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## Review Article

# A Review on Herbal Sunscreens for Skin Protection

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### ABSTRACT

Herbal cosmetics have gained significant attention due to their safety, eco-friendliness, and minimal side effects compared to synthetic products. The present study focuses on the formulation and evaluation of an herbal sunscreen using extracts of Rosella and Caesalpinia sappan. These plants are rich in natural antioxidants such as flavonoids, anthocyanins, phenolic compounds, and brazilin, which possess strong UV-absorbing and free radical scavenging properties. The herbal extracts were incorporated into a suitable cream base to prepare the sunscreen formulation. The prepared formulation was evaluated for various physicochemical parameters including pH, viscosity, spreadability, homogeneity, stability, and Sun Protection Factor (SPF). The results indicated that the formulation showed acceptable physical properties, good stability, and significant SPF value, demonstrating effective protection against harmful ultraviolet (UV) radiation. The study concludes that the combination of Rosella and Caesalpinia sappan extracts can be effectively used in the development of a safe, natural, and cost-effective herbal sunscreen with promising photoprotective activity.

### INTRODUCTION

As awareness of the potential risks of synthetic sunscreens grows, many people are turning to natural alternatives. These options often include ingredients like zinc oxide and titanium dioxide, which provide physical barriers against UV rays. Natural sunscreens are generally less likely to cause irritation or allergic reactions, making them suitable for sensitive skin. Additionally, they can offer broad-spectrum protection while being

environmentally friendly. However, it is essential to apply these products correctly and generously to ensure adequate protection. Regular reapplication, especially after swimming or sweating, is crucial for maintaining effective sun protection. Ultimately, choosing the right sunscreen can significantly impact skin health and overall well-being. Herbal sunscreens are gaining traction as a safer alternative to traditional products. They are made from natural ingredients, reducing the risk of

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skin irritation and allergic reactions. These sunscreens utilize plants known for their antioxidant and photoprotective qualities, offering effective UV protection. By harnessing the power of nature, they provide a gentle yet effective way to shield the skin from harmful rays. Excessive UV exposure can lead to sunburn and long-term skin damage, making protection essential. Herbal sunscreens not only help prevent these issues but

also support overall skin health. As people become more aware of the risks associated with synthetic chemicals, herbal options are likely to gain even more popularity. Embracing these natural alternatives can lead to healthier skin and a reduced environmental impact.

## 2. Targeted Diseases



**Fig. 1**

Herbal sunscreen prepared using *Hibiscus sabdariffa* (Rosella) and *Caesalpinia sappan* mainly targets skin damage caused by ultraviolet (UV) radiation.

### 1. Sunburn (Solar Erythema)

Sunburn occurs when the skin is overexposed to UVB radiation, causing inflammation. Symptoms include redness, pain, irritation, and eventual peeling of the skin. Herbal sunscreens provide a natural option to help prevent sunburn by either blocking or absorbing harmful UV rays. These products often contain ingredients like aloe vera and green tea, which can soothe the skin while providing protection. Regular application of herbal sunscreen is important for effective sun safety. Additionally, seeking shade and wearing protective clothing can further reduce the risk of sunburn.

– Redness, irritation, and inflammation due to UV exposure.

### 2. Photoaging (Premature Skin Aging)

Long-term exposure to sunlight can lead to premature aging of the skin, a condition known as photoaging. Symptoms of photoaging include wrinkles, loss of skin elasticity, dryness, and pigmentation changes. Protecting your skin from UV rays is crucial for maintaining its youthful appearance. Using sunscreen, wearing protective clothing, and seeking shade are effective strategies to prevent photoaging. Regularly moisturizing and staying hydrated can also help improve skin health. Additionally, incorporating antioxidants into your skincare routine may combat the effects of sun damage. Awareness of these factors can lead to better skin care choices and a healthier complexion. Taking proactive steps now can

significantly enhance the long-term health of your skin.

