FORMULATION AND EVALUATION OF MULTIPURPOSE HERBAL SCRUB IN GEL FORM USING LIMONIA ACIDISSIMA

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Abstract: The main objective of the present study was to prepare a Multi-Purpose Herbal scrub incorporated into the gel. In daily life for both women and men apply the cosmetics for beautifying and altering the appearance of the skin. Nowadays consumers are well aware of the product benefits and their side effects, hence the usage of herbal cosmetics increases because herbal cosmetics have fewer or no side effects.

*L. acidissima* is a huge source of vitamin C and it contains 4 times vitamin C than any other citrus fruits. Vitamins C help in Immunity improvement and also protect against common infections and pathogen. *L. acidissima* contains antioxidant like B-carotene which helps defend the skin from Aging and wrinkles. It also contains vitamin A, B helps in getting cleared of skin discoloration, dark circles, redness, and acne irritation. It is understood that the regular use on the skin helps to keep skin cool, smooth, fair and well-textured appearance it is also known to be defensive against skin cancer by blocking UV rays. The pulp of *L.acidissima*, to eliminate minor spots and lesions on the skin

Keyword: Multi-Purpose, Anti-aging, Anti-oxidant, B- Carotene.

I. INTRODUCTION

Generally herbal cosmetics are also referred to as natural cosmetics. herbal cosmetics, referred as products are formulated using various permissible cosmetic ingredients to form the base in which one or more herbal ingredients are used to provide defined cosmetics benefits only shall be called as herbal cosmetics.

The science of Ayurveda has utilized many herbs and floral to make cosmetics for beautification and protection from external effects. The natural content in the botanicals do not cause any side effects on the human body; instead enrich the body with nutrients and other useful minerals. The natural herbs and their products when used for their aromatic value in cosmetics preparation are termed as herbal cosmetics.

The increased demand for natural products has created new avenues in the cosmetics market. Herbal medicines have long history of use and better patient tolerance as well as acceptance medicinal plants have a renewable source which is due only hope for sustainable supplies of cheaper medicines for the world growing populations. There are a number of herbs that are used for their medicinal and cosmetics properties, *Limonia acidissima* is one of them. Different parts of *Limonia acidissima* are responsible for different medicinal as well as cosmetics properties.

*L. acidissima* is a huge source of vitamin C and it contains 4 times vitamin C than any other citrus fruits. Vitamins C help in Immunity improvement and also protect against common infections and pathogen. *L. acidissima* contains antioxidants like B-carotene which helps defend the skin from Aging and wrinkles. It also contains vitamin A, B helps in getting cleared of skin discoloration, dark circles, redness, and acne irritation it is also known to be defensive against skin cancer by blocking UV rays the pulp of *L.acidissima* to eliminate minor spots and lesions on the skin.

Scrubbing is the process of eliminating dead skin cells from the surface of your skin using the granulated substance and exfoliator tool. A facial scrub is generally a cream and Gel-based product that contains tiny exfoliating pieces. A facial scrub is an added step above and beyond a basic cleanser-toner-moisturizer routine, it often gets neglected.

**Top 10 benefits of scrubbing your skin**

- For A Squeaky Spotless Skin: Scrubbing gives you clear skin, free from dirt, oil, and sweat.
- Frees Your Skin From Flakes: Blistered skin looks hideous!
- Helps In Removing Dead Cells
- Adds Glow To Skin
- Removes Dark Patches.
- Removes Acne Scars
- Prevents Ingrown Hair
- For Smooth Skin
- Improve the Smoothness Of Your Skin
- Promotes Clear Complexion
Aging and Wrinkles are natural. As people get of age, their skin gets thinner, drier, and less elastic, and less capable to defend itself from damage. This leads to wrinkles, creases, and lines on the skin. UV light breaks the collagen and elastin fibers in the skin. These fibers form the skin’s connective tissue. They are located below the surface of the skin, and they support the skin. Destroying this layer causes the skin to become weaker and less flexible. The skin starts to languish, and wrinkles occur.

