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Activity Antioxidant Ethanol Extract U Groh (Cocos nucifera L.) with DPPH Method

Aktivitas Antioksidan Ekstrak Etanol U Groh (*Cocos nucifera* L.) dengan Metode DPPH

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ABSTRACT
U groh shells and coir (Cocos nucifera L) have the potential as antioxidants. This study aimed to evaluate the IC50 value of young coconut ethanol extract as an antioxidant. The DPPH technique was used for extraction and antioxidant activity testing at concentrations of 6.25;12.5; 25; 50, and 100 ppm. The ethanol extracts of young coconut shell and coir generated antioxidant activity with IC50 values of 11.811 ppm and 42.483 ppm, respectively, and were classified as very active (50 ppm). As a result, young coconut shells and coir can be used as an antioxidant source.
***Keywords**: Antioxidants, U groh (Cocos nucifera L.), coir, shell, DPPH.*

ABSTRAK
Tempurung dan sabut U groh (Cocos *nucifera* L) berpotensi sebagai antioksidan. penelitian ini dilakukan untuk mengetahui nilai IC_{50} ekstrak etanol U groh sebagai antioksidan. Ekstraksi secara maserasi dan uji aktivitas antioksidan pada seri konsentrasi 6,25;12,5; 25; 50 dan 100 ppm, dengan metode DPPH. Hasil penelitian menunjukkan ekstrak etanol tempurung dan sabut U groh menghasilkan aktivitas antioksidan dengan nilai IC_{50} masing-masing 11,811 ppm dan 42,483 ppm, termasuk ke dalam katagori sangat aktif (< 50 ppm). Tempurung dan sabut U groh dapat dijadikan sebagai sumber bahan antioksidan.

Kata kunci: *Antioksidan, U groh (Cocos nucifera L.),sabut, tempurung,DPPH.*

INTRODUCTION

Free radicals are molecules that do not have one or more electron pairs in the outermost orbit, are unstable, highly reactive, and can initiate a chain reaction (Yuslianti, 2018). According to Hidayati et al., (2017), electrons that do not have a partner would seek new partners in order to easily react with protein and fat in the body. As a result, antioxidants are required by the body to defend it from free radical attacks. Antioxidant compounds operate by providing one or more electrons to prevent free radicals (Sayuti and Yenrina, 2015).

Plants can provide natural antioxidants, one of which includes *U Groh* (young coconut). *U groh* is a very young coconut fruit with a high-water content since the endosperm has not yet formed. The *U groh* shell, in particular, is consumed in the Aceh region as *rujak* (fruit salad) (Misrahanum *et al*., 2022).

Secondary metabolite compounds found in coconut shells and coir have an antioxidant capacity (Kushmitha *et al*., 2017). According to (Thebo *et al*., 2016), plant phenolic compounds operate as antioxidants. The GC-MS study revealed that the shell and coir of coconut contain compounds with antioxidant potential (Misrahanum *et al*., 2022). Currently, there is currently no research on the antioxidant activity of *U groh* shell and coir (*Cocos nucifera* L.).

Figure 1. *U Groh* (*Cocos nucifera* L.)

Method

The *U groh* sample was obtained from Aceh Besar District**.**

TOOLS AND MATERIALS

The tools and materials used were a UV-Vis spectrophotometer, rotary evaporator, Erlenmeyer flask, test tube, *U groh* shell and coir, 95% ethanol, ascorbic acid, DPPH powder, and ethanol pro analyzer.

EXTRACT MANUFACTURE

As much as 200 g Simplisia shell and *U groh* coir each were macerated using ethanol solvent for 7 days (Ministry of Health of Indonesia, 2009). Then the solvent evaporation was carried out using a rotary evaporator to obtain a thick extract consistency (Anief, 2010).

SIMPLICIA MACROSCOPIC AND MICROSCOPIC

Macroscopic observations included shape, color, and smell while macroscopic observations included observing Simplicia fragments using a microscope.

ANTIOXIDANT ACTIVITY TEST

A total of 4 mg of DPPH powder (BM 394.32 g/mol) was dissolved in ethanol and then diluted in a 100 mL measuring flask. The 0.1 mM mains solution (40 ppm) was prepared in a variety of concentrations, including 6.25;12.5; 25; 50, and 100 ppm. Additionally, the wavelength was determined by leaving 4 mL of 0.1 mM DPPH solution in the dark for 30 minutes. The absorbance was measured with a UV-Vis spectrophotometer at 400-800 nm and ethanol as a blank solution (Anton *et al*., 2021). An ascorbic acid reference solution was employed at concentrations of 3, 6, 9, and 15 ppm.

Antioxidant activity (% inhibition) of the sample is calculated by the formula: The IC50 value (50% Inhibitory Concentration) was calculated using the linear regression equation y = ax + b, (Fachriyah *et al*., 2020).

