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ARTICLE

Antioxidant Potential of Methanol Extract from the Wood of *Artocarpus altilis* from West Java

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A B S T R A K

Artocarpus altilis (sukun) merupakan salah satu tanaman yang banyak dibudidayakan di Indonesia dan mempunyai nilai ekonomi yang tinggi. Penelitian literatur menunjukkan bahwa tanaman sukun memiliki berbagai aktivitas biologis yang menarik, antara lain sifat antibakteri, antijamur, antivirus, antiplatelet, antiartritis, antiinflamasi, antikanker, dan antiinflamasi. Berdasarkan hal tersebut, penelitian yang dilakukan bertujuan untuk mengetahui potensi ekstrak metanol kayu tanaman sukun asal Jawa Barat sebagai antioksidan. Metode yang digunakan untuk menguji aktivitas antioksidan adalah metode DPPH. Hasil penelitian menunjukkan bahwa ekstrak metanol kayu tanaman sukun yang diteliti mempunyai nilai IC_{50} sebesar 63,6602 µg/mL.

Kata Kunci: Artocarpus altilis; antioksidan; DPPH; IC_{50}

A B S T R A C T

Artocarpus altilis (breadfruit) is one of the plants widely cultivated in Indonesia with a high economic value. Literature research shows that the breadfruit plant has various interesting biological activities, including antibacterial, antifungal, antiviral, antiplatelet, antiarthritics, anti-inflammatory, anticancer, and anti-inflammatory properties. Based on this, the conducted research aims to determine the potential of methanol extract from the wood of the breadfruit plant originating from West Java as an antioxidant. The method used to test antioxidant activity is the DPPH method. The results of the study show that the methanol extract from the wood of the studied breadfruit plant has an IC_{50} value of 63.6602 µg/mL.

Keywords: *Artocarpus altilis; antioxsdant; DPPH; IC_{50}*

INTRODUCTION

Breadfruit is one of the jackfruit varieties commonly found in Indonesia with a relatively high economic value [1]. The most commonly utilized part of the breadfruit is the fruit itself, which is often fried, steamed, or grilled [2]. The leaves are used as livestock feed, the flowers as insecticides, and the wood for making furniture and bridges [3]. Additionally, in traditional medicine, it is mentioned that extracts from breadfruit leaves have potential as an antihelminthic and as a skin-lightening agent in cosmetics, its sap is used for treating diarrhea, vomiting, and menorrhagia [4], and the bark of the breadfruit tree has been reported to have the ability to modulate oncogenic transcription activities [5], and the roots of the breadfruit are reported to be useful as a headache medicine, anti-inflammatory, and expectorant [6]. Based on these activities, it is interesting to know the antioxidant activity of breadfruit wood from West Java, Indonesia.

METHODS

Materials

The wood of the breadfruit plant (Artocarpus altilis) used in this study, was obtained from the Majalaya, Paseh Subdistrict, Bandung Regency, West Java. The chemicals used in the antioxidant activity test were methanol, DPPH, and ascorbic acid.

Methods, Sample Preparation

Wet stem wood samples from the breadfruit plant (Artocarpus altilis) were peeled to separate the stem wood from its outer bark. Subsequently, the stem wood samples were chopped and dried until a yield of 3 kg of dry samples was obtained.

Extraction

Breadfruit stem wood powder was subsequently macerated using 16 L of methanol solvent for 3 x 24 h, which

was then concentrated using a rotary evaporator to obtain 28.7938 g of methanol extract.

Antioxidant Activity Test, Preparation of 100 ppm DPPH Solution

The preparation of a 100 ppm DPPH solution was carried out by weighing 10 mg of DPPH, then dissolving it in methanol p.a and transferring it into a 100 mL volumetric flask. Methanol p.a was marked to the scale and the solution was then homogenized. The 100 ppm DPPH solution was diluted to obtain a 30 ppm DPPH solution. A total of 7.5 mL of the 100 ppm DPPH solution was pipetted and transferred into a 25 mL volumetric flask, then methanol p.a was added up to the mark and homogenized.

Measurement of Maximum Absorption Wavelength of DPPH

A 10 mL vial was prepared, and all parts of the bottle were covered with aluminum foil. 1 mL of 30 ppm DPPH solution and 3 mL of methanol p.a are added into the vial, and the mouth of the vial was sealed with aluminum foil. The vial was then incubated in a dark place for 30 min. The maximum absorption of DPPH was measured using a UV-Vis spectrophotometer in the range of 400-800 nm [7].