– Wrinkles, pigmentation, and loss of skin elasticity caused by long-term sun exposure.

### 3. Hyperpigmentation & Tanning

UV radiation triggers the skin to produce excess melanin, leading to dark spots and uneven skin tone. This reaction is often a response to sun exposure, which can damage skin cells. Prolonged exposure to UV rays can worsen these conditions, making prevention essential. Wearing sunscreen and protective clothing can help minimize the risk of developing these skin issues. Regular skin checks and consultations with a dermatologist can also aid in early detection and treatment. Maintaining a consistent skincare routine may further improve skin appearance and health. Taking care of your skin is crucial for overall well-being and confidence.

– Dark patches and uneven skin tone due to melanin overproduction.

### 4. Skin Cancer (Preventive Role)

Prolonged exposure to ultraviolet (UV) radiation can significantly increase the risk of developing various skin cancers. These include Melanoma, Basal Cell Carcinoma, and Squamous Cell Carcinoma, which can pose serious health threats if not detected early. It is essential to take preventive measures, such as wearing sunscreen, protective clothing, and seeking shade during peak sunlight hours. Regular skin checks can also help in identifying any unusual changes that may indicate the onset of skin cancer. Awareness and education about the dangers of UV radiation are crucial for reducing the incidence of these cancers. By taking proactive steps, individuals can protect themselves and promote healthier skin.

– Long-term UV exposure can lead to skin cancers like basal cell carcinoma and melanoma.

- Sunscreen helps in prevention (not treatment).

- Oxidative Skin Damage

– UV rays produce free radicals; both plants contain antioxidants that protect skin cells.

#### 2.1. Etiology :

The development of a herbal sunscreen using Roselle and *Caesalpinia sappan* focuses on creating a natural alternative to synthetic options. Both plants are rich in antioxidants, which can help shield the skin from harmful UVA and UVB rays. By harnessing the benefits of flavonoids and phenolics, this formulation aims to prevent premature aging and soothe skin inflammation. The evaluation process will assess the effectiveness, safety, and overall user experience of the herbal sunscreen. This innovative approach not only promotes skin health but also highlights the importance of using natural ingredients in personal care products. Ultimately, this project seeks to provide a viable solution for those seeking eco-friendly and safe sun protection.

#### Etiology of UV-Induced Skin Damage

##### 1. Ultraviolet (UV) Radiation

The sun emits different types of UV rays that can impact our skin in various ways. UVA rays penetrate deep into the skin and contribute to premature aging, leading to wrinkles and age spots. UVB rays primarily affect the outer skin layer and are responsible for causing sunburns. Both types of UV rays can increase the risk of skin cancer, making sun protection essential. It is important to use sunscreen with broad-spectrum protection to shield against both UVA and UVB rays. Regularly reapplying sunscreen and wearing



protective clothing can further minimize skin damage. Understanding these rays can help individuals make informed choices about sun exposure. Taking the necessary precautions can significantly reduce the risk of skin-related issues.

## 2. Oxidative Stress

UV radiation is a significant contributor to skin damage, as it generates free radicals within the skin's layers. These free radicals can harm essential cellular components like proteins, lipids, and DNA, leading to various skin issues. The damage caused by UV exposure often results in inflammation, which can further exacerbate skin conditions. Over time, this cellular harm may contribute to premature aging and an increased risk of skin cancer. Protecting the skin from UV radiation through sunscreen and protective clothing is crucial for maintaining skin health.

## 3. DNA Damage in Skin Cells

Continuous exposure to ultraviolet (UV) light can lead to significant damage to the DNA within skin cells. This damage increases the risk of developing serious skin diseases, such as Melanoma, Basal Cell Carcinoma, and Squamous Cell Carcinoma. Protecting your skin from UV rays is essential for long-term health. This can be achieved through measures such as wearing sunscreen, protective clothing, and avoiding tanning beds. Regular skin checks and awareness of any changes can help in early detection and prevention. Taking proactive steps can significantly reduce the likelihood of skin cancer and promote healthier skin overall.

