a smooth application.

### Spreadability Test

The spreadability was tested by placing a weight on a specific amount of cream, measuring its diameter after spreading. This value reflects the cream's ease of application, calculated as the spread area in mm<sup>2</sup>.

### Microbial Limit Test

Tests for *Escherichia coli* and *Staphylococcus aureus* were performed using selective media to ensure the cream's safety. Samples were incubated and checked for bacterial growth, confirming the cream met microbial safety standards.

### Sensory Evaluation

A panel of testers assessed the cream's color, odor, texture, and feel on the skin, rating these on a scale from 1 (worst) to 5 (excellent). This evaluation provides feedback on the cream's user appeal and overall quality.

## RESULT

### Physical Properties

The cream's color, texture, and odor were consistent across formulations. F1 appeared creamy white, while F2 to F5 showed shades from whitish brown to brown, with a smooth texture and a characteristic herbal scent.

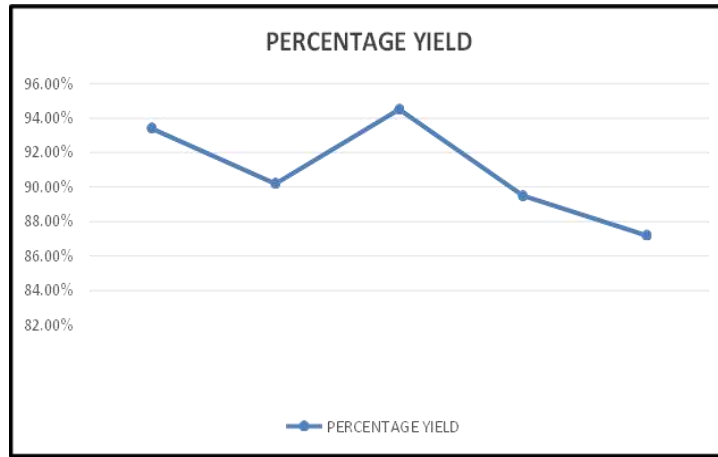
### Percentage Yield

The cream formulations yielded 87.2% to 94.5%, indicating a successful formulation process. Formulation F3 had the highest yield, showing effective ingredient utilization.

**Table 02: Percentage yield**

FORMULATIONS	PERCENTAGE YIELD
F1	93.4%

F2	90.2%
F3	94.5%
F4	89.5%
F5	87.2%



**Fig 02: Percentage yield**

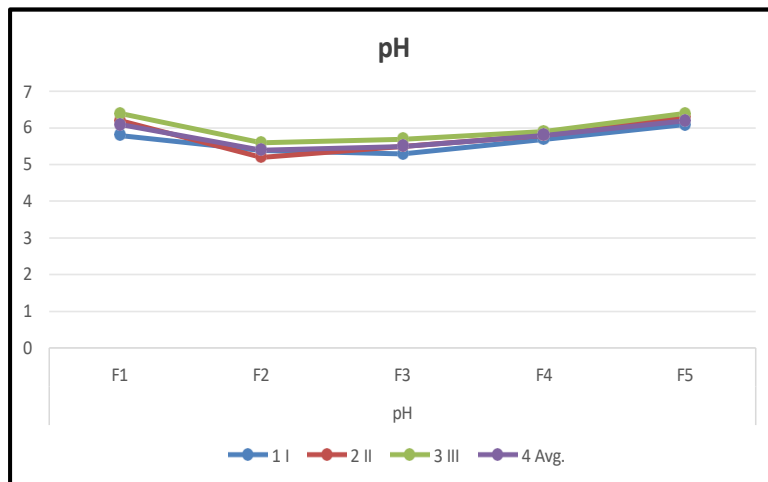
**pH Measurement**

The pH ranged between 5.4 to 6.8, which aligns well with skin’s natural pH, indicating that the

cream is skin-compatible and safe for topical application.

**Table 02: pH measurement**

Sl.No.	Trial	pH				
		F1	F2	F3	F4	F5
01	I	5.8	5.4	5.3	5.7	6.1
02	II	6.2	5.2	5.5	5.8	6.3
03	III	6.4	5.6	5.7	5.9	6.4
04	Avg.	6.1	5.4	5.5	5.8	6.2



**Fig 03: pH measurement**

**Viscosity**

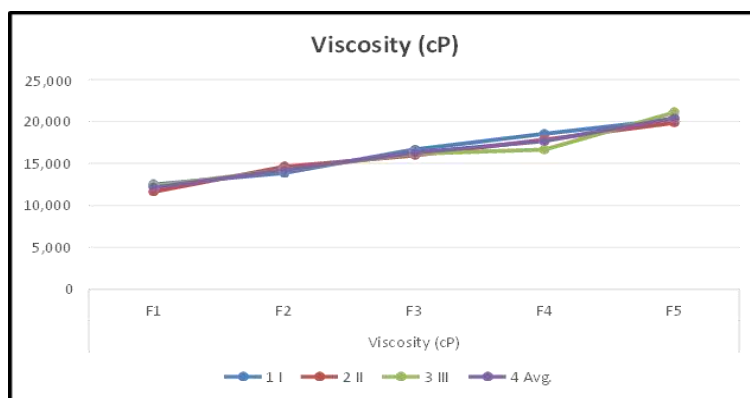
The viscosity of the cream ranged from 12,000 to 20,000 centipoise, which is within the acceptable

range, ensuring the cream is thick enough for stability yet smooth enough for easy application.



