

Effect of Drying Method on Levels of Antioxidant Activity, Total Flavonoid Levels, and Total Phenol Levels in Ethanol Extract of Bawang Dayak (*Eleutherine americana*) Leaves

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ABSTRACT

The drying process can affect the content of seconder metabolites such as flavonoids and phenols in plants. The content of flavonoids and phenols plays an important role in the antioxidant activity of a plant. This study aims to determine the effect of drying methods using sunlight and oven on antioxidant activity, total flavonoids, and total phenols. Measurement of antioxidant activity using the DPPH method with vitamin C as a standard, total flavonoid levels using quercetin as a standard, and total phenol using gallic acid as a standard were measured using a UV-Vis spectrophotometer. The results of antioxidant activity (IC₅₀) by sun drying and oven respectively were 123 ppm and 152 ppm, total flavonoid content by sun drying and oven respectively were 22.5% and 20.698%, and total phenol content by sun drying and oven respectively amounted to 37.35% and 36.648%. The conclusion is that the sun-drying method has antioxidant activity, total flavonoids, and total phenol levels which are greater than the oven-drying method. **Keywords:** dry method; Bawang Dayak; phenol total; flavonoid total; antioxidant activity

INTRODUCTION

The drying process is one of the stages in the manufacture of *Simplicia* which can affect the good quality of the material in terms of the antioxidant activity contained in the simplicial material (Pujiastuti, 2019). Drying methods can be done in various ways including drying in the sun and using an oven. Sun drying is a cheap and easy drying technique, but the antioxidant activity can decrease due to ultraviolet light. Drying using an oven is more effective because it doesn't take a long time, but using high temperatures can cause an increase in production costs (Apsari, 2021).

The drying process can degrade compounds such as flavonoids and phenols. This is because flavonoids can be degraded through chemical reactions such as light, oxygen and enzymes (Rababah et al, 2015). Flavonoids and phenols are antioxidant compounds that can capture free radicals such as peroxides, peroxy and hydroxyl (Wongklom & Moonsim, 2018).

Dayak onion is a plant that is often found on the island of Borneo. Empirically, Dayak onions are used by local people as a medicine for various types of diseases such as breast cancer, hypertension, diabetes mellitus, cholesterol, ulcers, and reducing postpartum pain (Mokoginta, 2020). Secondary metabolite compounds contained in Dayak onions include phenols, flavonoids, tannins, glycosides, steroids, and alkaloids (Yuswi, 2017).

Dayak onions contain various compounds that have an antioxidant activity such as isoliquiritigenin which belongs to the flavonoid group and oxyresveratrol which belongs to the polyphenol group (Annisa, 2021).

Research conducted by Pratiwi (2013) showed antioxidant activity in the ethanol extract of Bawang Dayak leaves which was dried using the aerated method with an IC₅₀ of 31.974 ppm. Another study conducted by Isnindar (2014) showed that the ethanol extract of Bawang Dayak leaves dried in an oven had an antioxidant activity with an IC₅₀ of 45.337 ppm. Based on the description above, this study tested antioxidant activity, total flavonoids, and total phenol levels to determine the effect of different drying methods.

METHODOLOGY

Materials

This research used Spectrophotometer UV-Vis (*Shimadzu* type 2450), Oven, rotary evaporator (*Heldolph*), micropipette, analytical balance, and glassware (*Pyrex*). The sample in this research is Bawang Dayak leave from Punggur Kecil village, Kubu Raya, Indonesia. The chemical used is 2,2-diphenyl-1-picrylhydrazyl; ethanol 70%; gallate acid; quercetin; Folin Ciocalteu; solvent grade pro analysis.

Methods

Extraction of Bawang Dayak leaves

Fresh Bawang Dayak leaves are sorted wet by separating the leaves and the stem, then

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washed and cut into small pieces. Bawang Dayak leaves were divided into 2 and dried using two methods, namely drying in the sun for 3 days and drying using an oven at 50°C for 1 day. The dried Dayak leaves are then made into powder. Extraction of leek Dayak using maceration method with 70% ethanol as a solvent. The ratio of *Simplicia* and solvent is 1:5. The extract obtained was concentrated using an evaporator to become a thick extract.

