



**TRANSPARENT SOAP FORMULATION FROM RED FRUIT (*PANDANUS
CONOIDEUS* LAM) OIL FERMENTATION**

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ABSTRACT

Red Fruit as an endemic plant in the Papua region contains natural antioxidant components such as α -carotene, β -carotene, β -criptoxanthin, α -tocopherol. Therefore, red fruit has the potential to be developed as a raw material for medicine. This study aims to develop the use of red fruit oil by processing it into pharmaceutical preparations namely transparent soap. Red fruit sampling was carried out in Jayapura, Papua. Red fruit oil is obtained by cooking red fruit juice for 5-6 hours. The fermentation process is carried out with three time variations (1 day, 2 days and 3 days). Red fruit oil was tested for antioxidant activity using a free radical reduction method, namely DPPH (2,2-diphenyl-1-picrylhydrazyl) using the Uv-vis spectrophotometry instrument at a wavelength of 517 nm. Formulation of transparent soap preparations by adding red fruit oil and glycerin concentration variations to get the best transparent soap preparations. The methods for evaluating transparent soap preparations include tests of water content, amount of fatty acids, amount of free alkali, non-soapy fraction, pH test, foam stability test, storage stability test and hedonic test. The test results show that the antioxidant activity of red fruit oil is potentially medium with an IC50 value of 128.993 and an increase in glycerin concentration in the preparation has a significant effect on the user's liking level on the transparency of the preparation. The results of the evaluation of transparent soap preparations show that the best formula is formula three (F3)

Keywords: Antioxidants, Red Fruit Oil (*Pandanus conoideus* Lam.), Transparent Soap

INTRODUCTION

Papua as one of the easternmost provinces in Indonesia has abundant biodiversity, both flora and fauna. One of the endemic biological sources is red fruit (*Pandanus conoideus* Lam). Overall red fruit potential in Papua and West Irian Jaya provinces with a harvest area of 354 ha and productivity of 5.58 tons / ha [1]. Indigenous Papuans make use of oil contained in red fruit as a staple of staple foods, namely sago and sweet potatoes [2].

The oil produced from red fruit is used as a food flavoring with high nutritional value because it contains beta-carotene, and is also used as a natural coloring agent that does not contain heavy metals and harmful microorganisms [3]. Red fruit and red fruit oil contain natural antioxidant components such as α -carotene, β -carotene, β -criptoxanthin, α -tocopherol and unsaturated fatty acids, especially oleic, linoleic and palmitic [4] and minerals such as Fe, Ca and P [5].

Red fruit has potential as a new source of vegetable oil because it has a high enough oil content. The results of research conducted by [2] found that red fruit contains 35.93 percent of dry weight oil. Processing red fruit to get oil, generally done traditionally through a heating process. This research conducted a

fermentation technique to get the highest yield with the best oil quality. The development of science and technology is currently expanding the use of the efficacy of red fruit oil, red fruit oil can be used as raw material in the cosmetics and health industries, one of which is packaged in the form of bath soap preparations.

Soap is a cleanser made by a chemical reaction between sodium or potassium bases and fatty acids from vegetable oils or animal fats in accordance with SNI06-3532, 1994 [6]. Transparent soap or also called glycerin soap is a type of bath soap that can produce softer foam on the skin and looks transparent when compared with other types of soap. Transparent soap can be produced in a number of different ways. One of the oldest methods is by dissolving soap in alcohol with low heating to form a clear solution, which is then given a coloring and fragrance. The color of the final bar soap depends on the choice of good quality starting ingredients, the poor quality of the ingredients allows the soap to be very yellow [7]. The attractive, classy and luxurious appearance of transparent soap makes transparent soap sold at relatively more expensive prices. In addition, transparent soap can also be used as souvenirs, souvenirs so as to give a unique

impression and exclusive appearance [8]. Based on this background, the authors conducted a study to ferment the red fruit (*Pandanus conoideus* Lam), where the oil obtained from the fermentation will be processed into pharmaceutical preparations in the form of transparent soap, so that the processing development process is expected to increase the selling value of the fruit red itself.

MATERIALS AND METHODS

Material Collection

Red fruit (*Pandanus conoideus* Lam) was obtained from the Jayapura region, Papua.

