



## **Formulation and Evaluation of Anti –Ageing Cream using Apple peel and Banana peel:**

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### **Abstract:**

Skin aging is primarily caused by the continuous breakdown of proteins and cellular DNA damage. The goal of this research is to create an anti-aging herbal cream using natural ingredients. The key active ingredients include apple peel, banana peel along with other components such as bees wax, borax, vitamin E, coconut oil, olive oil, aloe vera, and basil oil. A water-in-oil (W/O) emulsion-based cream is developed using these natural elements. The combination of these ingredients results in a versatile cream, and further research can focus on testing its stability and potential skin irritation. C An anti-ageing cream is a moisturizer based skincare product marketed to reduce the visible signs of skin ageing like wrinkles and fine lines by stimulating collagen production and hydrating the skin.

Skin aging is a complex biological process influenced by both internal and external factors. Ultraviolet (UV) rays generate free radicals, which can damage the collagen and elastin structures in the skin. This damage hinders the natural cell regeneration process, leading to issues like hyperpigmentation and rough, wrinkled skin. As a result, the research focuses on the development of natural cosmetic products that can help rejuvenate the skin, delay, or even reverse the signs of aging.

**Keywords:** Anti-ageing, Herbal Cream, Prevent Ageing, Wrinkles



Fig. 1

### **Introduction:**

The development of anti-aging creams using plant extracts has gained significant attention due to the increasing demand for natural, safe, and effective skincare solutions. Plant extracts are rich in antioxidants, vitamins, minerals, and other bioactive compounds that can help combat skin aging. These extracts are derived from various parts of plants, such as leaves, flowers, seeds, and roots, and are known for their rejuvenating, moisturizing, and skin-healing properties.

**Anti-ageing:**

Aging is a complicated process that's affected by both our genes and our lifestyle or environment. Certain vitamins, minerals, and natural compounds can help slow down aging by working on the processes inside our cells. By understanding how aging works at the molecular level, we can create better ways to stay healthy, prevent age-related diseases, and maybe even live longer.

**Herbal Cream:**

Herbal creams are made to be applied on the skin and use the healing and beauty benefits of plant-based ingredients. These creams usually come in two types: oil-in-water or water-in-oil. They help treat different skin problems and keep the skin well-moisturized. When traditional herbal knowledge is combined with modern cosmetic science, we get safe and effective skincare products that suit a variety of skin needs.