![Mechanism action of Aging](image1)

### 2.1. Scrub use for Anti-aging and Anti-wrinkle Purpose

The Fruit is rich in vitamins and antioxidants like B-carotene, lycopene which help protect the skin from aging, wrinkles, skin discoloration, dark circles, redness, and acne. It is high in astringent properties; it also helps in tone up and tightens the skin. Vitamins and Antioxidant like B-carotene are increases the production of collagen and elastin to prevent wrinkles and skin aging.

![Skin without protection and Filter reflect UV radiation](image2)

### 2.2. Multiple benefits of Scrub

- Moisturizes and hydrates aging skin
- Controls Excessive Facial Oil, Removes Serious Acne, Pimples, Blackheads and whiteheads.
- Also a natural mild treatment for the reduction of
  - Freckles
  - Dark inner elbows & knees
  - Sunspots
  - Melasma
  - Hyperpigmentation
  - Senile lentigines
  - Birthmarks
  - Age spots
  - Liver spots
  - Old scars
  - Chloasma
  - Post-inflammatory hyperpigmentation
2.3. Active Profile:-

*Limonia acidissima* is the only species within the monotypic genus *Limonia*. It is also known as a wood apple belonging to family Rutaceae. It is globally reported from India, Sri Lanka, and Java it occurs in dry regions. *Limonia acidissima* (L.) of family Rutaceae (Citrus family) belongs to the monotypic genus elephant-apple, monkey fruit, curd fruit, kath bel and kaiitha. This plant is given as a medicine for the treatment of various disorders. *L. acidissima* is a deciduous, slow-growing, erect tree with a few upward-reaching branches bending outwards near the summit where they are subdivided into slender branchlets drooping at the tips. Its fruit is spherical in shape with 5-12.5 cm diameter. The rind is greyish-white in color and 6 mm thick. It has a woody and extremely hard outer shell (called a rind) which is very difficult to crack open. Hammer is used to crack the hard rind of wood-apple fruit. The Pulp is a brown, mealy, aromatic, resinous, sour or sweetish with many small white seeds embedded in it. Syrups, drinks, jellies and jams can be prepared from its sticky pulp. The valuable parts of the plant include its roots, fruits, bark and the leaves which are used for various therapeutic purposes.
### Taxonomy

<table>
<thead>
<tr>
<th>Taxonomic Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kingdom</td>
<td>Plantae</td>
</tr>
<tr>
<td>Sub-Kingdom</td>
<td>Tracheobionta</td>
</tr>
<tr>
<td>Superdivision</td>
<td>Spermatophyta</td>
</tr>
<tr>
<td>Division</td>
<td>Magnoliophyta</td>
</tr>
<tr>
<td>Class</td>
<td>Magnoliopsida</td>
</tr>
<tr>
<td>Sub-Class</td>
<td>Rosidae</td>
</tr>
<tr>
<td>Order</td>
<td>Sapindales</td>
</tr>
<tr>
<td>Family</td>
<td>Rutaceae</td>
</tr>
<tr>
<td>Genus</td>
<td>Limonia L.</td>
</tr>
<tr>
<td>Species</td>
<td>L. acidissima</td>
</tr>
<tr>
<td>Synonyms</td>
<td>Feroniaele phantom Correa, Feronia limonia (L.) Swingle, Schinus limonia L.</td>
</tr>
</tbody>
</table>