## 4. Environmental Factors

Pollution and high temperatures can significantly intensify the harmful effects of sunlight on the skin. Prolonged outdoor activities during such conditions can lead to serious skin damage,

including burns and long-term issues. It is crucial to take preventive measures, such as using sunscreen, wearing protective clothing, and seeking shade. Staying hydrated and limiting sun exposure during peak hours can also help reduce risks. Being aware of these factors can promote better skin health and overall well-being. Individuals should prioritize their protection against UV radiation, especially in adverse environmental conditions.

## 5. Lack of Skin Protection

Not using protective measures like sunscreen can lead to significant skin damage. Prolonged exposure to UV rays without protection increases the risk of sunburn and skin cancer. Wearing protective clothing and seeking shade are essential practices for skin health. Taking these precautions can help minimize the harmful effects of the sun's rays. It's important to incorporate sun safety into your daily routine. Remember that even on cloudy days, UV rays can still penetrate the skin. Protecting your skin today can lead to healthier skin tomorrow. Make sun safety a priority to reduce the risk of UV-related issues.

### 2.2 Epidemiology :

Epidemiology plays a crucial role in understanding the effects of UV radiation on skin health. It helps identify populations at greater risk and informs public health strategies to mitigate these risks. In tropical and subtropical regions, such as India, the prevalence of skin damage from UV exposure is notably higher. Increased awareness and preventive measures are essential in these areas to protect skin health. Regular use of sunscreen, protective clothing, and seeking shade are effective strategies to reduce UV exposure.

Herbal sunscreens are gaining traction as a safer alternative to traditional options. This shift is



largely due to growing awareness of the harmful effects of UV exposure and the potential risks associated with synthetic ingredients.

These natural formulations often include ingredients like zinc oxide and botanical extracts, which can provide effective UV protection without the adverse side effects. Additionally, herbal sunscreens are more environmentally friendly, reducing the risk of harm to marine ecosystems.

As consumers become more educated, the demand for these products is likely to continue rising. This trend encourages further research into the efficacy and safety of herbal formulations in dermatology.

### 3. Herbal Phytomedicine:

#### 3.1 Caesalpinia sappan :



Caesalpinia sappan is known for its powerful phytochemicals that support skin health. These compounds offer antioxidant, anti-inflammatory, antimicrobial, and photoprotective benefits, making them essential for maintaining healthy skin. The antioxidants in this plant help neutralize free radicals generated by ultraviolet (UV) radiation. This action prevents oxidative damage to skin cells, reducing the risk of skin disorders. Excessive UV exposure can result in conditions like sunburn, hyperpigmentation, and premature aging. Therefore, incorporating this natural remedy can significantly enhance skin protection and overall appearance.

A medicinal plant whose heartwood extract is a promising natural ingredient for herbal sunscreens due to its high concentration of UV-blocking flavonoids and potent antioxidants. Its contain bioactive compound like brazilin and other phenonic compound that offer natural protection again UV rays.

Biancaea sappan, commonly known as sappanwood, is a flowering tree in the legume family, native to tropical Asia, prized for its reddish dye (brazilin) and medicinal properties, including antibacterial and anticoagulant effects.

**Appearance:** A thorny tree with greyish-brown bark; its heartwood is light yellow but turns red when exposed to air and hot water.