Fermented Red Fruit Oil

Steamed flesh using medium heat for about 1-2 hours. The red juice is filtered to separate the seeds and then the red fruit filter is cooked again over medium heat for 5-6 hours while stirring, when blackish red oil has appeared on the surface. Lift and move in a fermentation container. There were 3 variations of fermentation time, they were 1 day, 2 days and 3 days. After the

fermentation time ends, the oil is transferred to another container [9].

Red Fruit Oil Antioxidant Test with DPPH Method

Antioxidant activity testing was carried out with the initial stages of determining the maximum wavelength of DPPH, then made a calibration curve to determine the concentration of DPPH stock, testing the antioxidant activity of red fruit oil was carried out using a free radical reduction method that is DPPH (2,2-diphenyl-1-picrilhidrazil) spectrophotometrically. Two milliliters of the DPPH stock solution are added to the vial, plus two milliliters of red fruit oil, then shaken until evenly mixed and allowed to stand for 30 minutes. Uptake of the solution was read at a wavelength of 517 nm using a Uv-vis spectrophotometry. Also carried out the reading of the absorption of the control solution. The amount of antiradical activity or radical scavenging is calculated by the formula:

$$\% \text{ antioxidant activity} = \frac{(\text{Control absorbance} - \text{Sample absorbance})}{\text{Control absorbance}} \times 100\%$$

Source: (10-12)

Red Fruit Oil Transparent Soap Formulation

Table 1: Red Fruit Oil Transparent Soap Formulation

Ingredient	Ingredient Concentration(%)			
	F1	F2	F3	F4
Red fruit oil	1	1	1	1
VCO	20	20	20	20
Stearic acid	8	8	8	8
NaOH 30%	22	22	22	22
Citric Acid	0,5	0,5	0,5	0,5

Coca DEA	3	3	3	3
Glycerin	5	7	10	12
Sucrose	8	8	8	8
Ethanol 96%	15	15	15	15
fragrance	q.s	q.s	q.s	q.s
Aquadest ad	100	100	100	100

Source: (13) modification

Red Fruit Oil Transparent Soap Formulation Stages (6, 8)

1. Stages of saponification reaction

Reaction of stearic acid in the fatty acid phase with 30% NaOH at 60-70 °C. Stearic acid is melted by heating until it melts and oil (VCO) is added, after stearic acid and homogeneous oil are then added with 30% NaOH solution.

2. Stages of obtaining transparent structures

Addition of glycerin, sucrose, citric acid, Coca DEA, ethanol, red fruit oil, aquadest at 60-70 °C. To get the aroma of soap, then add fragrance.

3. Curing stages

Furthermore, soap is printed and undergoes a 24-hour curing process, which is by storing it at room temperature.

Evaluation of Red Fruit Oil Transparent Soap Preparations (6)

Evaluation consists of: water content (SNI, 06-3532-1994), Amount of fatty acids (SNI, 06-3532-1994), Amount of free alkali (SNI, 06-3532-1994), Non-soapy fraction (SNI, 06-3532-1994), acidity (pH) (SNI, 06-3532-

1994), foam stability (SNI, 06-3532-1994), stability test [14], and hedonic test.

RESULTS AND DISCUSSION

Fermented Red Fruit Oil

The weight of fermented red fruit oil are: 9.3 g (1 day), 13.7 g (2 days), 15.3 g (3 days). This shows that the relationship between the length of fermentation time and the amount of oil produced is directly proportional ie the longer the fermentation time the amount of oil produced is more and more [9].

Red Fruit Oil Antioxidant Activity Test with DPPH Method

The maximum wavelength (λ max) for measurement / testing of antioxidant activity from red fruit oil samples was obtained at 517 nm. IC50 measurement results can be seen in **Table 2**.

At the testing stage the antioxidant activity of red fruit oil gives results that the presence of fermentation treatment affects the IC50 results obtained, where IC50 red fruit oil sample 1 (control) is 128,993 this indicates that the antioxidant activity is being due to being in the range of 100-150 [15].

Formulation and Manufacture of Transparent Soap

The results of the transparent red fruit oil soap formulation can be seen in **Figure 1**.

Transparent Soap Evaluation

Organoleptic Testing

Organoleptic testing is done by observing the texture, color, aroma, transparency of soap with a variation of glycerin concentration that is 5%, 7%, 10% and 12%. The results can be seen in **Table 3**.