**Table no:-01 Taxonomy of *Limonia acidisima***

### 2.4. Nutritional Value of *L.acidissima*:

<table>
<thead>
<tr>
<th>Nutritional Value per 100 g (3.5 oz)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Energy</strong></td>
<td>518.816 kJ (124.000 kcal)</td>
</tr>
<tr>
<td><strong>Carbohydrates</strong></td>
<td>18.1 g</td>
</tr>
<tr>
<td><strong>Sugars</strong></td>
<td>0 g</td>
</tr>
<tr>
<td><strong>Dietary fiber</strong></td>
<td>5 g</td>
</tr>
<tr>
<td><strong>Fat</strong></td>
<td>3.7 g</td>
</tr>
<tr>
<td>Nutrient</td>
<td>Quantity</td>
</tr>
<tr>
<td>----------------</td>
<td>----------</td>
</tr>
<tr>
<td>Protein</td>
<td>7.1 g</td>
</tr>
<tr>
<td><strong>Vitamins</strong></td>
<td></td>
</tr>
<tr>
<td>Thiamine (B1)</td>
<td>0.04 mg</td>
</tr>
<tr>
<td>Riboflavin (B2)</td>
<td>17 mg</td>
</tr>
<tr>
<td>Niacin (B3)</td>
<td>8 mg</td>
</tr>
<tr>
<td>Vitamin C</td>
<td>20 mg</td>
</tr>
<tr>
<td><strong>Minerals</strong></td>
<td></td>
</tr>
<tr>
<td>Calcium</td>
<td>13%</td>
</tr>
<tr>
<td>Iron</td>
<td>46%</td>
</tr>
<tr>
<td>Manganese</td>
<td>857%</td>
</tr>
<tr>
<td>Zinc</td>
<td>105%</td>
</tr>
<tr>
<td><strong>Other constituents</strong></td>
<td></td>
</tr>
<tr>
<td>Water</td>
<td>64.2 g</td>
</tr>
</tbody>
</table>

Table no: - 02 Nutritional Value of *L.acidissima*

2.5. Phytoconstituents

The analysis of *Limonia acidissima* plant parts showed the presence of alkaloids, flavonoids, phenols, terpenoids, tannins, fats steroids, saponins, glycosides, gum, mucilage, and fixed oils. The unripe fruits contain stigmasterol. Fruit pulp contains a large quantity of citric acid and other fruit acids, mucilage and minerals. Alkaloids, coumarins, fatty acids, and sterols have been detected in the pericarp. It also contains umbelliferone, dictamine, xanthotoxol, scoparone, xanthotoxin, isopimpinellin, isomimeratorin and marmesin. Leaves contain stigmasterol, psoralen, bergapten, orientin, vitedin, saponarin, tannins, and essential oil. Marmesin, feronolide, and feronone have been isolated from the carbohydrates, proteins and amino acids. Roots contain feronaria lactone, geranylumbelliferone, bergapten, osthol, isopimpinellin, marmesin, and marmesin. Seeds contain fixed oil.

3. Aim:

Formulation and Evaluation of Multi-purpose Herbal Scrub in Gel Form Using *Limonia acidissima* Linn.

4. Objective:

- To Prepare a Multipurpose Scrub Incorporated into gel.
- To Study the role of Limonia Fruit to Prevent Wrinkling or Removing dirt, oil. Sebum and Reduce the clogged of pore.
To assess the efficacy & tolerability of face gel to improve the appearance of aging, wrinkle, finelines, etc.

To nourish and beautify the skin.

5. Methodology:

A proper method has to be carried out while formulating the Anti-aging Herbal Scrub are as,

1) Selection of active
2) Collection and Authentication
3) Extraction Method
4) Selection of base
5) Formulation
6) Preparation
7) Evaluation

5.1 Methods:-

1) Selection of active
The analysis of Limonia acidissima plant parts showed the presence of alkaloids, flavonoids, phenols, terpenoids, tannins, fats steroids, saponins, glycosides, gum, mucilage, and fixed oils. Fruit contains some useful phytochemical constituent like vitamins, Antioxidants, Lycopene Carotenoids, etc

2) Collection and Authentication
Limonia acidissima were purchased from the local market and authenticated in the botanical department by botanists.

