Proceeding International Conference on Religion, Science and Education (2023) **2**, 611-615

Determination of The SPF Value of Onion Extract (*Allium Cepa L*) and Kecomrang Leaves (*Etlingera Elatior*) A Systematic Review

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Abstract: Ultraviolet (UV) rays are sunlight that can be harmful to the skin. Sunscreen is generally used when handling. Sunscreen is a product that is intended to protect the skin from damage caused by UV rays of the sun, with formulations that are able to protect against UV-A and UV-B rays. Sunscreens have different SPF values. The SPF value is a measure of the amount of ultraviolet radiation used to burn the skin when exposed to sunlight protected by sunscreen. Therefore, the SPF value indicates the ability of a sunscreen to reduce the harmful effects caused by UV rays. Indonesia has around 30.000-50.000 plant species, but there are many medicinal plants such as kecombrang leaves and shallot skin. Only about 7.500 of the species available for it contain phenolic and flavonoid compounds that provide UV protection and have sunscreen potential. The SPF test uses maceration extracted samples. The solvents used were water and ethanol and tested with a UV-Vis spectrophotometer. The test results showed that 300 ppm kecombrang leaf water extract had the highest SPF value and an additional sun protection power of 7.30 ± 0.62. The n-hexane fraction of kecombrang leaves showed the best protection with an SPF of 17.57 ± 2.49 at a UV protection level of 300ppm. The ethyl acetate fraction had the highest SPF value, namely 2.65 ± 0.12 in the least protected class. From the results of the shallot skin extraction test, the SPF value of the differences in concentrations of 4ppm, 8ppm, 12ppm and 16ppm was 11.44 each. 20:12; 30.80 and 34.83. The optimum concentration of shallot skin is 16ppm with an SPF value of 34.83. As a result of data analysis, it was found that the ethanol extract of shallot skin had a higher sunscreen effect than the aqueous extract of kecombrang leaves.

Keywords: UV light; Sunscreen; *Allium Cepa L*; *Etlingera Elatior*; Sun Protection Factor (SPF).

Introduction

Ray sun could causing problem skin, especially in the area exposed tropics ray sun in period long time. Problem this caused by facts that ray sun own radiation. Radiation the sun is hitting surface earth is energy form wave electromagnetic (Rizkita et al, 2022). Radiation the sun is hitting surface earth related with response body human, that is Ultra Violet/ UV light (200-400 nm), light visible (400-760 nm) and infrared light (above 760 nm). Of all many spectrum the light arrives to surface earth, UV rays are part small from spectrum ray sun and light this is not enough of 1% of whole spectrum ray sun. However ray this is the most dangerous because raises skin reaction. Exposure excessive ultraviolet radiation could causing condition skin as hyperpigmentation, burning ray sun, aging early, skin dark skin scaly, and cancer skin. Exposure ray sun could prevented with use veil solar. Veil Sun is product used for protect health skin man from effect negative radiation the sun (Oktaviani, 2019).

In Indonesia it has about 30.000-50.000 species plant however, only about 7.500 that got used for plant medicine, one of which is onion skin red (*Allium cepa L*) containing Flavonoid compounds or scale leaf is part outermost from onion containing red backup food, which is waste and exist in sufficient amount (Mursiti et al, 2017). Apart from the backup nutrition, skin the stem also contains

ISSN 2829-3355 | EISSN 2828-8467

compound from class of flavonoids, alkaloids, glycosides, phenols, steroids and tannins as substance deterrent cancer skin (Amir et al, 2022). Flavonoids have characteristic antioxidants because ability for Act as scavenger radical free and nature complex metal (Rizkita et al, 2020). Types of flavonoids in skin onion red is quercetin. This Quercetin Act as inhibitor tyrosinase or substance bleach skin (Agusta, 2015).

Apart from skin onion red, kecombrang leaves is also one that has known by the people of Indonesia as plant ornamental, vegetable and medicinal traditional. Kecombrang leaves are also rich in class phenols, polyphenols, and flavonoids such as skin onion red (Maulana et al, 2022). Flavonoids are compound producing bioactive activity antioxidants as well as own characteristic photoprotective so that capable absorb ultraviolet rays (Rizkita et al, 2021). Types of flavonoids in kecombrang leaf kaempferol and quercetin. Extract ethanol kecombrang leaf own effect antioxidants and flavanoids 3. Flavanoids, tannins, anthraquinones, wood sweet and others said own ability for protect from UV light 1. Compound phenolics, mainly class flavanoids and tannins, have potency veil Sun because existence. Chromophore group (conjugated singlet bond). Absorb UV rays, fine UVA and UVB rays, and reduce intensity on the skin (Rahayu et al, 2017). As for goals from the second review journal this that is utilization ingredients natural for made as ingredients making more sunscreen effective, with do ratio spf test results on both journal.

