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Increasing the Usability of Ageratum Conyzoides Linn And Ocium Sanctum L To Become Eco-Friendly Sunblock As Skin Protection From Ultraviolet Rays A And B

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Abstract
Indonesia is a tropical country with an ultraviolet index above 11, coupled with global warming causing the level of ultraviolet radiation to increase. This has great potential to cause damage to the skin. Therefore, sunblock protects the skin from the dangers of exposure to UV rays. cosmetic products sunblock is accompanied by the circulation of various sunblock made from synthetic chemicals which of course can endanger health. Based on these problems, the authors created an innovative sunblock from bandotan root extract and basil leaves. This type of research is descriptive analysis with literature review. Based on the studies that have been carried out, it is known that bandotan root extract (Ageratum Conyzoides Linn) has the potential as a sunblock because it contains tannins and flavonoid compounds that can absorb UV A rays at a concentration of 150 ppm. While the basil leaf extract (Ocimum sanctum L) can absorb UV B rays because there are flavonoid and phenol compounds SPF 8.58 is obtained at a concentration of 0.03%. Bandotan root and basil leaf extracts were obtained through maceration and evaporation techniques, while rose water as a solvent was obtained by distillation techniques. The results obtained, namely: (1) increasing the usability of bandotan roots and basil leaves; (2) reducing pathological risk from harmful UV rays; (3) alternative for making sunblock made from natural and halal ingredients. Thus, sunblock is eco-friendly.

Keywords: eco-friendly; halal; cosmetics; ultraviolet light; sunblock;

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Introduction

Indonesia is a tropical country with abundant sun exposure throughout the year so Indonesia has an ultraviolet index above 11, which means it has an extremely dangerous risk (BMKG, 2021). Ultraviolet radiation can cause damage to the skin (Rahmawati, Muflihunna, and Amalia 2018). Not only that, but global warming can also increase exposure to ultraviolet rays that enter the earth (Mumtazah et al. 2020). Please note, that ozone can absorb all UV C rays because of its tendency to absorb UV light with short waves more easily. In contrast to UV C rays, UV B rays can only be partially absorbed and UV A rays are not absorbed by the ozone layer (Watson, Holman, and Maguire-Eisen 2016). The non-absorption of UVA by the ozone layer can have a negative impact because radiation enters the skin deeper, such as premature aging, lowering the immune system, pigmentation, melasma, skin cancer, and blindness (Mumtazah et al. 2020). UV radiation is very dangerous, so the skin needs to be protected. Skin protection from these hazards can be done in two ways, namely by physical and chemical protection (Watson, Holman, and Maguire-Eisen 2016).

Chemical protection is carried out by using protection products from direct sunlight, such as sunblock (Watson, Holman, and Maguire-Eisen 2016). Sunblock is known to completely protect the skin from UV rays, both UV A and UV B. In addition to these abilities, now cosmetic products including sunblock are becoming a popular trend among the public. This is shown in the increasing public enthusiasm for cosmetic products, as evidenced by BPS data that the growth of the chemical, pharmaceutical and traditional medicine, as well as cosmetics industries actually increased by 5.59% in the first quarter of 2020 and is expected to continue to rise to reach 7%. in 2021. However, this high enthusiasm was accompanied by the circulation of sunblock made from synthetic chemicals among the public. The use of sunblock has the potential to endanger skin health (Wijaya 2019), such as irritation with burning and stinging, even long-term use can cause allergic reactions in certain people (Purwaningsih, Salamah, and Adnin 2015). Therefore, sunblock made from natural ingredients has high effectiveness, and is environmentally friendly is the right choice.

Ageratum conyzoides Linn is a plant that is included in the type of weed for other plants and has a high population level with a fast growth process. This plant has compounds that can be used as sunblock. This has been proven by the results of research on *bandotan* root extract which has the same characteristics as sunblock (Athiyah, Ahmad, and Rijai 2015). On the other hand, Indonesia also has a plant that is still widespread and its uses are not explored, namely Ocimum sanctum L often called basil. This leaf extract has the potential to be used as an ingredient in sunblock because of its content.

By utilizing *bandotan* roots and basil leaves as a sunblock made from natural ingredients, it can prevent the adverse effects of exposure to the sun's high intensity and can reduce skin health problems due to the use of sunblocks of synthetic chemicals addition, this breakthrough can also help people take advantage of weeds that are considered harmful by farmers and utilize basil which is still widespread in Indonesia

into a useful product, and even has the potential to improve the community's economy.