3) Selection of base
The main objective of the present study was to prepare a Multi-Purpose Herbal scrub incorporated into the gel, hence gel base are used

a) Carbapol940:- Gelling agent
In this preparation carbopol is used to prepare gel Because, Carbopol contains good consistency and the gel becomes whiter or clear.
b) Propylene glycol: - Moisturizer

It is the clear liquid acts as a humectant and one of the most effective moisturizer

c) Triethanolamine: - Neutralizer

TEA acts as a ph adjuster and also acts as emulsifier.

d) Sodium Lauryl Sulfate: - Foaming agent

It is a widely used surfactant in cleaning products, cosmetics, and personal care products. SLS is also used in lower concentrations in household and personal care products.

e) Distilled Water: - Solvent

It is a universal solvent that acts as a hydrating agent.

## 5.2 Formulation of Multipurpose Herbal Scrub

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>Parts Used</th>
<th>Category</th>
<th>Qty%</th>
</tr>
</thead>
<tbody>
<tr>
<td>L.acidissima</td>
<td>Fruit (Pulp)</td>
<td>Anti-aging, Anti-Oxidant</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Anti-Wrinkles</td>
<td></td>
</tr>
<tr>
<td>L.acidissima</td>
<td>Outer (shell)</td>
<td>Exfoliate Skin</td>
<td>2</td>
</tr>
<tr>
<td>Carbopol 940</td>
<td>_</td>
<td>Gelling agent</td>
<td>3</td>
</tr>
<tr>
<td>Triethanolamine</td>
<td>_</td>
<td>Neutralizer</td>
<td>2</td>
</tr>
<tr>
<td>Propylene glycol</td>
<td>_</td>
<td>Moisturizer</td>
<td>2</td>
</tr>
<tr>
<td>Sodium Lauryl Sulfate</td>
<td>_</td>
<td>Foaming Agent</td>
<td>2</td>
</tr>
<tr>
<td>Distilled water</td>
<td>_</td>
<td>Vehicle</td>
<td>3.85</td>
</tr>
<tr>
<td>Methyl Paraben</td>
<td>_</td>
<td>Preservative</td>
<td>0.15</td>
</tr>
</tbody>
</table>
5.3. Extraction of fruits parts

**Extraction of fruits parts:-**

The fresh fruits was collected from the local market.

fruit was dried hot air oven at 40°C to avoid degradation of phytoconstituents

After drying material was coarsely powered with grinding mill and kept in well closed container

About 30g powder respectively was defatted with petroleum ether (60-80°C) in a Soxhlet apparatus followed by extraction with ethanol.

The collected extract

kept in a vacuum dryer until used.

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**Fig:-05 Outer Shell Powder**

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5.4. Preparation of Gel base:-

The gel prepared first the Required quantity of water was taken in a beaker

then weighed quantity of propylene glycol, and sodium lauryl sulfate was added and dissolved.

A weighed quantity of carbopol 940 was added little by little in a homogenizer until uniform gel was obtained.

To this, extract of fruit pulp powder was added and fruit outer shell powder are added then triturated well

and at last, triethanolamine was added to adjust the pH

Fig:-06 Pulp

Fig: 07 Formulated Anti-Aging Herbal Scrub
5.5 Ideal properties of a Scrub

- Non-toxic
- Possess small gritty particles
- Mild abrasive
- Non-irritant
- Non-sticky
- Removes dead skin

5.6. Precautions to be taken while applying a Scrub

- A Scrub is selected based on the skin type
- Excessive Scrub and rubbing can damage the skin
- Do not Scrub skin if any open wounds, cuts, and sunburns present
- Apply twice a week
- Apply with a rotating motion to face and neck for about 30secs.
- Thoroughly rinse with water

6. Evaluation of Multipurpose Herbal Scrub

**Ph**

The pH of the gels was determined using a digital pH meter. The pH value of the Scrub was 7.4 which are considered acceptable to avoid the risk of irritation on application to the skin.