**Table 03: Viscosity measurements**

Sl. No.	Trial	Viscosity (cP)				
		F1	F2	F3	F4	F5
01	I	12,500	13,860	16,650	18,540	20,300
02	II	11,650	14,650	15,980	17,870	19,870
03	III	12,320	14,240	16,200	16,670	21,120
04	Avg.	12,156	14,250	16,276	17,693	20,430



**Fig 04: Viscosity measurements**

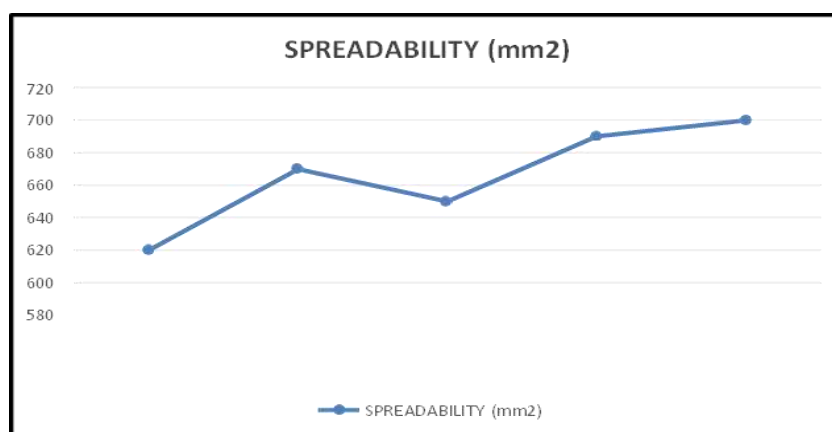
**Spreadability**

The cream's spreadability ranged from 620 to 700 mm<sup>2</sup>, indicating good ease of application.

Formulation F5 showed the best spreadability, ensuring comfortable use.

**Table 04: Spreadability measurements**

SL NO.	FORMULATIONS	SPREADABILITY (mm <sup>2</sup> )
1	F1	620
2	F2	670
3	F3	650
4	F4	690
5	F5	700



**Fig 05: spreadability measurements**

**Microbial Limit Test**

Tests confirmed the absence of *Escherichia coli* and *Staphylococcus aureus*, verifying that the cream is safe and meets microbial safety standards.



**Table 05: Microbial limit test**

Parameter	Media	Result	Acceptance Criteria	Conclusion
<i>Escherichia coli</i> (E coli)	Nutrient agar media	absence	Must be absent	Pass
<i>Staphylococcus aureus</i>	Stephyococcus selective media	absence	Must be absent	Pass

### Sensory Evaluation

Panelists rated the cream highly on color, odor, texture, and skin feel, with an average rating of 4-5 out of 5. This feedback confirms that the cream is user-friendly and pleasant for daily application.

### DISCUSSION

In this study, we formulated and evaluated a herbal cream specifically designed for reducing periorbital hyperpigmentation, using *Cassia Fistula* (Amaltas) flower extract and *Capra Aegagrus Hircus* milk. The formulation of this cream was guided by the natural properties of *Cassia Fistula*, known for its skin-lightening and antioxidant effects, along with goat milk, which is rich in lactic acid and moisturizing agents that can help in reducing dark circles. The preparation process was meticulously carried out to maintain the stability and efficacy of the active ingredients. Key physical characteristics of the cream, such as its consistency, color, and odor, were noted. The cream displayed a light-yellow hue and a mild, pleasant fragrance—likely influenced by the *Cassia Fistula* extract. The texture was smooth, creamy, and non-greasy, ensuring that it could be easily applied to the sensitive skin around the eyes. In terms of chemical analysis, pH testing revealed a mild acidity, around 5.5, which aligns well with the natural pH of the skin. This is particularly beneficial as it indicates the cream is less likely to cause irritation. Moreover, no significant variations in pH were observed over the stability testing period, showing good stability of the formulation. Microbial tests showed that the cream formulation met acceptable limits for microbial content, with low Total Aerobic Microbial Count

(TAMC) and no detectable pathogens. This assures that the formulation is safe for application, which is especially important given the delicate area around the eyes. The cream's stability over a period of three months also demonstrated no microbial contamination, which speaks to the effectiveness of the preservative system we used. Overall, the findings suggest that our herbal cream, made from *Cassia Fistula* and goat milk, can potentially be an effective, natural remedy for periorbital hyperpigmentation. The combination of skin-lightening, antioxidant, and moisturizing properties in this cream provides a gentle yet effective option for individuals looking to reduce dark circles naturally. Future studies could focus on optimizing the formulation further, possibly exploring additional herbal ingredients for enhanced effects and longer shelf life.

### CONCLUSION

The formulated herbal cream containing *Cassia fistula* flower and *Capra aegagrus hircus* (goat) milk showed promising results for reducing periorbital hyperpigmentation. It exhibited excellent consistency, spreadability, and pH compatibility with skin. The cream's ingredients provided anti-inflammatory, antioxidant, and hydrating benefits, which are essential for reducing pigmentation and supporting skin health. Microbial tests confirmed the cream's safety, and sensory evaluations indicated high user satisfaction. Overall, this herbal cream presents a natural, effective, and gentle solution for periorbital hyperpigmentation, aligning with consumer demand for safe, plant-based skincare products. This study supports the potential of herbal ingredients in dermatology.





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