The purpose of writing this article is to find out the potential of the content of bandotan root (Ageratum Conyzoides Linn) and basil leaf (Ocimum sanctum L) which can be used as a sunblock so as to protect the skin from ultraviolet rays and how to make sunblock made from bandotan root extract and basil leaves.

As a medium for developing knowledge in optimizing natural resources that are considered detrimental, underutilized, and their uses have not been explored, namely bandotan and basil so that innovation with maximum results is obtained. In addition, it is a form of student service in empowering biodiversity as a manifestation of the Tri Dharma of Higher Education.

As for the community, the benefits of this paper are to provide information and broaden public knowledge regarding the use of biodiversity in the form of weeds that are considered harmful and whose uses have not been explored, namely the use of bandotan roots (Ageratum Conyzoides Linn) and basil leaves (Ocimum sanctum L) as sunblock. In addition, this breakthrough also has the potential to improve the community's economy.

In addition, this paper is also one of the innovative solutions for the government in utilizing bandotan weed which is considered very harmful, and basil which has not been explored for its usefulness as a sunblock.

Method

Type of Research

The type of research used is descriptive analysis, in which the data obtained are descriptive and qualitative data described through the results of a literature study to solve problems.

Data collection techniques

Data collection techniques in this paper use the literature review from research journals that have carried out laboratory tests so that authentic and objective data are obtained. The author analyzes the data obtained to then be processed and concluded as solving related problems.

Data analysis

Data analysis was carried out descriptively-qualitatively through a literature review conducted on 19 May-7 June 2021 at the residence of each member due to the limited space and time due to the Covid-19 pandemic, causing the authors to be unable to gather and conduct experiments.

Result and Discussion

Potential of *Bandotan* Root (Ageratum Conyzoides Linn) and Basil Leaf (Ocimum sanctum L) as Sunblock

Root is a plant that has sunscreen properties (Athiyah, Ahmad, and Rijai 2015). Bandotan roots contain compounds that play an important role in the reaction of sunblock, namely alkaloids, saponins, flavonoids, glycosides, and tannins (Agbafor, Engwa, and Obiudu 2015). While compounds that can absorb UV light are tannins and flavonoids (Purwaningsih, Salamah, and Adnin 2015). These compounds when extracted can protect the skin from UV A and UV B rays. The sunscreen activity of bandotan root extract was tested to obtain the data shown in the following table:

Table 1 Results of Bandotan Root Sunscreen Activity in Percentage of Erythema and Pigmentation Transmission

Konsentrasi (ppm)	%Te	Kategori	%Tp	Kategori
Ekstrak Metanol				
150	23,71	-	17,23	*Sunblock*
200	15,26	*Fast tanning*	9,47	*Sunblock*
250	10,90	*Fast tanning-Suntan standard*	5,83	*Sunblock*
300	7,40	*Suntan standard*	3,20	*Sunblock*
350	5,14	Proteksi ekstra	1,72	-
400	3,74	Proteksi ekstra	0,98	-
450	3,12	Proteksi ekstra	0,69	-
500	2,47	Proteksi ekstra	0,47	-
550	1,86	Proteksi ekstra	0,25	-
600	1,57	Proteksi ekstra	0,19	-
650	1,41	Proteksi ekstra	0,17	-
700	1,21	Proteksi ekstra	0,15	-
750	1,01	Proteksi ekstra	0,14	-
800	0,89	*Sunblock*	0,14	-
Fraksi Etil Asetat				
25	35,77	-	30,59	*Sunblock*
50	14,48	*Fast tanning*	9,54	*Sunblock*
75	6,53	*Suntan standard*	2,94	-
100	4,19	Proteksi ekstra	1,36	-
150	1,73	Proteksi ekstra	0,25	-
200	0,86	*Sunblock*	0,14	-

Source: (Athiyah, Ahmad, and Rijai 2015)

Based on these tests, it can be seen that the compounds in bandotan root extract can protect the skin from ultraviolet radiation by absorbing 95% of UV rays. UV rays that are absorbed will be converted to a very low heat level so it is not harmful to the skin. Through the data in the table above, it can also be seen that bandotan root extract acts as a sunblock at a concentration of 150-300 ppm to prevent pigmentation and 800 ppm to prevent erythema. This shows that bandotan root extract cannot be used to protect the skin from pigmentation and erythema at the same time because at a concentration of 150-300 ppm it does not prove sunblock for erythema, while sunblock for pigmentation is proven at that concentration (Athiyah, Ahmad, and Rijai 2015). Therefore, bandotan root extract in sunblock is used as skin protection from UV A rays because at low

concentrations it can provide a sunblock. The concentration of bandotan root extract in sunblock is 150 ppm. So that sunblock can completely protect the skin, both UV A and UV B rays, Ocimum sanctum L better known as basil are added.