In the organoleptic testing stage high glycerin concentrations increase transparency. This is because glycerin as a transparent structure forming on soap [8].

Water content

The water content in transparent red fruit oil soap can be seen in table 4, where the water content of the four soap formulas is not more than 15% which is the maximum water content requirement in soap required by SNI, 06-3532-1994 [6].

Amount of Fatty Acid

Based on the results of testing the amount of fatty acids from the four formulas meets the requirements according to SNI, 06-3532-1994, where the requirement for the amount of fatty acids (b/b;%) is a minimum of 70% [6]. The results of testing the amount of transparent soap fatty acids can be seen in **Table 5**.

Total Alkali Free

In the free alkali test all four formulas meet the quality requirements that must be met in soap products according to SNI, 06-3532-1994 [6]. When free alkali levels are too high it will remove all the oil produced by the skin which functions as a natural moisturizer, resulting in dry skin. Under certain conditions it can cause skin irritation. The results of testing the amount of transparent soap-free alkali can be seen in **Table 6**.

The Non-Soapy Fraction

Based on the test results of transparent soap unsaturated fractions can be seen in **Table 7**, it is known that the four formulas meet the requirements in accordance with SNI, 06-3532-1994, where the requirements for non-soapy fraction content (b / b;%) are a maximum of 2.5 [6].

Acidity (pH)

The value of the acidity (pH) produced shows that the four soap formulas still meet the requirements, where the soap pH requirements are 8-10 in SNI, 06-3532-1994 [6]. The pH of the soap is not too alkaline due to the use of citric acid as a pH regulator. Thus, the pH of the soap meets the requirements so it will not cause irritation to the skin. The results of pH testing can be seen in **Table 8**.

Foam Stability

The foam stability test results show that the fourth formula has the highest foam stability at 93.33%, this is due to the use of DEA cocamid which provides a fairly stable foam on the preparation. The results of the stability test of the transparent red foam soap fruit oil can be seen in **Table 9**.

Storage Stability

In this study, the accelerated stability test was carried out by means of temperature manipulation techniques (temperature 25-30°C and 60°C) which was carried out for 3 weeks [14]. The parameters performed include foam stability test. Storage stability test results can be seen in **Figures 2 and 3**.

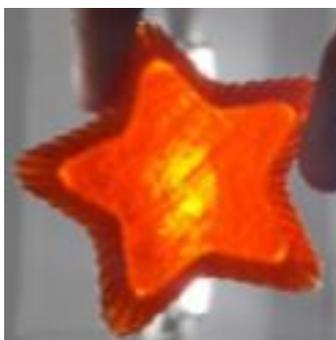
Hedonic Test (passions)

This test was carried out to determine the preference level of panelists for transparent soap red fruit oil, tested on 20 panelists with criteria for women aged 20-30 years. The assessment of transparent soap preference test is based on aroma, texture / hardness, foaming, color and transparency with the rating scale given, namely: (1) dislike, (2) somewhat dislike, (3) rather like, (4) like. The test results can be seen in **Table 10**.

Based on test results on panelists stated that F3 is the most preferred formula based on aroma, texture, lots of foam, color and transparency. In addition, from all test results giving safe results do not occur irritation or redness.

Table 2: IC50 Measurement of Red Fruit Oil

No	Red fruit oil concentration(µg/mL)	Absorban		% radical scavengers	IC ₅₀ (µg/mL)
		A1	A2		
1	20	0,804	0,543	32,463	128,993
2	40		0,516	35,821	
3	60		0,486	39,552	
4	80		0,459	42,910	
5	100		0,428	46,766	
6	120		0,399	50,373	
7	140		0,369	54,104	



Note: A1 = Control Absorbance; A2 = Sample Absorbance

Figure 1: Red Fruit Oil Transparent Soap Formula

Table 3: Observations of Organoleptic Transparent Soap Red Fruit Oil

Formula	Texture	Transparency	color	Aroma
F1	Solid bar soap +++	Transparent ++	Red +++	Jasmine ++
F2	Solid bar soap +++	Transparent ++	Red +++	Jasmine ++
F3	Solid bar soap +++	Transparent +++	Red ++	Jasmine ++
F4	Solid bar soap +++	Transparent +++	Red ++	Jasmine ++