Materials and Methods

Method

On journal review this explain quote methods for test content spf on extract ingredients nature. The journal under review is entitled Determination of SPF (Sun Protection Factor) Value of Kecombrang Leaf Extract and Fraction (*Etlingera Elatior*) In Vitro Using Spectrophotometric Methods and Determination of Sun Protection Factor (SPF) Value of Shallot Skin Extract. Process for skin onion red that is with washed until clean for remove ingredients impurities on the skin onion red, then dried. After the drying process finished Step next is milling to use for get powder skin onion red

Extraction of Shallot Skin and Kecombrang Leaves

On the skin onion red use method maceration with ingredients solvent his that is ethanol. Powder onion red weighed as much as 100 grams, then entered to in container. added 1 liter solvent 50% ethanol up to powder submerged. Next skin onion red extracted use method maceration for 1 day at room temperature space (Wibowo et al, 2018). After soaking finished conducted filtering, liquid obtained stored in another container. After results filtering there is dregs. Then dregs from results maceration first added 1 liter solvent 50% ethanol and done maceration second for 1 day. After results maceration second got, then mixed with results maceration first. Forget extract thick skin onion red conducted warming up especially first. Extract condensed that has got, then weighed each as much as 0.01 gr; 0.02 gr; 0.03 gr; and 0.04 gr. Next step his that is do dilution with addition solution aquades as much as 250 ml. Then step next be measured its absorbance use tool UV - Vis spectrophotometry at length waves 290-320 nm for obtain SPF value (Wiraningtyas et al, 2019).

On kecombrang leaves conducted with method maceration use water solvent. As much as 200 gr of powder kecombrang leaf plus 2000 L of water with ratio of 1:10, and macerated for 2 days. Then as much as 100 grams of powder kecombrang leaf macerated for 2 x 24 (48) hours using 600 ml of n - Hexane solvent. Next conducted remaceration with solvent ethyl gosh 600 ml for 2 x 24 (48) hours. Then each filtrate thickened use rpt Ary evaporator (Pramiastuti, 2019).

Determination test SPF value using UV-Vis Spectrophotometer

Spectrophotometer test kecombrang leaf determine SPF values and n - hexane fractions and fractions ethyl acetate kecombrang leaf dissolved in water with ratio concentrations of 100 ppm, 200 ppm and 300 ppm. Meanwhile on the skin onion red in determine SPF value reconstituted in 50% ethanol with ratio concentrations of 4 ppm, 8 ppm, 12 ppm and 16 ppm. In step next that is

measurement the SPF value, where in step this both of them same that is sample be measured absorption with UV-Vis spectrophotometer every 5 nm over the range long wave from 290 nm up long 320 nm wave and followed with application Mansur's equation (Primary & Zulkarnain, 2015). With Formula:

$$SPF = CF \times \sum EE\ (\pi) \times abs\ (\pi)$$

Description:
CF = Correlation Factor (10)
EE = Efficiency Erythema
I = Simulation spectrum ray Sun
Abs = Readable Absorption Value

Results and Discussion

Determination of *Sun Protection Factor (SPF)* Value

The SPF value is measured as ability or effectiveness something ingredients as veil solar. The more tall the SPF value, the more good protection veil Sun to UV light. The SPF value is ratio size how many lots of UV needed for burn table 613skin protected with no protected by a veil solar. So, the SPF value shows ability product veil Sun for reduce resulting erythema because radiation UV rays (Suryanto et al, 2013).

On the skin onion red Sun Protection Factor (SPF) values were obtained from results measurement absorbance in table 1 wave between 290 – 320 nm using UV-Vis spectrophotometer (Wukana, 2013). Absorbance results could seen in table 1. Meanwhile, for determine SPF value is used formula following, so generated SPF value of extract skin onion red as seen in the following table (Wiraningtyas et al, 2019).

Table 1. Absorbance Results From Onion Skin Extract

Long Wave (nm)	Absorbance			
	4 ppm	8 ppm	12 ppm	16 ppm
290 nm	0.85	1,483	2.34	2,263
295 nm	0.829	1.44	2.27	2,457
300 nm	0.765	1.33	2095	2,347
305 nm	0.69	1,206	1904	2,111
310 nm	0.627	1.105	1,748	1.91
315 nm	0.585	1038	1,644	1,768
320 nm	0.558	0997	1,581	1675

Determination Optimum Concentration of Shallot Skin Extract

On determination the most optimal concentration for determine the SPF value of the extract skin onion red conducted with varying the 4 concentrations namely 4 ppm; 8 ppm; 12 ppm; and 16 ppm. The resulting concentration from study this could seen on Table 2 and Figure 3 below (Wiraningtyas, 2019).

Table 2. SPF Value Of Shallot Skin Extract

Extract (ppm)	SPF value	Category
4 ppm	11.44	Maximum
8 ppm	20.12	Ultra
12 ppm	31.8	Ultra
16 ppm	34.83	Super

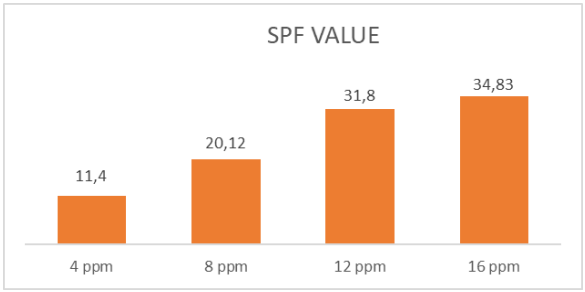

Figure 3. Optimum Concentration of Shallot Skin Extract

Meanwhile, in determining the SPF value of kecombrang leaves each have score sample water extract, n - hexane fraction and fraction ethyl acetate. Kecombrang Leaves dissolved in water and made in concentrations of 100 ppm, 200 ppm and 300 ppm. The UV-vis spectrophotometer is calibrated especially formerly with using 1 ml of water. Measurement SPF value, sample be measured absorption with UV–vis spectrophotometer every 5 nm over the range long wave from 290 nm up long wave of 320 nm and done three times determined each point, followed with application Mansur equation (Mansur et al, 1986).