Fig.2

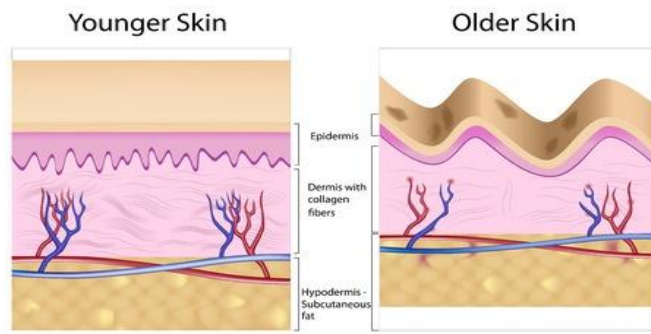


Fig.3

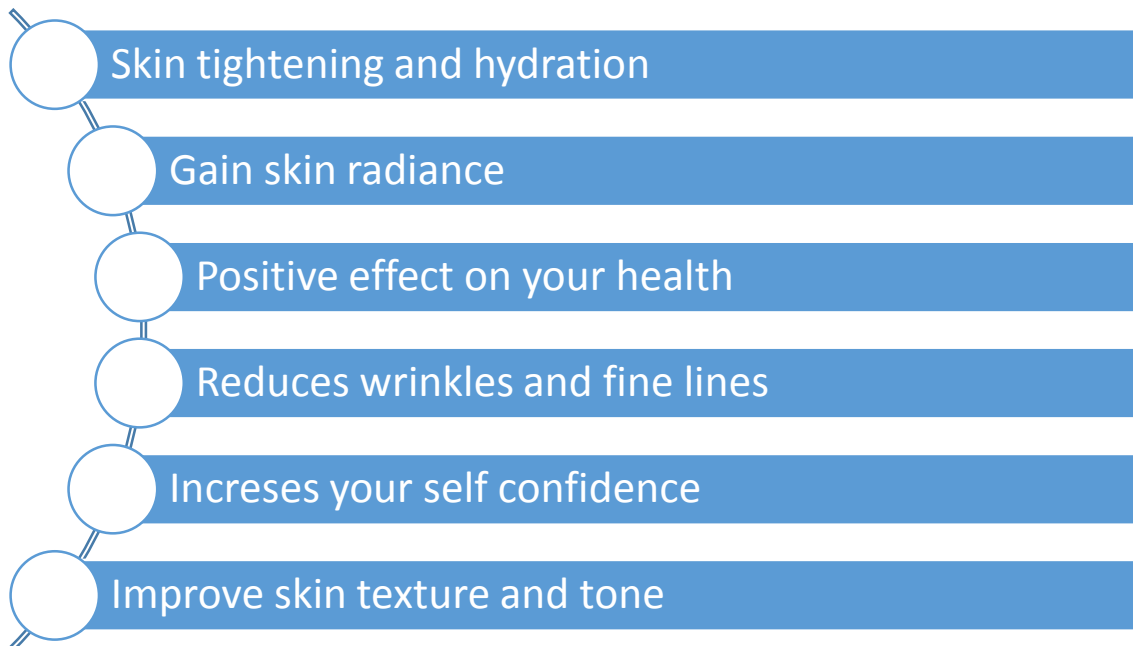
**Benefits of Anti- ageing Cream :**



Fig 5

### Information About Key Ingredient:

#### 1. Banana Peel

The banana, belonging to the Musaceae family, is one of the most important tropical fruits and ranks as the fourth-largest food commodity globally. India produces about 32% of the world's total fruit yield. It is the only tropical fruit widely exported, dominating the global market. Bananas have been cultivated in India for centuries and are among the country's oldest and most popular fruits. Often called the "apple of paradise," legend suggests that Eve used banana leaves for modesty in the Garden of Eden.

In many African nations, bananas serve as a staple food, consumed both ripe and unripe. The fruit is available year-round, and every part of the plant is useful. The peel contains antioxidants, fiber, and nutrients that help improve skin health by brightening the complexion, reducing wrinkles, and providing hydration. Studies also suggest its anti-inflammatory properties.

#### ▪ Banana Chemical Composition:

Chemical	Amount
Magnesium(Mg)	27 mg (8%)
Zinc(Zn)	0.15 mg (2%)
Water	74.91 g
Sugar	12.23 g
Energy	371 kJ (89kcal)
Choline	9.8 mg (2%)
Pyridoxin	0.4 mg (31%)
Potassium (K)	358 mg (8%)
Carbohydrate	22.84 g
Panthothenic Acid	0.334 mg (70%)
Phosphorus (P)	22 mg
Vitamin C	8.7 mg
Sodium (Na)	1 mg

#### ▪ Banana Peel Benefits for The Face :

##### ○ Dark Circle Remedy

If you often struggle with dark circles, a banana peel can be a quick fix. Placing a small piece under your eyes helps cool, brighten, and hydrate the skin, giving it a refreshed and youthful look.

##### ○ Soothing Irritated Skin

Skin irritation and inflammation are common issues, but banana peel can help. Rich in vitamin C and histamine-reducing properties, it soothes irritation while acting as a natural moisturizer to calm the skin.

### ○ Acne Control

For oily, acne-prone skin, banana peel works as an excellent oil regulator. It helps reduce excess oil production, preventing clogged pores and breakouts.

### ○ Enhancing Skin Elasticity

Packed with antioxidants and vitamin C, banana peels improve skin elasticity, reducing fine lines and wrinkles. They also help fade dark spots, giving the skin a youthful and even appearance.



Fig.6

## 2. Apple Peel:

Apples belong to the Rosaceae family and the genus *Malus*. The most common apple species is *Malus domestica*.

### ▪ Apple peel Benefits for the Face :

Apple peel is rich in antioxidants, polyphenols, vitamin C, and quercetin, which help fight skin aging. Here's how apple peel benefits anti-aging creams:

- **Reduces Wrinkles** – The antioxidants in apple peel neutralize free radicals, preventing premature aging and reducing fine lines.
- **Boosts Collagen Production** – Vitamin C enhances collagen synthesis, improving skin firmness and elasticity.
- **Brightens Skin** – The natural acids in apple peel help exfoliate dead skin cells, promoting a youthful glow.
- **Hydrates and Nourishes** – Apple peel contains natural sugars and moisture-retaining compounds that keep the skin soft and hydrated.
- **Protects Against UV Damage** – Quercetin, a powerful antioxidant in apple peel, helps shield the skin from sun damage and oxidative stress.