Determination of Total Phenolic Level

Bawang Dayak leaves extract and a standard solution of gallic acid with a concentration series of 0.001-0.005 were prepared in 10 mL. 0.1 mL of each sample and the standard solution were taken and mixed with 0.2 mL of the Folin-Ciocalteu reagent and stirred for 6 minutes. 20% sodium carbonate was added to as much as 2 mL and left at room temperature for 90 minutes. The absorbance was measured using a UV-Vis spectrophotometer at a wavelength of 760 nm.

Determination of Flavonoid Total Level

Bawang Dayak leaves extract and quercetin standard solution with concentration series from 0.02 to 0.06 ppm were prepared in 10 mL. Take 1 mL of each solution and add 3 mL of 70% ethanol, 0.2 mL of 10% aluminum chloride, and 0.2 mL of acetic acid. The solution was allowed to stand for 30 minutes and the absorbance was measured using a UV-Vis spectrophotometer at a wavelength of 430 nm.

Antioxidant Activity Test

The test was carried out by taking 100 mg of extract and vitamin C as a standard and dissolving it with 10 mL of methanol so that an extract content of 10 mg/mL was obtained. The extract solution was made into a concentration of 0.04; 0.08; 0.12; 0.16; and 0.20 mg/mL. 2 mL of DPPH solution was added to each solution and vortexed for 15 seconds. The homogeneous solution was incubated for 30 minutes in a dark place with a temperature of 37°C. Sample absorbance was measured using a UV-Vis spectrophotometer at a wavelength of 517 nm. IC₅₀ was calculated from the linear regression curve between concentration versus % antioxidant activity.

RESULT AND DISCUSSION

Extraction of Bawang Dayak leaves

Bawang Dayak leaves extract uses the maceration method because the maceration method is an extraction method that does not damage chemical compounds, especially compounds that are thermolabile. Extraction using

oven drying obtained a yield of 12.26%, while extraction using sun drying obtained a yield of 7.35%.

Flavonoid total and phenol total content

Total Flavonoid content using the standard quercetin obtained total flavonoid results in the oven method of 20.698% and the sunlight method of 22.5%. These results indicate that the levels of flavonoids in the sunlight method were higher than in the oven method. The difference in total flavonoid content between the two methods was not significantly different.

The total phenol content in the drying method and the oven method were 37.35% and 36.648 respectively. These results indicate that the total phenol content in sun drying is greater than in oven drying. The difference in total phenol content was not significantly different between the two drying methods.

Sun drying gives better results than oven drying. This is due to drying in the sun using a black cloth so that sunlight does not directly hit the sample. Temperature also affects the drying process. The temperature in the sun is not as big as the temperature in the oven which uses a temperature of 50°C. Increase temperature can cause a decrease in the total phenolic concentration in the sample (Pujiastuti & Saputri, 2019).

Antioxidant activity

Measurements using DPPH resulted in a color change from purple to paler after 30 minutes of incubation. This color change is due to a decrease in the DPPH absorbance value resulting from the antioxidant activity in the sample. Compounds that provide hydrogen atoms to DPPH radicals so that they are reduced to a more stable form, namely DPPH-H (Molyneux, 2004).

The IC₅₀ value is used in measuring the radical scavenging activity. This value indicates the amount of concentration required to capture free radicals by 50%. The smaller the IC₅₀ value means the better the antioxidant activity.

The results obtained showed that the IC₅₀ value of vitamin C was 1.883 ppm. The ethanol extract of Dayak chives using the sun and oven drying method was 123 ppm and 152 ppm, respectively. These results indicate that the ethanol extract of Bawang Dayak leaves with the sun-drying method has better antioxidant activity than the oven-drying method. The antioxidant activity of leek Dayak extract is still lower than that of vitamin C. This is because vitamin C is a pure compound, while the ethanol extract of leek Dayak consists of various types of mixtures.

Table I. Total flavonoid and total phenol content in various drying methods

Drying method	Phenol total (%)				Flavonoid total (%)			
	I	II	III	Average	I	II	III	Average
Sun	37.990	37.391	36.667	37,35	23.149	22.976	21.374	22,5
Oven	36.198	36.392	37.354	36,648	20.848	19.096	22.151	20,698

Table II. IC50 values at various drying methods

Drying method	IC ₅₀ (ppm)
Sun	123
Oven	152
Vitamin C	1,883

CONCLUSION

The ethanol extract of Bawang Dayak leaves using the sun drying method had higher levels of total flavonoids, total phenols, and antioxidant activity than the oven drying method, but the differences between the two methods were not significantly different.

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