**Spreadability**

The spreadability is very much important as it shows the behavior of gel that comes out from the tube. It is used to identify the extent of spreadability by the gel on the skin. A small quantity of sample was placed on a glass slide and another slide was placed above them; 100 g of weight was placed on the slide. The time taken for the gel to spread on the slide was noted and measured which was found to be 6.5 cm in 5 min. It was calculated using the following formula:

\[ S = \frac{m \times 1}{t} \]

- **S**= Spreadability
- **m**= Weight placed on the slide
- **l**= Length of the glass slide
- **t**= Time taken in seconds

**Extrudability**

To determine extrudability, a closed collapsible tube containing formulation was pressed firmly at the crimped end. When the cap was removed, formulation extruded until the pressure dissipated. Weight in grams required to extrude a 0.5 cm ribbon of the formulation in 10 s was determined. The average extrusion pressure in g was reported. It was found to be 15.3 g/cm²

**Viscosity**

The thickness of the different gel designs was determined at 25°C using Brookfield viscometer apparatus DV2T model. The gel sample (5g) was placed in the sample holder of the viscometer and permitted to settle for 5 min, and the viscosity measured a rotating speed of 50 rpm at room temperature (25–27°C). The viscosity was found to be 1050 centipoise

**Irritability**

A small amount of gel was applied externally on the skin surface for a few minutes and checked for reactions on the skin. It was found to be non-irritant.

**Washability**

A small amount of gel was applied externally on the skin surface, and it was washed with running water. It was found to be easily washable.
Foamability
A small amount of gel was taken in a measuring cylinder, and it was shaken for 5 min and the foam stability of the gel was measured.

Grittiness
needs to have abrasive property so to satisfy that the Fruit Shell were powdered and passed through sieve no 30 such that the preparation has few gritty particles

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Parameters</th>
<th>Observation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Color</td>
<td>Sticky Brown</td>
</tr>
<tr>
<td>2</td>
<td>Odor</td>
<td>Aromatic</td>
</tr>
<tr>
<td>3</td>
<td>Consistency</td>
<td>Good</td>
</tr>
<tr>
<td>4</td>
<td>pH</td>
<td>7.4±0.8</td>
</tr>
<tr>
<td>5</td>
<td>Viscosity</td>
<td>1050±0.2 centipoise</td>
</tr>
<tr>
<td>6</td>
<td>Spreadability</td>
<td>6.5±0.6 cm</td>
</tr>
<tr>
<td>7</td>
<td>Washability</td>
<td>Easily washable</td>
</tr>
<tr>
<td>8</td>
<td>Grittiness</td>
<td>Presence of gritty particles</td>
</tr>
<tr>
<td>9</td>
<td>Foamability</td>
<td>Foam volume 100ml at 5 min</td>
</tr>
<tr>
<td>10</td>
<td>Irritability</td>
<td>Non-irritant</td>
</tr>
<tr>
<td>11</td>
<td>Extrudability</td>
<td>15.3±1.2 g/cm²</td>
</tr>
</tbody>
</table>

8. RESULT

Multipurpose Scrub was prepared and evaluated. It contains ethanol extract of L. acidissima fruit Pulp which possesses antioxidant, anti-aging, and anti-wrinkle skin tightening lightening and brightening properties. It also contains outer shell powder of Fruit acting as a natural exfoliating agent on the skin surface by releasing dead cells and pore-blocking impurities. They can exfoliate the skin without scratching the skin surface by applying pressure on them. Suitable base materials such as gelling agent, preservative, neutralizer, and foaming agent were selected and incorporated into the extract to design a suitable herbal gel. Evaluation parameters such as color, odor, consistency, and pH were checked.

9. CONCLUSION

The current work was done to prepare a multipurpose herbal scrub using an appropriate base to form a gel. The prepared scrub gel was evaluated using various parameters and was found to be satisfied with the application on the skin to make it healthy and glowing without any side effects. Since L. acidissima are natural anti-aging and anti-wrinkle agents, they are incorporated into the formulation which increases the efficiency of the product.
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