### Chemical Composition of Apple Peel:

Chemical	Amount (per 100 g of peel)
Polyphenols	200-400 mg
Quercetin	3-10 mg
Flavonoids	50-100 mg
Tannins	Present
Vitamin C	8-12 mg
Vitamin A	80
Vitamin E	0.3- 0.6 mg
Vitamin K	2-5
Dietary Fiber	2-4 g
Potassium	110-150 mg



Fig .7

## Process of Drying Apple peel and Banana peel:

### 1. Collection & Cleaning

- Collect fresh **apple** and **banana peels** (make sure the fruits are ripe and clean).
- Wash the peels thoroughly under running water to remove any dirt, pesticides, or residues.
- Pat them dry with a clean towel or leave them to air dry for a few minutes.

### 2. Cutting/Chopping

- Cut the peels into smaller pieces or strips. This helps them dry more evenly and quickly.

### 3. Drying Methods

You can choose any of the following methods based on what's available:

#### A. Sun Drying (Traditional Method)

- Spread the chopped peels on a clean tray or mesh, in a single layer.
- Place under direct sunlight for 2–4 days, depending on the weather.
- Cover with a thin mesh or cloth to protect from dust and insects.
- Bring them in at night to avoid moisture from dew.

#### B. Oven Drying

- Preheat the oven to around **50–60°C (120–140°F)**.
- Spread the peels on a baking tray lined with parchment paper.
- Keep the oven door slightly open for ventilation.
- Dry for about **4–6 hours**, flipping occasionally for even drying.
- Check regularly to avoid burning.

#### C. Dehydrator Method (if available)

- Spread the peels on dehydrator trays in a single layer.
- Set the dehydrator to **50–60°C**.
- Dry for **6–8 hours** or until completely crisp.



Fig.8

**MATERIAL AND METHODOLOGY:**

- Material :**

**Table 1 Formulation Table for anti-ageing cream.**

Sr.no	Ingredients	Role
1	White bees wax	Skin Moisturizer, emollient, it gives thickness and increases the water holding capacity of the cream
2	Borax	Emulsifier, buffering agent, and preservative
3	Almond oil	Emollient, Solvent, oleaginous vehicle
4	Methyl Paraben	Preservatives
5	Perfume	Enhance odour
6	Apple Powder	Anti oxidants, enhance skin elasticity, provide hydration
7	Banana Powder	Skin hydration and regeneration
8	Distilled Water	solvent

**Table 2 Various Formulation of Anti-Ageing**

Sr.no	Ingredient	F1	F2	F3
1	White bees wax	3.2g	3.2g	3.2g
2	Borax	0.16g	0.16g	0.16g
3	Almond oil	10ml	10ml	10ml
4	Methyl paraben	0.02g	0.02g	0.02g
5	Rose water	0.5ml	0.5ml	0.5ml
6	Apple powder	0.10g	0.25g	0.5g
7	Banana powder	0.10g	0.25g	0.5g
8	Distilled water	6ml	6ml	6ml

➤ **Ingredient and its Uses****1. White Beeswax :**

- Acts as a natural emollient and occlusive, creating a protective barrier on the skin.
- Helps retain moisture, preventing dryness and fine lines.
- Contains vitamin A, which supports skin renewal and elasticity.
- Provides a smooth texture to the cream.

**2. Almond Oil :**

- Rich in vitamin E, a powerful antioxidant that protects against free radical damage.
- Deeply moisturizes and nourishes the skin, reducing dryness and wrinkles.
- Helps improve skin tone and texture, making it look youthful and supple.
- Contains fatty acids that strengthen the skin barrier.

**3. Methyl Paraben :**

- Works as a preservative to prevent microbial growth, extending the shelf life of the cream.
- Helps maintain product safety by stopping bacteria, mold, and yeast from contaminating the formula.
- Ensures that active anti-aging ingredients remain effective over time.

