

CHAPTER I

INTRODUCTION

1.1 Research Background

Indonesia is located on the equator which has a tropical climate and high intensity of sunlight humidity. Global warming worsens the climate changer. Ultraviolet (UV) rays are beneficial for humans to synthesize vitamin D and also kill bacteria. But besides these benefits, UV radiation for too long can cause skin damage.

One of the skin damage caused by UV radiation is sunburn. Sunburn is characterized by symptoms of redness (erythema) accompanied by itching, pain, and a feeling of warmth in the skin. Sunburn is more common in men, teenagers, outdoor workers, and people with light skin tones. Sunburn can be treated by applying topical skin care containing flavonoids when have antioxidants activity. Antioxidant work by pushing one electron towards the oxide compound, then inhibiting the oxidation reaction by binding to free radicals so that it can prevent cell damage. Flavonoids are widely found in plants, including vegetables and fruits.

Pineapple is one of the fruits that contain activity flavonoids, and these flavonoids have antioxidants. Pineapple has parts that are waste such as stems, bark, leaves, and humps. The part is simply thrown away and becomes waste that is left to rot so that it emits an unpleasant and less useful aroma.¹ Indeed, Allah SWT created everything in this universe with a variety of forms of creation and their respective levels, which can be used for human welfare. This is explained in the Qur'an, Allah says:

وَمَا ذَرَأَا لَكُمْ فِي الْأَرْضِ مُخْتَلِفًا أَلْوَانُهُ إِنَّ فِي ذَلِكَ لَآيَةً لِّقَوْمٍ يَتَذَكَّرُونَ ﴿١٣﴾ (النحل/16:13)

Meaning: (He also controls) what He has created for you on this earth with its various types and colors. Indeed, in such a thing there is a sign (the greatness of Allah) for those who take lessons (An-Nahl:13)

¹ Septiana Indratmoko, . Suratmi, And Elisa Issusilaningtyas, “Formulasi, Karakterisasi Dan Evaluasi Self-Nano Emulsifying Drug Delivery System (Snedds) Ekstrak Etanol Kulit Buah Nanas Sebagai Antibakteri Streptococcus Mutans,” *Fitofarmaka: Jurnal Ilmiah Farmasi* 11, No. 1 (June 30, 2021): 12–22, <https://doi.org/10.33751/Jf.V11i1.2560>.

Surah An-Nahl verse 13 explains that Allah created animals, plants, and others that are different from their respective circumstances, characters, and functions. Allah also subdued this universe and provided its benefits to humans, that no matter how small God created it provides benefits for human welfare.² As with pineapple waste. The pineapple peel that is usually thrown away and becomes useless waste contains flavonoids that have the potential to be powerful antioxidants to treat sunburn.³

In the research of Syarif Nadia (2023), pineapple peel extract with concentrations of 10, 20, 30, 40, and 50% is categorized as having good antioxidant activity. The higher the concentration of the sample, the higher the antioxidant activity.⁴ Antioxidants are compounds that can inhibit or prevent cell damage caused by free radicals. Antioxidants play a role in providing hydrogen which acts as free radical acceptors and can delay the initiation of free radical formation, so it cannot induce a disease.⁵

Flavonoid has Sun Protection Factor (SPF) so that they can protect the skin from exposure to UV rays. The concentration of active ingredients in the serum can be increased so that it is absorbed faster by the skin. Serum preparations also have a low viscosity so that they spread on the skin more easily and provide a more comfortable feeling when used. Therefore, the form of serum preparations is chosen because it provides many benefits and is easy to use.⁶

The impact of UV rays on the skin makes collagen production decrease, skin rough, dull and also sunburn which is very harmful to the skin. Therefore, to prevent this impact, you can use a cosmetic preparation of pineapple peel extract which is formulated in the form of a serum preparation. This study aims to evaluate the quality characteristics of the SPF of pineapple

² Nahdlatul Ulama, "An-Nahl · Ayat 13," nuonline, 2024, <https://quran.nu.or.id/an-nahl> > 13.

³ Indratmoko dan Issuilaningtyas, *Loc.Cit.*

⁴ Syarifah Nadia dkk., "Uji aktivitas antioksidan ekstrak etanol dan sari kulit nanas (*Ananas comosus* (L) Merr) menggunakan metode radical scavenger," 2023, 422–31.

⁵ Anggun Raga Bijaksana, Yani Lukmayani, And Reza Abdul Kodir, "Studi Literatur Potensi Aktivitas Antioksidan Dari Kulit Buah Nanas (*Ananas Comosus* (L.) Merr.)" 6, No. 2 (2020).

⁶ Nilsya Febrika Zebua *et al.*, "Uji Aktivitas Antioksidan Dan Penentuan Nilai Spf Ekstrak Etanol Daun Salam (*Syzygium Polyanthum* (Wight.) Walp) Pada Sediaan Serum Wajah," *Forte Journal* 3, No. 1 (February 17, 2023): 87–96, <https://doi.org/10.51771/Fj.V3i1.500>.

peel extract serum and test the SPF value of pineapple peel extract serum preparations.