Preparation of Sample Solution and Reference Solution

The concentrated methanol extract was weighed, then dissolved in methanol and made up to the mark in a 25 mL volumetric flask to obtain a concentration of 1000 ppm. This 1000 ppm solution was then diluted to concentrations of 50 ppm, 75 ppm, 225 ppm, 250 ppm, 275 ppm, and 350 ppm in 10 mL volumetric flasks. Ascorbic acid, used as a reference solution, was weighed at 10 mg, then dissolved in methanol and made up to the mark in a 100 mL volumetric flask and homogenized. This 100-ppm ascorbic acid solution was then diluted to concentrations of 4 ppm, 5 ppm, 6 ppm, 7 ppm, and 9 ppm.

Measurement of Antioxidant Activity

Solutions of the methanol extract of breadfruit stem wood and the reference solution of ascorbic acid, each at their respective concentrations, were pipetted in a 1:1 ratio with the 30 ppm DPPH solution using a micropipette into vials already lined with aluminium foil. The mixture of the sample solution with DPPH and the reference solution with DPPH were then incubated in a dark place for 30 min. The measurement using UV-Vis spectroscopy indicates that the maximum absorption of DPPH occurs at a wavelength of 515 nm. The degree of inhibition of free radical absorption by DPPH is calculated using a specific formula, as follows:

$$\%\mathbf{Inhibition} = \frac{\mathbf{Abs_{blank}} - \mathbf{Abs_{sample}}}{\mathbf{Abs_{blank}}} \times \mathbf{100}\%$$

The calculation of the IC_{50} value is done by using a linear regression equation, where the X-axis is the concentration of the test sample and the Y-axis is the percentage of inhibition.

RESULT AND DISCUSSION

IC_{50} (Inhibition Concentration) is a value or parameter used in determining antioxidant activity. IC_{50} is the concentration of a sample's ability to scavenge 50% of DPPH free radicals. The IC_{50} value can be obtained from the calculation of the linear regression equation. This equation states that there is a relationship between the concentration of the sample and the percentage of inhibition. Table.1 shows the results of the antioxidant activity test.

Table 1. Results of the antioxidant activity test of methanol extract of heartwood of bread fruit

Sample	Conc. (ppm)	Abs.	% Inhibition	Linier Equation	IC_{50} (ppm)
Methanol extract *of heartwood of bread fruit* (*Artocarpus altilis*)	Blank	0.6	-	y = 0.1285x + 41.119 r = 0.9741	63.660
	50	0.324	46		
	75	0.272	54.667		
	225	0.185	69.166		
	250	0.157	73.833		
	275	0.116	80.666		
	350	0.085	85.833		
Ascorbic acid *	Blanko	0.933	-	y = 8.2413x - 13.154 r = 0.992	7.663
	4	0.746	18.114		
	5	0.666	28.617		
	6	0.576	38.264		
	7	0.516	44.695		
	9	0.373	60.021		

*ascorbic acid as (+) standard for antioxidant activity

The reaction that occurs when the DPPH solution is mixed with a methanol extract sample of the breadfruit tree stem falls under the oxidation-reduction reaction category. The DPPH solution acts as an oxidizer that accepts a proton donor, while the methanol extract sample of the breadfruit tree stem acts as a reductor that donates protons with the aim of converting the DPPH radical solution into a non-radical DPPH solution. Physically, the change can be observed through the color change of the DPPH solution from purple to pale yellow as the concentration of the tested sample is increased.

Based on the testing of the antioxidant activity of the methanol extract of the breadfruit tree stem (Artocarpus altilis), it is known that the IC_{50} value is 63.6602 ppm, and the IC_{50} value of ascorbic acid as a comparative solution is 7.663 ppm. Both values were obtained by calculating using their respective linear regression equations, where Y is substituted by the value 50, and X is the IC_{50} value to be found. If the resulting IC_{50} value is smaller, then the tested sample has the potential as an active antioxidant. Studies report that compounds in the breadfruit plant acting as antioxidants include hydroxyartoflavanone A, isocycloartobiloxanthone, and artoflavone A. Therefore, based on the comparison with IC_{50} values in the literature, it is known that the methanol extract of the breadfruit tree stem has strong antioxidant activity potential, namely in the concentration range of 50-100 ppm.

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