**4. Banana peel :**

- Rich in Antioxidants: Contains lutein and vitamin C, which help fight free radicals and slow down skin aging.
- Moisturizing: High in potassium, which hydrates and softens the skin.

**5. Apple Peel :**

- High in Polyphenols & Flavonoids: Protects the skin from UV damage and oxidative stress, reducing premature aging.
- Contains Malic Acid: Acts as a gentle exfoliant, improving skin texture and radiance.

## ➤ METHODOLOGY

### Procedure:

1. Take bees wax in china dish. Add almond oil according to the quantity in the beeswax dish. Heat the mixture in water bath until the bees wax melt.

2. Add peel powder of banana and apple to the melted beeswax mixture

3. Dissolve borax in 6mi of wate . Add this solution dropwise to the melted beeswax mixture while stirring.

4. Add methyl paraben to preserve the cream. Add rose water for fragrance and additional benefits.

5. Stir well to achieve a smooth and even texture. Transfer the cream into a clean container .



Fig. 9

### ➤ Evaluation of Cream :

#### 1. Organoleptic Evaluation:

The prepared cream was examined for its sensory characteristics such as color, smell, and texture. The visual appearance was evaluated based on its color and surface feel, and then rated accordingly .

## 2. Microbial Growth Test in Formulated Creams

To check for microbial contamination, the cream samples were spread on Muller Hinton agar plates using the streak plate method. A separate plate without cream was used as a control. All plates were incubated at 37°C for 24 hours. After incubation, the plates were observed for any microbial growth and compared with the control plate.

## 3. Stability Studies

Stability testing helps determine how long a drug or formulation remains effective and unchanged. These tests were done following ICH guidelines. Cream samples were sealed in bottles and stored in a humidity chamber under two conditions:  $30 \pm 2^\circ\text{C}$  with  $65 \pm 5\%$  relative humidity, and  $40 \pm 2^\circ\text{C}$  with  $75 \pm 5\%$  relative humidity, for two months. At the end of this period, the creams were tested for any changes in appearance and viscosity.

## 4. pH Measurement of the Cream

To measure the pH, the pH meter was first calibrated with a standard buffer. Then, 0.5 grams of the cream was mixed in 50 ml of distilled water, and the pH of the resulting solution was recorded.

## 5. Spreadability Study

One of the key qualities of semi-solid formulations like creams is how easily they spread on the skin. This quality, known as spreadability, indicates how well and how far the cream can be distributed during application. It also plays a role in the product's effectiveness.

To measure this, a specific setup is used. Spreadability is determined by measuring the time (in seconds) it takes for two glass slides to slide apart when a known weight is applied. A shorter time means better spreadability.

For the test, two glass slides of the same size were used. A small amount of cream was placed on one slide, and the other slide was placed on top, covering the cream over a 5 cm length. A 100 g weight was placed on the top slide for even spreading, forming a thin layer of cream. After removing the weight, any extra cream sticking out was wiped off.

The bottom slide was kept fixed, while the top slide was connected to a string attached to a weight (30 g) through a pulley system. The time it took for the top slide to move 5 cm and separate from the bottom one due to the weight was recorded.

Spreadability was then calculated using the formula:

$$\text{Spreadability} = (m \times l) / T$$

Where:

- **m** = weight applied (30 g)
- **l** = length of the slide (5 cm)
- **T** = time taken (in seconds)

## 6. Viscosity

The thickness (viscosity) of the cream was measured using a Brookfield Viscometer (Model DV-II+). The test was done with spindle number LV4, and the cream was placed into the viscometer's container. The spindle's speed was gradually increased from 0.5 to 20 revolutions per minute (rpm) to assess how the formulation responds to movement.

## 7. Homogeneity

To ensure uniformity, the cream was visually inspected and also tested by touch to check if it had a smooth and consistent texture without any lumps or separation.

## 8. After Feel

After applying a fixed quantity of the cream, its feel on the skin was assessed. This included checking for softness (emolliency), how slippery it felt, and whether any noticeable residue remained after application.

## 9. Removal

The ease with which the cream could be removed from the skin was tested by washing the applied area with tap water and observing how easily it washed off.

