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Research Article

Phytochemical Analysis and Antioxidant Activity of Water Hyacinth Flowers (*Eichhornia Crassipes*) Extract

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ABSTRACT

The purpose of this research was to know about phytochemical compounds and antioxidant activity of water hyacinth flowers extract and its potential use as a natural antioxidant. Data analysis was performed descriptively. Research consisted of several stages including sampling, sample preparation, sample extraction, yield of extract, phytochemical analysis (phenols, tannins, alkaloids, flavonoids and saponins), antioxidant activity test with DPPH method and reducing power. The results showed that extracts yield of water hyacinth flowers with n-hexane solvent was 4.95%, ethyl acetate solvent was 1.69%, and highest extracts yiled obtained from methanol was 26.06%. Results of phytochemical compounds analysis showed positive results for phenolic compounds, tannins, flavonoids and saponins. Result of antioxidant activity with DPPH method interpreted within parameters of IC_{50}. IC_{50} of Hyacinth flower extract were 1085.31 ppm for n-hexane, 950.71 ppm for ethyl acetate and 35.83 ppm for methanol. Small IC_{50} showed that higher antioxidant activity.

Key words: Water Hyacinth Flowers, Antioxidant, Phytochemical, Reducing ability.

INTRODUCTION

Water hyacinth plant (*Eichhornia crassipes*) is one of the many flora diversities in the waters that live floating, can develop roots in the mud in shallow water, and contain chemical compounds.[1] Rorong and Suryanto[1] reported that the extraction of water hyacinth plants on the leaves, stems and roots has phenol, flavonoids and tannins. Phenol compounds can function as primary antioxidants due to being able to stop the chain reaction of free radicals on lipid oxidation. Phenolic compounds have groups that can be used as electron donors, such as OH phenol groups. Tannins can form strong complex bonds. While flavonoids have the potential as antioxidants and have bioactivity as drugs.[2]

As has been tested on the leaves, stems and roots of water hyacinth plants (*Eichhornia crassipes*), it is suspected that the flower part also has phytochemical content which can be used as a source of natural antioxidants. Before using it further, water hyacinth flowers must be examined first the phytochemical content and antioxidant activity. Therefore, this study was conducted to determine the content of antioxidant compounds in water hyacinth flowers (*Eichhornia crassipes*).

METHODS

Yield of extraction

Yield was the ratio between the weight of the extract material and the initial weight.

Phytochemical screening of water hyacinth flowers (*Eichhornia Crassipes*) extract

Test of flavonoids, alkaloids, saponin, steroids, triterpenoids were determined by Harborne method.[3]

DPPH radical scavenging activity

DPPH radical scavenging activity was measured based on methods described in Hanani *et al.*[4]

Reducing power

Reducing power was determined by Oyaiza method.[5]

RESULTS AND DISCUSSION

Yield of extraction

The yield of extract of Water hyacinth flower (*Eichhornia crassipes*) from each solvent can be seen in Figure 1.

The highest value of the yield of water hyacinth flower (*Eichhornia crassipes*) extract was obtained through methanol solvent extraction which was 32.57 g (26.06%) and the lowest ethyl acetate 2.11 g (1.69%). Pane[5] reported that methanol solvents are solvents that are widely used for the extraction of organic compounds, because methanol can bind to polar, non-polar and semi-polar compounds. Methanol is a solvent that can dissolve polar and non-polar bioactive compounds because the chemical structure contains hydroxyl (OH) and carbon (C) groups. So that the molecular structure of bioactive compounds will bind to hydroxyl and carbon groups causing bioactive compounds to dissolve in alcohol solvents such as methanol *via* hydrogen atomic bonds.[6]

Phytochemical screening of water hyacinth flowers (*Eichhornia Crassipes*) extract

Phytochemical compound from extract of Water hyacinth flower (*Eichhornia crassipes*) can be seen Table 1.

Phytochemical compound from extract of Water hyacinth flower (*Eichhornia crassipes*) were shown in Table 1. The water hyacinth extract was positively

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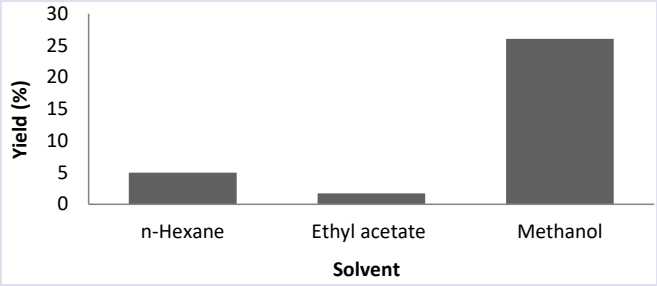

Figure 1: The yield of extraction of water hyacinth flower (*Eichhornia crassipes*).

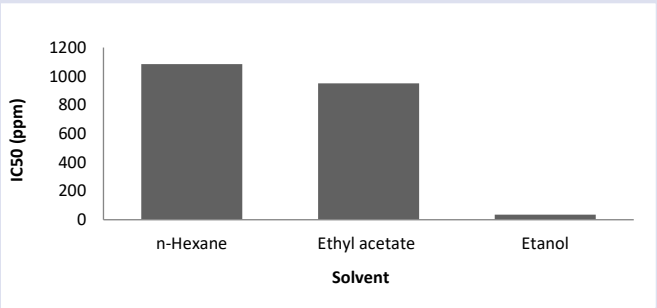

Figure 2: IC50 of water hyacinth (*Eichhornia crassipes*) extract..