In the world of health, basil can function as antibacterial, antipyretic, analgesic, antifungal, antiseptic, anti-expectorant, hepatoprotection, immunomodulator, and anti repellent. In protecting the skin from UV B rays, Sun Protecting Factor (SPF) is used as a basis for determining the effectiveness of sunscreen (sunblock) (Purwaningsih, Salamah, and Adnin 2015). The ability of sunscreen is divided into several categories, namely a minimum with an SPF of 2-4, moderate (4-6), extra (6-8), and maximum (8-15) (Damogalad et al., 2013). Basil leaf extract with a concentration of 0.01% has an SPF of 2.84, SPF 5.67 at a concentration of 0.02%, and SPF 8.58 at a concentration of 0.03% (Ismail 2013). The effective concentration of basil leaf extract used in the manufacture of sunblock is 0.03%, which is in the category of extra sunscreen ability. Therefore, basil leaf extract has the potential to be used as a sunblock to protect the skin from UV B rays..

Making Sunblock from *Bandotan* Root Extract and Basil Leaves

Bandotan root extract can be obtained by maceration process with methanol on bandotan root simplicia. This process is carried out for three days. The ability of the maceration process to effectively attract plant compounds or secondary metabolites is the background for the use of this process. The difference in pressure outside and inside the simplicia cells caused the breakdown of cell walls and membranes in the soaked plant samples so that the secondary metabolites contained in the simplicia also dissolved into the solvent (Kumalasari and Andiarna 2020). The solvent used is methanol (Athiyah, Ahmad, and Rijai 2015).

The next stage is the evaporation of the sample using a rotary evaporator. After evaporation, a high concentration of bandotan root extract was obtained. The viscosity level of the evaporated bandotan root is even higher than before the process.

The compound content of basil leaves can be obtained by making the extract. To be able to obtain the desired secondary metabolites through the extraction method, the solvent used must be appropriate. The effectiveness in obtaining a more optimal active ingredient causes the use of ethanol as a solvent. With the use of ethanol, contamination of the extraction fluid caused by foreign materials can be minimized. Ethanol is an antimicrobial compound so it can attract compounds maximally compared to water or a mixture of water and ethanol (Kumalasari and Andiarna 2020).

The content of compounds in basil leaves is not much different from the content found in bandotan roots, namely flavonoids, phenols, saponins, and essential oils (Kumalasari and Andiarna 2020). This plant with the Latin name Ocimum sanctum L can absorb UV B rays when extracted with 96% ethanol solvent (Ismail et al. 2014). The extraction process is the same as the bandotan root, namely through the process of maceration and evaporation (Kumalasari and Andiarna 2020).

Evaporation is an evaporation process carried out in order to obtain a solution with

a higher concentration. This process is based on the solubility of the material in a solvent. The solubility of the material will decrease when the temperature is low and increase when the temperature increases (Sumada, Dewati, and Suprihatin 2016). The evaporated solution is even more concentrated, so a solvent is needed in making sunblock. Therefore, rose water is used as the solvent. This rose water is obtained by the distillation technique. This technique is more time-consuming. However, the distillation technique can produce better rose water and more natural benefits can be obtained compared to the boiling technique.

Sunblock is in the form of a liquid, making it easier for consumers to use it because they don't need to apply it, but just spray it onto the skin. This form can also accelerate the absorption of sunblock into the skin. Bandotan root extract, basil leaf extract, and rose water are very good combinations when used as sunblock. Bandotan root extract which can protect the skin from UV A rays and basil leaf extract protect the skin from UV B rays complimented by rose water, which can treat acne, cleanse, and moisturize the skin, making sunblock to be called a superior product.