## 10. Irritation Test

A small area (1 cm<sup>2</sup>) was marked on the back of the left hand. The cream was applied to this marked spot, and the time of application was noted. The area was then observed at regular intervals for up to 24 hours to check for any signs of skin irritation, such as redness (erythema) or swelling (edema), and the findings were recorded.

## Result and Discussion:

### 1. Appearance :

After keeping the cream formulation for an extended period, no noticeable changes were observed in its sensory characteristics. The results are presented in Table:

Sr.no	Specification	Observation
1	State	Semi-solid
2	Color	Brownish
3	Odour	Mild characteristic's smell
4	Texture	Smooth and uniform

## 2. Microbial Test :

The cream formulation was tested for microbial contamination, and the results showed that microbial growth remained within acceptable limits . Therefore, the formulation is considered microbiologically safe for topical application.

Microbial Load	Limits	Result
TMC (Total Microbial Count)	Not more than 100 CFU/g	58 CFU/G
Limit test (E. Coli, S. aureus, Salmonella )	No characteristics colonies	Complies

## 3 .Stability Studies

The cream formulations were subjected to a stability study over two months. No changes were observed in physical parameters such as pH, color, and viscosity. Results are presented in Table .

**Table: Stability Study Results After 2 Months**

Formulation	pH	Color	Viscosity
F1	5.4	Brownish	580
F2	5.7	Brownish	600
F3	6	Brownish	640

## 4. Spreadability Studies

Spreadability tests showed that all formulations had good spreadability, with quicker spreading observed in some samples. The details are shown in Table.

**Table: Spreadability Study :**

Formulation	Time (seconds)	Spread ability (g.cm/sec)
F1	12	12.5
F2	11	13.63
F3	9	16.67

## 5. pH of the Cream

The pH of the cream formulations ranged between 5.6 and 6.8, which is considered suitable and gentle for skin application. Each formulation had a pH close to the natural skin pH: F1 had a pH of 5.8, F2 was 6.0, F3 was 6.5, and F4 was 6.7.

## 6. Viscosity

The viscosity of all cream samples was found to be between 500 and 1000 centipoise (cPs), suggesting that the creams can be spread easily with minimal force. Among them, formulations F2 and F3 showed better spreadability compared to the others.

## 7. Homogeneity

Each cream formulation showed even and consistent distribution of ingredients throughout the product. This was verified both visually and by touch, indicating uniform texture.

## 8. After Feel

The creams provided a pleasant feel after application, with good moisturizing (emollient) properties, smoothness, and minimal leftover residue on the skin.

## 9. Removal

Formulations F3 and F4 could be easily washed off the skin using tap water, indicating good removability

## Conclusion:

In conclusion, the development of an herbal anti-aging cream utilizing apple and banana peel extracts represents a significant advancement in the field of natural skincare. This study underscores the untapped potential of fruit peels, often discarded as waste, highlighting their richness in bioactive compounds with remarkable antioxidant, anti-inflammatory, and anti-aging properties. The apple peel, known for its high content of polyphenols, flavonoids, and vitamin C, contributes to enhanced skin elasticity, protection against free radical damage, and a brighter complexion. Simultaneously, banana peel, enriched with lutein, vitamin E, and essential fatty acids, supports skin hydration, promotes collagen synthesis, and aids in reducing the appearance of fine lines and wrinkles.

The synergistic effect of these two natural ingredients forms the basis of an effective, sustainable, and eco-friendly alternative to conventional synthetic anti-aging products. The formulated cream not only addresses visible signs of aging but also provides nourishing benefits to maintain overall skin health. Through in vitro and possibly in vivo evaluations, the cream has demonstrated significant antioxidant activity, improved skin texture, and enhanced moisture retention, affirming the efficacy of plant-based actives in dermatological applications.

Moreover, the use of herbal ingredients reduces the risk of adverse side effects commonly associated with synthetic compounds, offering a safer and more holistic approach to skincare. This innovation aligns with the growing global demand for green, organic, and sustainable cosmetic solutions. By transforming organic waste into a value-added product, this initiative also contributes positively to environmental conservation and waste management.

Overall, the successful formulation and potential commercialization of this herbal anti-aging cream not only open new avenues in the cosmetic industry but also encourage further research into other underutilized natural resources. Future studies may explore enhancements in formulation stability, extended shelf life, and clinical validation, paving the way for a new generation of ethical and effective skincare products.

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