Table 4. Normalized Product Function in Calculations SPF

No	Wavelength (λ nm)	EE X 1
1	290	0.015
2	295	0.0817
3	300	0.2874
4	305	0.3278
5	310	0.1864
6	315	0.0839
7	320	0.018
Total		1

Procedure Calculation:
1. Multiply score the absorbance obtained with value of EE X 1 for every long wave from Table 1.
2. Absorbance Multiply and EE X 1 results are added.
3. Then total results multiplied with factor correct with 10 points for get SPF value of 8 (Wibowo et al, 2017).
Data obtained (value) SPF of each extract of water, n-hexane fraction, and ethyl acetate analyzed with the SPSS program. Homogeneity test conducted with using Levene's test, the data normality test was performed with the Komolgrov-Smirnov test, and the data was analyzed using One Way ANOVA to compare SPF value (Pramiastuti, 2019).

Table 5. SPF value Water Extract, N -Hexane Fraction, Ethyl Acetate Fraction of Kecombrang Leaves

Description	SPF			Category
	100 ppm	200 ppm	300 ppm	
water extract	2,503	±4.128	±7,305	± extra
	1,462	0.314	0.626	
n -hexane fraction	5,665	±11,700	±17,579	± extra - ultra
	0.208	1,678	2,495	
fraction ethyl acetate	1,436	±2.655	±1,736	± minimum
	0.045	0.121	0.029	

Discussion

Determination extract SPF value kecombrang leaf and fraction done 290 nm – 320 nm. Wavelength represent long wave UVB rays (290-230 nm) and are in the area erythematous causes skin burning. UV-B rays are group ray more dangerous fast and more easy than 1.9 UV-A rays (Ismail et al, 2014). Water is used as solvent and blank because relatively no hindered from absorption to in compound dissolved. Absorbance leaf water extract kecombrang measured, absorbance highest in length 290 nm wave, value absorbance decreased and lowest on length 320 nm wave. In addition, the absorbance of the n-hexane and ethyl fractions acetate Kecombrang leaf highest in length wave between 290 nm and lowest at 320 nm. Measurement results in research this obtained highest SPF value that is for n-hexane fraction, for water extract, and for fraction ethyl acetate. The more tall concentration extract so the more tall SPF.

Based on the data in table 2, the SPF value is required for each concentrations of 4 ppm, 8 ppm, 12 ppm and 16 ppm. The highest SPF value is found in the extract Onion skin ethanol with a concentration of 16 ppm is 34.83 where is the SPF value This can be used as a sunscreen ingredient that is able to provide protection from UV A and UV B rays due to the highest SPF value range with potency capability ultra. Whereas SPF value of ethanol extract of shallot skin with a concentration of 12 ppm 31.80 is classified as a sunscreen with maximum protection ability, concentration of 8 ppm has an SPF value of 20.12 classified as ultra protection ability, and Shallot Skin Extract a concentration of 4 ppm has an SPF value of 11.44 belonging to the category of sunscreen with maximum protection ability. A sunscreen is said to provide protection if it has an SPF value at least 2 and a good category if the test sample has an SPF value above 15 which It belongs to the category of ultra protection sunscreen. This is because the SPF value is above 15 will be able to provide better protection from the risk of long-term skin damage, like skin cancer. Plus, SPF 15 and above can protect your skin more than sun exposure. For example, SPF 30 can protect the skin from sun exposure for approximately 4-5 hours, while SPF 10 only protects the skin for 1.5 hours (Damogalad et al, 2013).

The results showed that the higher the concentration, the higher the SPF value. Determination of the Optimal Concentration of Merlion Fruit Peel Extract.

Conclusions

Determination of the SPF value of shallot skin extract and kecombrang leaves has activity as a sunscreen. The results of the SPF value of shallot skin extract at a concentration of 4 ppm with an SPF value of 11.44, a concentration of 8 ppm with an SPF value of 20.12, a concentration of 12 ppm with an SPF value of 31.80, and a concentration of 16 ppm with an SPF value of 34.83. The optimum concentration is at a concentration of 16 ppm with an SPF value of 34.83 which is classified as ultra protection while the smallest concentration is at a concentration of 4 ppm which is classified as maximum protection. While the results of the SPF value of kecombrang leaf extract had the highest

SPF value found in the n-hexane fraction of 17.579 ± 2.495 followed by the water extract of 7.305 ± 0.626 and the ethyl acetate fraction of 1.736 ± 0.029 at a concentration of 300 ppm.

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