**Common Names:** Sappanwood, Indian redwood, Pathimugam (in Kerala).

**Family:** Fabaceae (pea family).

#### Uses and benefits

**Dye:** The heartwood produces a valuable reddish dye (brazilin) used for textiles, paints, and inks.

**Medicinal:** Used in traditional medicine for its antioxidant, anti-inflammatory, and antimicrobial properties.

#### 3.2 Rosella plant:



Hibiscus sabdariffa, or Rosella, is a plant known for its rich medicinal properties. It is widely grown in tropical and subtropical areas, where it has been used for various health and cosmetic applications. The calyces and leaves contain bioactive compounds like anthocyanins, flavonoids, and vitamin C. These compounds contribute to its strong antioxidant and anti-inflammatory effects, making Rosella a valuable addition to traditional medicine. Its use has been extended to beverages, teas, and dietary supplements, highlighting its versatility. Moreover, ongoing research continues to explore its potential health benefits, ensuring that Rosella remains relevant in modern wellness practices. Overall, Hibiscus sabdariffa is a remarkable plant that combines traditional uses with emerging scientific validation. Its properties make it a popular choice for those seeking natural remedies.

It's a tropical shrub used in herbal sunscreens for its high content of antioxidant and natural compounds that help protect the skin from Free Radicals and Harmful UV Rays. It is primarily involved incorporated into sunscreens and

skincare products not as a direct UV block. But as a powerful adjuvant that enhances the products efficiency and provides additional skin benefits.

Roselle (Hibiscus sabdariffa) is a versatile, tropical plant known for its edible, crimson-red calyces, which are used to make beverages, jams, and sauces, and for its fiber, leaves, and seeds, all of which have culinary and medicinal uses. it's cultivated globally for its antioxidant-rich parts, which support immune health, digestion, and cardiovascular function, and it's also grown for its strong, lustrous fiber.

**Appearance:** A hibiscus species with deep red, fleshy calyces (the part that surrounds the fruit) that are vibrant and tart. Flowers are typically white or pale yellow with a red spot.

### Uses

**Medicinal:** Used to support immune health, lower blood pressure, reduce inflammation, and aid digestion due to high levels of antioxidants and vitamin C.

**Table – Application of Herbal Phytomedicines**

Herbal Phytomedicine	Potent Phytoconstituent	Part Used	Uses
Caesalpinia Sappan	Braziline, Homoisoflavonoids	Bark	Anti-inflammatory, antimicrobial, anti-aging
Rosella Plant	Flavonoids, phenolicacid, Organic acid	Flower	Anti-oxidant, Anti-Hypertensives

## CONCLUSION

The study focuses on creating a herbal sunscreen using Hibiscus sabdariffa and Caesalpinia sappan. These plant-based ingredients are significant in offering protection against harmful ultraviolet (UV) radiation. Prolonged exposure to the sun can lead to several skin issues, including sunburn and hyperpigmentation. Additionally, it can accelerate premature aging and increase the risk of serious conditions like melanoma. Consequently,

developing safe and effective sunscreen products is crucial for maintaining skin health. This research emphasizes the potential benefits of using natural ingredients in skincare formulations. The findings could contribute to a more sustainable approach to sun protection. Overall, this study highlights the importance of exploring plant-based solutions for skincare needs.

This study successfully formulated and evaluated a herbal sunscreen using extracts of Hibiscus

sabdariffa and *Caesalpinia sappan*. These plants are rich in natural antioxidants, flavonoids, and phenolic compounds that help protect the skin from harmful ultraviolet (UV) radiation. Exposure to UV rays can cause several skin problems, such as sunburn, hyperpigmentation, and premature skin aging. The herbal sunscreen prepared in this study exhibited good physical properties, making it suitable for skin application. The formulation not only aims to protect against UV damage but also offers additional benefits due to the antioxidant properties of the ingredients. Overall, this herbal sunscreen represents a promising alternative to conventional products in skin protection.

The present study highlights that the herbal sunscreen made from *Rosella* and *Caesalpinia sappan* extract exhibits significant photoprotective effects. These plants contain natural antioxidants like flavonoids, anthocyanins, and phenolic compounds, which aid in shielding the skin from damaging UV rays and minimizing oxidative stress. The formulated product showed favorable physicochemical characteristics, including a suitable pH, excellent spreadability, and stability, along with an acceptable SPF value. This suggests that the herbal sunscreen could be a viable alternative to conventional products, offering both protection and skin benefits.

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