Conclusion

Bandotan root extract contains tannin and flavonoid compounds which in a concentration of 150-300 ppm can protect the skin from UV A rays, while basil leaf extract contains phenols and flavonoids that can protect the skin from UV B rays. conyzoides Linn and basil leaf extract (Ocimum sanctum L) have the potential to be used as cosmetic products in the form of sunblock so that they can be a solution to problems regarding the high risk of skin disorders due to the large UV index in Indonesia and the use sunblocks of synthetic chemical

Bandotan root and basil leaf extracts can be obtained through maceration and evaporation processes. Meanwhile, rose water, which acts as a solvent, is obtained through a distillation process. The concentration of bandotan root extract in sunblock is 150 ppm, while the concentration of basil leaf extract is 0.03% with an extra SPF of 8.58.

References

Agbafor, Kingsley N, G A Engwa, and I K Obiudu. 2015. "Analysis of Chemical Composition of Leaves and Roots of Ageratum Conyzoides." *International Journal of Current Research and Academic Review* 3(11): 60–65.

Aliyah, A. H. (2020). Uji Efektivitas Ekstrak Bandotan (*Ageratum conyzoides L.*) dan Patikan Kebo (*Euphorbia hirta L.*) terhadap Mortalitas Ulat Tritip (*Plutella xylostella L.*)(*Lepidoptera*; *Plutellidae*) serta Pengembangannya Sebagai Media Pembelajaran.

Athiyah, Meilisa, Islamudin Ahmad, and Laode Rijai. 2015. "Aktivitas Tabir Surya Ekstrak Akar Bandotan (Ageratum Conyzoides L.)." *Jurnal Sains Dan Kesehatan* 1(4): 181–87.

BMKG. (2021). Indeks Sinar Ultraviolet (UV) (Ultraviolet (UV) Light Index). https://www.bmkg.go.id/cuaca/indeks-uv.bmkg. Diakses pada Juli 2021.

Carey, F. A., 2006. Organic Chemistry, 6th ed., New York: McGraw Hill, 954.

Elsie, B.H., & Dhana Rajan, M.S. (2010). Evaluation of antimicrobial activity and phytochemical screening of gelidium acerosa. Journal of Pharmaceutical Sciences and Research, 2(11), 704–707.

Indonesia, M.U., 2013. Fatwa Majelis Ulama Indonesia No. 26 tentang standar kehalalan produk kosmetika dan penggunaannya. Jakarta: MUI.

Ismail, Isriany. 2013. "Potensi Bahan Alam Sebagai Bahan Aktif Kosmetik Tabir Surya." *Jurnal Farmasi UIN Alauddin Makassar* 1(1): 45–55.

Ismail, Isriany, Gemy Nastity Handayany, Dwi Wahyuni, and Juliandri Juliandri. 2014. "Formulasi Dan Penentuan Nilai SPF (Sun Protecting Factor) Sediaan Krim Tabir Surya Ekstrak Etanol Daun Kemangi (Ocimum Sanctum L.)." *Jurnal farmasi UIN Alauddin Makassar* 2(1): 6–11.

Jannah, M. 2019. Uji Aktivitas Antimalaria In Vitro dari Ekstrak Etanol Daun Tanaman Ashitaba (Angelica keiskei). Mataram: Universitas Muhammadiyah Mataram.

Kumalasari, Mei Lina Fitri, and Funsu Andiarna. 2020. "Uji Fitokimia Ekstrak Etanol Daun Kemangi (Ocimum Basilicum L)." *Indonesian Journal for Health Sciences* 4(1): 39–44.

Liputan 6. (2019). Ini 5 Bahan Kimia Berbahaya di Produk Sunscreen, Perlu Diperhatikan. https://hot.liputan6.com/read/4019745/ini-5-bahan-kimia-

berbahaya-di-produk-sunscreen-perlu-diperhatikan. Diakses pada Juli 2021.

Malangngi, L., Sangi, M., dan Paendong, J., 2012. Penentuan Kandungan Tanin dan Uji Aktivitas Antioksidan Ekstrak Biji Buah Alpukat (Persea americana Mill.). Jurnal Mipa, 1(1), pp.5-10.

Mega I. M. dan Swastini D. A. 2010. Skrining fitokimia dan aktivitas antiradikal bebas ekstrak metanol daun gaharu (Gyrinops versteegii). Jurnal Kimia 4(2): 187-192.

Mumtazah, Edlia Fadilah et al. 2020. "Pengetahuan Mengenai Sunscreen Dan Bahaya Paparan Sinar Matahari Serta Perilaku Mahasiswa Teknik Sipil Terhadap Penggunaan Sunscreen." *Jurnal Farmasi Komunitas* 7(2): 63–68.