1.2 Research Problem Formulation

Research problem of this study are:

1. What are the characteristics of serum pineapple peel extract (*Ananas comosus* (L.) Merr.)?
2. What is the SPF value of serum pineapple peel extract (*Ananas comosus* (L.) Merr.)?

1.3 Research Objectives

The objectives of this research are:

1. To knowing the characteristics of SPF serum preparation of pineapple fruit peel extract (*Ananas comosus* (L.) Merr.).
2. Knowing the SPF value of SPF serum preparation formula of pineapple fruit peel extract (*Ananas comosus* (L.) Merr.).

1.4 Research Benefits

1. Theoretical Benefits

The results of this study can be used as reference material for further research on the development of pharmaceutical products in serum preparations which has Sun Protection Factor (SPF).

2. Practical Benefits

The results of this study are expected to provide innovation in the utilization of pineapple fruit peel waste which is usually useless and only thrown away to produce serum preparations as Sun Protection Factor (SPF) in preventing sunburn and other negative effects of UV exposure.

1.5 Authenticity of Research

Tabel 1. The Authenticity of Research

Research Title	Research Methods	Variable	Result	Research Differences
Formulation and Test of Antioxidant Activity and SPF (Sun	Laboratory experimental	Dependents: Quality evaluation of Serum Preparation of	Serum preparations with a concentration of plantain peel ethanol extract (<i>Musa paradisiaca</i> L) as much as 10% produce serum	Dependents : Quality Evaluation of Serum SPF

Research Title	Research Methods	Variable	Result	Research Differences
Protection Factor) Serum of Ethanol Extract of Plantain Peel (Musa paradisiaca L). ⁷		Ethanol Extract of Plantain Peel (Musa paradisiaca L). Independent: Variation of Plantain Peel Ethanol Extract (Musa paradisiaca L)	preparations that are better than concentrations of 15% and 5% obtained SPF values of 5.1553 including 5 classified as moderate protection.	Preparation of Pineapple Fruit Peel Extract (Ananas comosus (L.) Merr.) Independent: Variation of Pineapple Fruit Peel Extract (Ananas comosus (L.) Merr.)
Antioxidant Activity Test and Determination of SPF Value of Ethanol Extract of Salam Leaf (Syzygium polyanthum (Ight.) Walp) in Facial Serum Preparation. ⁸	Laboratory experimental	Dependents: Serum quality evaluation of ethanol extract of bay leaves (Syzygium polyanthum (Ight.) Walp). Independent: Variation of concentration of Ethanol Extract of Salam Leaf (Syzygium polyanthum (Ight.) Walp)	All serum preparation formulations of Salam Leaf Ethanol Extract (Syzygium polyanthum (Ight.) Walp) do not cause irritation to the skin and are stable in storage and formulation 1 (5%) of 32.32 has the highest SPF value classified in the ultra category.	Dependents : Quality Evaluation of Serum SPF Preparation of Pineapple Fruit Peel Extract (Ananas comosus (L.) Merr.) Independent : Variation of Pineapple Fruit Peel Extract

⁷ Jumarti Suhaela dkk., "Formulasi dan Uji Aktivitas Antioksidan dan SPF (Sun Protection Factor) Serum Ekstrak Etanol Kulit Pisang Raja (Musa paradisiaca L): Antioxidant and Activity Test Formulation and SPF (Sun Protection Factor) Serum Ethanol Extract from Banana Peel (Musa paradisiaca L)," *Jurnal Sains dan Kesehatan* 5, no. 6 (31 Desember 2023): 915–24, <https://doi.org/10.25026/jsk.v5i6.2118>.

⁸ Nilsya Febrika Zebua et al, *Loc. Cit*

Research Title	Research Methods	Variable	Result	Research Differences
Antioxidant Activity Test of Ethanol Extract and Pineapple Peel Juice (Ananas comosus (L) Merr) using radical scavenger method ⁹	Laboratory experimental	<p>Dependents: Identification of chemical compounds with antioxidant activity</p> <p>Independent: Ethanol Extract and Pineapple (Ananas comosus (L) Merr) Peel Juice.</p>	Ethanol extract and pineapple peel juice (Ananas comosus (L) Merr) contain chemical compounds of alkaloids, flavonoids, tannins, saponins, steroids, and glucose. These compounds have antioxidant activity tested by the radical scavenger method. The result of Ethanol Extract of pineapple fruit peel is categorized as strong and Pineapple Peel Juice is categorized as medium.	<p>(Ananas comosus (L.) Merr.)</p> <p>Dependents : Quality Evaluation of Serum SPF Preparation of Pineapple Fruit Peel Extract (Ananas comosus (L.) Merr.)</p> <p>Independent: Variation of Pineapple Fruit Peel Extract (Ananas comosus (L.) Merr.)</p>

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⁹ Nadia dkk., Loc Cit.