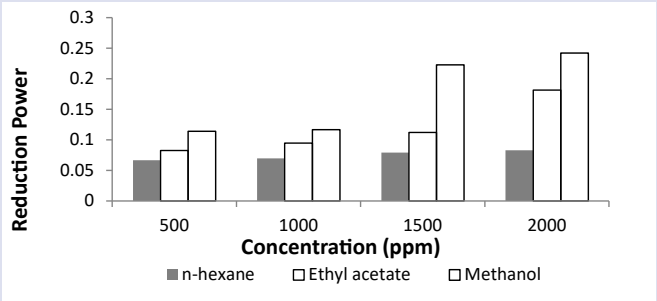

Figure 3: Reduction power of water hyacinth extract (*Eichhornia crassipes*).

Table 1: Phytochemical compounds of Water hyacinth flower (*Eichhornia crassipes*).

Phytochemical compounds	Ekstrak dari Pelarut		
	N-Hexane	Etyl Acetic	Methanol
Flavonoid	+	+	+
Alcaloid	-	-	-
Saponin	+	-	+
Steroid	-	-	-
Terpenoid	+	+	+

Table 2: DPPH radical scavenging activity of water hyacinth flower extract.

Sample	% Inhibition				
	50 ppm	100 ppm	250 Ppm	500 ppm	1000 ppm
N-Hexane	6.52	12.50	15.76	18.29	20.65
Ethyl acetic	8.15	14.31	16.31	18.84	38.77
Methanol	32.61	58.88	62.32	76.99	91.30

containing phenol, tannin, flavonoid, and saponin compounds. But the three samples above showed negative results for alkaloid compounds because they did not form white deposits on meyer or brown test on Wagner and Dragendorf test. While the phenol test positive reaction is indicated by the formation of light green color in n-hexane solvent and concentrated green color in ethyl acetate and methanol solvents.

DPPH radical scavenging activity

DPPH radical scavenging activity of water hyacinth flower extract can be seen Table 2.

Table 2 shows that the DPPH radical activity has increased along with the increasing concentration of water hyacinth flower extract. Romadanu[7] reported that the highest percent value of DPPH radical activity in lotus flower extract (*Nelumbo nucifera*) was 91% found in the extract treatment of methanol solvent with a concentration of 2000 ppm. Hanani *et al.*[4] which also states that percent of radical activity will increase with increasing concentration of sample solution. If seen from the percentage of DPPH radical activity of the water hyacinth extract was higher than the lotus flower extract (*Nelumbo nucifera*).

The mechanism of antioxidant compounds against DPPH radicals is a reduction reaction.[9] Proton donations cause DPPH radicals (purple) to non-radical (colorless) compounds. This activity can be observed in decreasing absorbance by spectrophotometer. The results obtained were calculated using linear equations, percent inhibition as Y axis and sample concentration as X axis. Calculating IC50 by looking at the ability of antioxidant compounds in inhibiting free radicals at 50% percent inhibition. IC 50 of water hyacinth (*Eichhornia crassipes*) flower extract with N-hexane, Ethyl Acetate, and Methanol solvent can be seen in Figure 2.

Result of antioxidant activity with DPPH method interpreted within parameters of IC_{50}. IC_{50} of Hyacinth flower extract were 1085.31 ppm for n-hexane, 950.71 ppm for ethyl acetate and 35.83 ppm for methanol. Small IC_{50} showed that higher antioxidant activity.

Reducing power

According to Oyaizu,[4] reduction power is related to the ability to release H atoms to react with free radicals to form antioxidant radicals. Compounds that can act as antioxidants in this method have reduced power activity because they can stabilize oxidant compounds by donating electrons to reducing agents, namely Fe^{3+} to Fe^{2+} to be more stable.

In Figure 3 it can be seen that the difference in concentration shows the increasing value of absorbance. Based on the results of the power reduction analysis using water hyacinth extract (*Eichhornia crassipes*) showed that the methanol extract had the highest reduction power at a concentration of 2000 ppm with an absorbance value of 0.2420. Then followed by the absorbance value of ethyl acetate extract at a concentration of 2000 ppm that is equal to 0.1815 and the extract of n-hexane has the highest reduction power at a concentration of 2000 ppm which is 0.0830. This value indicates that methanol extract has the highest ability to reduce that is equal to 0.2420.

CONCLUSION

The results showed that extracts yield of water hyacinth flowers with n-hexane solvent was 4.95%, ethyl acetate solvent was 1.69%, and highest extracts yiled obtained from methanol was 26.06%. Results of phytochemical compounds analysis showed positive results for phenolic compounds, tannins, flavonoids and saponins. IC_{50} of Hyacinth flower extract were 1085.31 ppm for n-hexane, 950.71 ppm for ethyl acetate and 35.83 ppm for methanol.

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