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

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

Misrahanum Misrahanum¹, Nurul Alfiyani¹, Murniana Murniana²

¹Pharmacy Department, FMIPA, Universitas Syiah Kuala – Banda Aceh
²Chemistry Department, FMIPA, Universitas Syiah Kuala – Banda Aceh
*e-mail Author: misra.hanum@usk.ac.id

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.

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 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 Simpisia 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 Simpilia 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 main 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 Simpilia. 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 simpilia 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.

Simpilia 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

<table>
<thead>
<tr>
<th>Sample</th>
<th>Concentration (ppm)</th>
<th>Absorbance</th>
<th>absorbance Negative Control</th>
<th>% Inhibition</th>
<th>IC50 (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shell</td>
<td>6,25</td>
<td>0,584</td>
<td>0,894</td>
<td>34,638330</td>
<td>11,811</td>
</tr>
<tr>
<td></td>
<td>12,5</td>
<td>0,426</td>
<td></td>
<td>52,311708</td>
<td></td>
</tr>
<tr>
<td></td>
<td>25</td>
<td>0,368</td>
<td></td>
<td>58,799403</td>
<td></td>
</tr>
<tr>
<td></td>
<td>50</td>
<td>0,113</td>
<td></td>
<td>87,322893</td>
<td></td>
</tr>
<tr>
<td></td>
<td>100</td>
<td>0,106</td>
<td></td>
<td>88,105891</td>
<td></td>
</tr>
<tr>
<td>Askorbic Acid</td>
<td>3</td>
<td>0,756</td>
<td>0,894</td>
<td>15,473527</td>
<td>6,344</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>0,456</td>
<td></td>
<td>48,993289</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>0,101</td>
<td></td>
<td>88,739746</td>
<td></td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>0,079</td>
<td></td>
<td>91,163311</td>
<td></td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>0,069</td>
<td></td>
<td>92,281879</td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Sample</th>
<th>Concentration (ppm)</th>
<th>Absorbance</th>
<th>Absorbance Negative Control</th>
<th>% Inhibition</th>
<th>IC50 (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coir</td>
<td>6,25</td>
<td>0,836</td>
<td>0,894</td>
<td>6,524981</td>
<td>42,483</td>
</tr>
<tr>
<td></td>
<td>12,5</td>
<td>0,598</td>
<td></td>
<td>33,109620</td>
<td></td>
</tr>
<tr>
<td></td>
<td>25</td>
<td>0,418</td>
<td></td>
<td>53,281133</td>
<td></td>
</tr>
<tr>
<td></td>
<td>50</td>
<td>0,340</td>
<td></td>
<td>61,931394</td>
<td></td>
</tr>
<tr>
<td></td>
<td>100</td>
<td>0,156</td>
<td></td>
<td>82,513050</td>
<td></td>
</tr>
<tr>
<td>Askorbic Acid</td>
<td>3</td>
<td>0,756</td>
<td>0,894</td>
<td>15,473527</td>
<td>6,344</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>0,456</td>
<td></td>
<td>48,993289</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>0,101</td>
<td></td>
<td>88,739746</td>
<td></td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>0,079</td>
<td></td>
<td>91,163311</td>
<td></td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>0,069</td>
<td></td>
<td>92,281879</td>
<td></td>
</tr>
</tbody>
</table>
The results of the antioxidant activity test of the U groh shell ethanol extract yielded an IC50 value of 11.811 ppm. While the IC50 value produced by U groh coir extract was 42.483 ppm. If the IC50 value is less than 50 ppm, the antioxidant activity is classified as very active (Molyneux, 2004). According to Zaujiyah et al., (2019), the IC50 value of coconut coir extract is 63.95 ppm, including those belonging to the active category where the IC50 value is greater than 50 ppm. The IC50 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 (Misrahamun 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 IC50 values of 11.811 ppm and 42.483 ppm, respectively.

**REFERENCE**


Mazumder, K., Nabila, A., Akta, A., Farahnaky, A. (2020). Bioactive Variability and In Vitro and In Vivo Antioxidant Activity of Unprocessed and Processed Flour of Nine Cultivars of...
Australian lupin Species a Comprehensive Substantiation. Antioxidants. 9, 282; doi:10.3390/antiox9040282.


