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The Potential of Natural Ingredients as Sunscreen: A Narrative Literature Review

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ABSTRACT

Sunlight is an electromagnetic wave that plays a role in producing UV radiation. UV radiation is a major source of skin damage. The utilization of natural ingredients as active ingredients in sunscreen cosmetics is an alternative to chemicals that are also harmful to the skin. Several plants, including *Brucea javanica* (L.), Family *Myrtaceae*, *Hippobroma longiflora* (L) G. Don, *Kaempferia galanga* L, and *Eucheuma cottonii*. Doty and *Zea mays* L. have the potential to be developed as a sunscreen.

1. Introduction

Sunlight is an electromagnetic wave that is the source of all types of light. On the Earth's surface, sunlight consists of several spectrums, namely infrared light (>760 nm), visible light (400-760 nm), ultraviolet (UV) A (315-400 nm), UVB light (290-315 nm). And UVC light (100-290 nm) is very harmful, has very high energy, and is carcinogenic. The Earth is protected by the ozone layer so that only a small part of the sunlight that reaches the Earth is mostly UVA, and a small portion is UVB. UV radiation is the main source of skin damage due to environmental influences, especially facultative skin color (FSC), which is a skin color that is influenced by UV rays and hormones. When the skin is exposed to UV light, melanogenesis occurs, which is the skin's main defense against further UV damage. Skin activity that

produces a dark color when exposed to sunlight is a protective effect for the cell nucleus so that DNA mutations do not occur and skin cancer occurs.¹

So efforts are needed to protect the skin, which is the outermost protection of the body, one of which is by using sunscreen. Phenolic compounds can act as sunscreens to prevent the harmful effects of UV radiation on the skin because antioxidants are photoprotective. This is supported by another study which revealed that antioxidant compounds are inhibitors used to inhibit autoxidation. The antioxidant effect of phenolic compounds is due to their oxidizing properties, which play a role in neutralizing free radicals. In general, there are two recognized types of sunscreen products, namely physical and chemical sunscreens. The active

ingredients of this sunscreen can be obtained from natural ingredients, especially chemical sunscreens. Herbal-based sunscreen cosmetics must contain one

or more active sunscreen ingredients that are antioxidants to achieve a good photoprotective effect.²



Figure 1. *Brucea javanica* (L.) Merr

One of the plants reported to contain phenolic compounds is *Brucea javanica* (L.) Merr, known locally as Wali. The ethanol extract of Wali seeds was reported to contain secondary metabolites in the form of phenols, polyphenols, and flavonoids. 12 Phenolic compounds in wali seeds are thought to be compounds that play a major role in causing antioxidant effects. The ethanol extract of wali seeds had better antioxidant activity than ascorbic acid and gallic at a

concentration of 6.25 g/mL. The content of phenolic compounds in plants is thought to have antioxidant activity and the ability to protect the skin from UV rays. This is in line with the results of the study, where the higher the antioxidant activity of a plant, the higher the ability of the plant to protect the skin from UV rays, which is indicated by an increase in the value of the sun protection factor (SPF) of the plant extracts tested.³



Figure 2. *Family Myrtaceae*

Several types of plants in the *Myrtaceae* family (bay leaves, clove leaves, and guava leaves) are thought to have free radical scavenging activity and are active ingredients in sunscreens. Antioxidants have the

potential as photo protectors. UV rays can stimulate the formation of a number of reactive compounds or free radicals on the skin. Bay leaves, clove leaves, and guava leaves extracted with 80% methanol as solvent

contained significant phenolic compounds, flavonoids, and condensed tannins. Methanol extract from the Myrtaceae has a strong ability to scavenge DPPH free radicals. The three extracts had antioxidant activity depending on the concentration. The greater the concentration of the extract showed the strongest activity. In vitro, clove leaf extract showed higher

antioxidant and sunscreen activity than guava and clove leaves with maximum protection (SPF value), respectively 34.38; 33.98, and 7.92. In general, phenolic extracts in the Myrtaceae family are candidates for protection against the adverse effects of UV radiation on the skin.⁴



Figure 3. *Hippobroma Longiflora (L) G. Don*

One of the natural ingredients that can be used as a natural sunscreen is kitolod leaf (*Hippobroma Longiflora (L) G. Don*). The phytochemical test of kitolod plants showed the presence of flavonoids. Flavonoids are compounds that have conjugated double bonds that allow these compounds to absorb UV radiation through electron delocalization. Kitolod leaves were extracted using methanol and then fractionated using n-hexane and ethyl acetate as solvent. The ethyl

acetate extract was then tested for its sunscreen activity. A concentration of 100 ppm has an SPF value of 4.3 and is included in the category of moderate protection. The concentration of 200 ppm has an SPF value of 10.3, which is included in the category of maximum protection. Concentrations of 300 ppm, 400 ppm, and 500 ppm have SPF values of 15.2, respectively; 21; and 28 are included in the ultra protection category.⁵



Figure 4. *Kaempferia galanga L*

The plant *Kaempferia galanga* contains chemical constituents, including 2.4–3.9% essential oil consisting of ethyl para methoxy cinnamate (30%), camphor, borneol, cineol, and pentade. The presence

of ethyl para methoxy cinnamate in kencur, which is a cinnamate derivative compound, functions as an anti-ultraviolet B chemical blocker which is useful as a sunscreen.⁶



Figure 5. *Eucheuma cottonii*. Doty

Seaweed *Eucheuma cottonii*. Doty is a marine plant whose main content is kappa carrageenan which has the potential for sun protection and nutrition. Carrageenan in *Eucheuma cottonii*. Doty has the

potential to protect UV-B in cosmetics. Carrageenan can be formulated in sunscreen products, anti-aging creams, and facial creams.⁷



Figure 6. *Zea mays* L

All parts of the corn can be utilized, including the hair. Corn silk (*Zea mays* L.) is an extension of the stigma of the female flower of the corn plant. Corn silk has the potential to be used for sunscreen because it is rich in bioactive compounds such as phenolic compounds, especially flavonoids. These compounds have conjugated bonds that can resonate when exposed to ultraviolet (UV) light so that they are photoprotective. Solvent variations greatly affect the content of bioactive compounds in corn silk extract. Corn silk has the potential to be used as a natural

sunscreen.⁸⁻¹¹

2. Conclusion

Several plants, including *Brucea javanica* (L.), Family Myrtaceae, *Hippobroma Longiflora* (L), *G. Don*, *Kaempferia galanga* L, and *Eucheuma cottonii*. Doty and *Zea mays* L. have the potential to be developed as a sunscreen.

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