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Antioxidant Activities Test of *Selada Air* Extract (*Nasturtium officinale* R.Br) by Using DPPH (*I, I-Difenil-2-Pikrilhidrazil*) Method

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***Abstract* – Selada air (*Nastrium officinale* R.Br) is a plant that grows in the highlands. Watercress is widely consumed by people as a vegetable. This study aimed to examine the antioxidant activity of watercress extract by using DPPH method. The extraction used the reflux method with n-hexane, ethyl acetate and 70% ethanol solvent. The result of antioxidant activity test obtained IC_{50} values of n-Hexane extract, ethyl acetate, 70% ethanol was 113.49 ppm, 110.82 ppm, 97.73 ppm. The extract which had the most powerful antioxidant activity was found in 70% ethanol extract**

Keywords: watercress, antioxidants, DPPH

I. INTRODUCTION

Selada air (*Nasturtium Officinale* R. Br.) is a plant that classified to the Brassicaceae family originating from Europe and Asia. Watercress is usually consumed as a vegetable or salad. The contents of watercress include protein, calcium, phosphorus, iron, vitamins A, E and C, flavonoids and phenols (Rahmawati & Bustanussalam, 2016).

Watercress has been known as a medicinal ingredient for thousands of years ago. The ancient Greeks and Romans believed that watercress is a tonic for children and made the brain smart. Meanwhile, Persian mothers always cook watercress for their children so that they are healthy and strong (Ayu, 2008).

Antioxidants are basically divided into two basic categories, namely natural antioxidants and synthetic antioxidants. Synthetic antioxidants that are commonly used such as butylated hydroxytoluene (BHT) and butylated hydroxyanisole (BHA) are consumed by humans because they are harmful to health. (Nadheesha et al. 2007; Wu et al. 2009), this causes natural antioxidant compounds to be highly desirable and needed.

Selada air has very good health benefits but information about the chemical composition in watercress is still lacking. (Siraoit, 2007)

II. MATERIAL AND METHOD

A. Procedure

Plant Determination

The determination of watercress was carried out at the Biology Faculty, Padjajaran University, Bandung. The determination aimed to ensure the identity of the plant used.

Sample processing

Sample processing consisted of wet sorting, washing, wind drying, dry sorting and powder making.

Phytochemical Screening

Phytochemical screening is carried out on simplicia and extracts. Phytochemical screening was conducted to determine the content of secondary metabolites in samples including alkaloid, flavonoid, polyphenol, tannin, saponin, quinone, steroid and triterpenoid tests, as well as mono and sesquiterpenoids.

Extraction and Concentration

A total of 250 grams of dried mashed sample was put into a round flask, added n-hexane to taste and reflux for 7 hours. The extraction was done 3 times. The resulting extract was filtered, then the filtrate was concentrated by using a rotary evaporator at 400C to obtain a thick extract and obtained the yield was calculated. The waste was dried and then after drying, it was refluxed by using ethyl acetate and 70% ethanol in the same way as n-hexane. (Kiswandono, 2011). The extraction results obtained extracts of n-hexane, ethyl acetate, ethanol.

Quantitative Antioxidant Test

Determination of Maximum Wavelength

Preparation of DPPH solvent was made by weighing as much as 50 mg DPPH powder dissolved into 100 mL methanol p.a (500 ppm). To determine the maximum wavelength of DPPH solvent, DPPH solvent, 500 ppm solvent in a pipette and diluted to 50 ppm, then the absorbance of the solution was measured at a wavelength of 400-800 nm (Nurmalasari, et.al., 2016)

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Measurement of Sample Absorbance

The extract was weighed 50 mg, dissolved in methanol p.a then put into a 100 mL volumetric flask, the volume was sufficient with methanol p.a to the mark so that a concentration of 500 ppm was obtained.

III. RESULTS

Characterization of Simplistic Watercress

Macroscopic testing included: shape, smell, taste, and color.

TABLE I. MACROSCOPIC TESTING RESULTS
Watercress (*Nastrium officinale* R.Br)

Parameter	Simplistic Watercress
Shape	Powder
Color	Green
Odor	Distinctive Smell
Taste	Rough

(a) (b) (c)

Figure 1. Macroscopic watercress a. watercress plants, b. watercress leaves, c. watercress simplicia powder.

TABLE II. PHYTOCHEMICAL SCREENING

Chemical compound classification	Result			
	Simplicia	*Extract*		
		n-Heksana	*Ethyl Acetate*	*Ethanol*
Alkaloids	+	+	+	+
Flavonoids	+	+	+	+
Saponin	+	-	-	-
Tannin	+	+	+	+
Polyphenols	+	-	-	-
Monoterpenoid/ Sesquiterpenoids	+	-	-	+
Steroids/ Triterpenoid	+	+	-	+
Kuinon	+	-	-	-

Notes: (+) = Identified
(-) = Not identified

Phytochemical screening testing aimed to provide an overview of the class of compounds contained in plants to be studied. Compounds that are thought to have antioxidant activity were flavonoids, tannins, steroids, found in simplicia, n-hexane extract, ethyl acetate extract, ethanol extract.

Quantitative Antioxidant Activity Test

TABLE III. RESULT OF WATERCRESS ANTIOXIDANT ACTIVITY TESTING

Sample	IC_{50} rata-rata (ppm)± SD	Antioxidant category
Vitamin C	6,633 ± 0,058	Very strong
N-hexane extract	113,49 ± 1,740	Neutral
Ethyl acetate extract	110,82 ± 1, 487	Neutral
Ethanol extract	97,73 ± 0,360	Strong

IV. DISCUSSION

Based on the calculation results, the IC_{50} value obtained by Selada air extract had the most powerful antioxidant activity, namely ethanol extract with an IC_{50} value of 97.73 ppm compared to 110.82 ppmethyl acetate extract and 113.49 ppm n-hexane.

Based on phytochemical screening results, compounds suspected to provide antioxidant activity are alkaloids, flavonoids, tannins, monoterpenoids/sesquiterpenoids, and steroids.

Flavonoid is a compound that has a phenolic structure, flavonoid compounds can promote the work of endogenous antioxidants as a scavenger with various mechanisms. Flavonoid compounds are grouped into 4 groups based on molecular structure namely flavones, catechins, and anthocyanins. Specifically, flavones and catechins are the most powerful flavonoids as antioxidants. (Winarsih) , 2014).

The mechanism of flavonoids as antioxidants in inhibiting cancer cells is by inducing apoptosis through inhibition of DNA topoisomerase I/II activity, modulation of signaling pathways, decreased expression of Bcl-2 and Bcl-XL genes, increased expression of Bax and Bak genes, and activation of endonuclease (Ren et al. 2003).

Tannin is active compounds of secondary metabolites that are known to have antioxidant activity, are very complex components of organic substances consisting of phenolic compounds that are difficult to separate, difficult to crystallize, precipitate proteins and their solvent and compound with these proteins (Desmiaty, 2008).

Terpenoid is defined as natural products whose structure is considered to be a number of isoprene or isoprenoid units. Terpenoid is classified broadly based on the number of isoprene units incorporated into an unsaturated hydrocarbon terpenoid molecule (Kar, 2009).).

V. CONCLUSION

From the results of the antioxidant activity test selada air extract, it has a strong antioxidant activity that is in ethanol extract with IC_{50} value 97.73 ppm, compared to ethyl acetate extract 110.82 ppm moderate antioxidants, and n-hexane extract 113.49 ppm moderate antioxidants.

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