Note: “-“ Nothing; “+” Little; “++” more; “+++” Very

Table 4: Red Soap Oil Transparent Fruit Water Content

Formula	Weight (gram)			% Water content
	Empty container(W ₀)	Sample(W ₁)	Container + sampleafter 2 hours (W ₂)	
F1	33,9899	5	38,6881	6,036
F2	35,2793	5	39,7975	9,636
F3	32,1465	5	36,7324	8,282
F4	32,1986	5	36,8128	7,716

Note : W₂ = W₂-W₀

Table 5: Amount of Fatty Acids from Transparent Soap Red Fruit Oil

No	Formula	Amount of Fatty Acid (%)
1	F1	80
2	F2	77
3	F3	70
4	F4	101

Table 6: Amount of Free Alkali from Transparent Soap Red Fruit Oil

No	Formula	Total Alkali Free (%)
1	F1	0,08
2	F2	0,04
3	F3	0,04
4	F4	0,08

Table 7: The Non-Soapy Fraction of the Transparent Red Fruit Oil Soap

No	Formula	The Non-Soapy Fraction (%)
1	F1	1,09
2	F2	2,17
3	F3	2,17
4	F4	1,09

Table 8: Acidity (pH) of Transparent Soap Red Fruit Oil

No	Formula	Acidity (pH)
1	F1	8,34
2	F2	8,61
3	F3	9,57
4	F4	9,48

Table 9: Stability of the Foam of the Red Fruit Oil Transparent Soap

No	Formula	High foam initial (cm)	High foam end (cm)	Foam Stability (%)
1	F1	1,3	1,1	84,61
2	F2	1,5	1,3	86,66
3	F3	1,8	1,6	88,88
4	F4	1,5	1,4	93,33

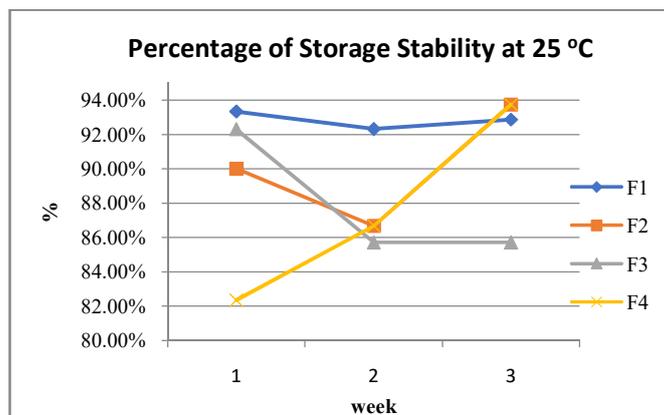


Figure 2: Percentage of Storage Stability at 25 °C

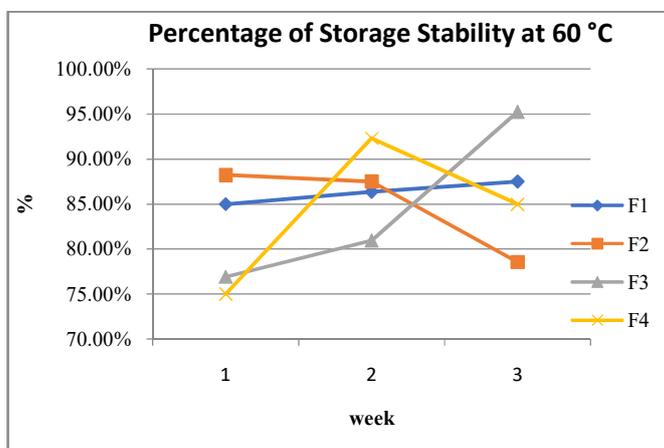


Figure 3: Percentage of Storage Stability at 60 °C

Table 10: Hedonic Test Results of the Red Fruit Oil Transparent Soap

Parameter	Total Rating			
	F1	F2	F3	F4
Aroma	64	63	68	60
Texture	64	68	70	66
Foaming	73	74	74	74
Color	74	75	75	74
Transparency	68	75	77	73
Total	343	355	364	347

CONCLUSION

Red fruit oil can be formulated into transparent soap by using sucrose, ethanol and glycerin as a transparent soap maker. Increasing the concentration of glycerin in a transparent soap formulation can increase the

level of panelists' preference for soap transparency.

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