RESULTS AND DISCUSSION

Macroscopic and Microscopic Observations

Macroscopic observation aims to identify the characteristics of *U groh's* coir and shell Simplicia. *U groh* coir is in the form of coarse powder, light brown in color, has a characteristic coir odor, and has a sour taste. Meanwhile, the simplicia of the *U groh* shell is in the form of a coarse powder, dark brown in color, has a characteristic coir odor, and has a sour taste. Microscopic observations using a microscope can be seen in Figure 2.

Simplicia powder from *U groh* coir and shell obtained fragments in the form of the trachea, xylem, shell hair, and calcium oxalate crystal. Trachea is a component of the secondary xylem which is shaped like holes and has thick walls. Shell hair is characterized by its shape like tapered needles. The xylem found in *U groh* coir is xylem with mesh thickenings, stairs, and spirals. Crystals of calcium oxalate are ergastic substances that are formed at the end of metabolism (Kasanah, 2011).

ANTIOXIDANT ACTIVITY

The results of the activity test of *U groh* shell and coir are shown in Tables 1 and 2.

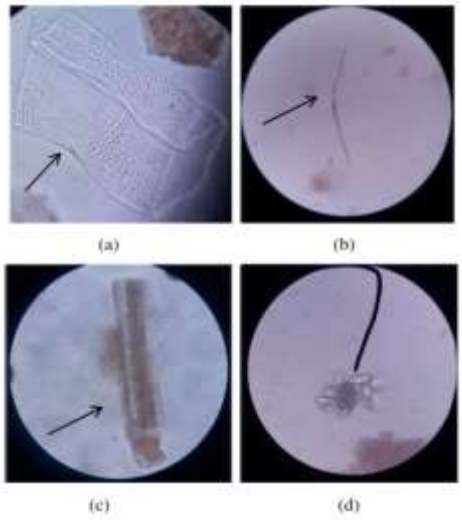

Figure 2. *U groh* coir and shell microscopy; (a) Shell trachea (b) shell hair (c) xylem coir (d) coir calcium oxalate crystals.

Table 1. Test results for antioxidant activity of *U Groh* shell ethanol extract and ascorbic acid

Sample	Concentration (ppm)	Absorbance	absorbance Negative Control	% Inhibition	IC_{50} (ppm)
Shell	6,25	0,584	0,894	34,638330	11,811
	12,5	0,426		52,311708	
	25	0,368		58,799403	
	50	0,113		87,322893	
	100	0,106		88,105891	
Askorbic Acid	3	0,756	0,894	15,473527	6,344
	6	0,456		48,993289	
	9	0,101		88,739746	
	12	0,079		91,163311	
	15	0,069		92,281879	

Table 2. Test results for the antioxidant activity of the ethanol extract of *U groh* coir and ascorbic acid.

Sample	Concentration (ppm)	Absorbance	Absorbance Negative Control	% Inhibition	IC_{50} (ppm)
Coir	6,25	0,836	0,894	6,524981	42,483
	12,5	0,598		33,109620	
	25	0,418		53,281133	
	50	0,340		61,931394	
	100	0,156		82,513050	
Askorbic Acid	3	0,756	0,894	15,473527	6,344
	6	0,456		48,993289	
	9	0,101		88,739746	
	12	0,079		91,163311	
	15	0,069		92,281879	

The results of the antioxidant activity test of the *U groh* shell ethanol extract yielded an IC50 value of 11.811 ppm. While the IC_{50} value produced by *U groh* coir extract was 42.483 ppm. If the IC_{50} value is less than 50 ppm, the antioxidant activity is classified as very active (Molyneux, 2004). According to Zaujiyah *et al*., (2019), the IC_{50} value of coconut coir extract is 63.95 ppm, including those belonging to the active category where the IC_{50} value is greater than 50 ppm. The IC_{50} value of ascorbic acid as a comparison was 6.344 ppm with a very active category.

The active compounds that serve as antioxidants in shell and *U groh* coir extracts impact their highly active antioxidant activity. GC-MS analysis revealed that *U groh* coir extract includes Erythritol, Hexadecanoic acid, Hexadecanoic acid, and methyl ester. Shell extract contains the following ingredients: methyl ester, erythritol, hexadecanoic acid, and methyl ester (Misrahanum *et al*., 2022). This is corroborated by Mazumder *et al*., 2020's research, which found that the substances hexadecanoic acid, hexadecanoic acid, methyl esters work as antioxidants. Antioxidants are also provided by erythritol compounds (Chiriac *et al*., 2022).

The variation in antioxidant activity produced can be attributed to variances in the number of active compounds, namely the location of growth, age, and harvest season, as well as the extraction procedure used (Depkes RI, 2000). According to the findings of this study, *U Groh* shell and coir are enormously potent and active antioxidants.

CONCLUSION

The antioxidant activity of ethanol extracts of shell and coir of *U groh* is quite high, with IC_{50} values of 11.811 ppm and 42.483 ppm, respectively.

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