Munhoz, V. M., Longhini, R., Souza, J. R., Zequi, J. A., Mello, E. V., Lopes, G. C., & Mello, J. C. (2014). Extraction of flavonoids from Tagetes patula: process optimization and screening for biological activity. Revista Brasileira de Farmacognosia, 24, 576-583.

Ola, A. O. (2018). Evaluation of antioxidant activity of stem and flower extracts of Ageratumconyzoides. 4(May), 891–897.

Osuntokun, O. T., Jemilaiye, T.A., & Akele, E. O. (2018). Antimicrobial Properties, Phytochemical Composition, and Phenotypic Resistance Pattern of Selected Enteropathogenic Microorganismon Ageratumconyzoides (Goat Weed) LeafExtract. 7(2).

Pharm, I. J., Res, P., & Leaf, L.(2012). Anti-inflammatory Activity, Total Flavonoids and Tannin Content from the Ethanolic. 1(5), 234–241

Purwaningsih, Sri, Ella Salamah, and M Nur Adnin. 2015. "Efek Fotoprotektif Krim Tabir Surya Dengan Penambahan Karaginan Dan Buah Bakau Hitam (Rhizopora Mucronata Lamk.)."

Qinghu, W., Jinmei, J., Nayintai, D., Narenchaoketu, H., Jingjing, H., Baiyinmuqier, B. (2016). Anti-Inflammatory Effects, Nuclear Magnetic Resonance Identification And High-Performance Liquid Chromatography Isolation Of The Total flavonoids From Artemisia Frigida, Journal Of Food And Drug Analysis, 24, 385-391.

Rahmawati, Rahmawati, A Muflihunna, and Meigita Amalia. 2018. "Analisis Aktivitas Perlindungan Sinar Uv Sari Buah Sirsak (Annona Muricata l.) Berdasarkan Nilai Sun Protection Factor (SPF) Secara Spektrofotometri UV-VIS." *Jurnal Fitofarmaka Indonesia* 5(2): 284–88.

Singh, J. & P.S. Basu. 2012. Non-nutritive bioactive compounds in pulses and their impact on human health: An overview. Food and Nutrition Sciences. 3: 16641672.

Solanki, J. D., Raiyani, K. D.,Modi, D. C.,Shahu, D.,Correspondence, F., & Solanki, J.D. (2010). ewsletter Solanki et al. Phyto-Pharmacologycal ProfileOf. 1004, 987–1004

Solomon T.E.W., 1980. Organic Chemistry, John Willey and Sons, 2th Ed New York.

Suarsana NI, Priosoeryanto BP, Bintang M, Wresdiyati T. 2008. Aktivitas Hipoglikemik dan Antioksidatif Ekstrak Metanol Tempe pada Tikus Diabetes. J Veteriner 9:122-127.

Sumada, Ketut, Retno Dewati, and Suprihatin Suprihatin. 2016. "Garam Industri Berbahan Baku Garam Krosok Dengan Metode Pencucian Dan Evaporasi." *Jurnal Teknik Kimia* 11(1): 30–36.

Watson, Meg, Dawn M Holman, and Maryellen Maguire-Eisen. 2016. "Ultraviolet Radiation Exposure and Its Impact on Skin Cancer Risk." In *Seminars in Oncology Nursing*, Elsevier, 241–54.

Wijaya, Dina Permata. 2019. "EDUKASI MELINDUNGI KULIT DARI SINAR UV DAN PEMANFAATAN TUMBUHAN PACHYRHIZUS EROSUS SEBAGAI TABIR SURYA DI DESA PULAU SEMAMBU INDRALAYA." *Jurnal Pengabdian Sriwijaya* 7(3): 840–43.

Winarsi, H. 2007. Antioksidan Alami dan Radikal Bebas. Yogyakarta: Kanisius. Wink, M. (2008). Ecological Roles of Alkaloids. Wink, M. (Eds.) Modern

Alkaloids, Structure, Isolation Synthesis and Biology,Wiley, Jerman: Wiley-VCH Verlag GmbH & Co. KgaA.

Yanuartono, Indarjulianto, S., Nururrozi, A., dan Purnamaningsih, H. (2017). Saponin: Impact on Livestock (A Review). Jurnal Peternakan Sriwijaya, 6(2): 79-90.