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Effect of Drying Time, Anting-Anting Plant (Acalypha Indica L.) Powder as Prepared by an Ultrasonic-Assisted Extraction

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ABSTRACT

Anting-Anting Plant or (*Acalypha indica L.)* is a tropical plant. Anting-Anting Plants can contain high bioactive compounds. One of the bioactives that can be used as antioxidants are flavonoids. Flavonoids act as strong antioxidants in granuloma tissue so that they are able to protect the area around the wound from free radicals that can inhibit wound healing through the destruction of fat, protein, collagen, proteoglycan and hyaluronic acid. One of the methods used to discover herbal remedies is to determine the best time for drying the Anting-Anting Plant and extraction using the ultrasonic method so that the appropriate sample is obtained. The choice of extraction method certainly depends on the nature of the material and compounds to be isolated. In a study with an initial mass of 50 grams of sample with a temperature of 50 °C and drying variations of 30 minutes, 45 minutes, 60 minutes, 90 minutes and 120 minutes, the effect of drying time with a dehydrator on the yield obtained by the regression equation with $R^2 = 0.9759$, this shows that there is a close correlation and influence between y and x, where the longer the sonication time, the greater the yield.

Keywords: Anting-Anting plant, antioxidant, flavonoid , extraction, and ultrasonic

1. Introduction

Indonesia has many types of plants that can be used as medicine, one of which is the Anting-Anting plant. Anting-Antings or (*Acalypha indica L.*) is a tropical plant. Although this plant is included in the type of weed plant, this plant can be used as a medicinal plant because it contains secondary metabolites, one of which is an alkaloid.

Anting-Antings are often found on the roadside and in fields that have a lot of grass, the Anting-Anting Plant has been widely used for generations as various types of drugs such as dysentery, diarrhea, digestive disorders, vomiting blood and others. Anting-Antings (*Acalypha indica L.*) are known to contain aleurone, steroids, alkaloids, saponins, tannins, and flavonoids compounds [4].

One of the bioactives that can be used as antioxidants are flavonoids. Flavonoids act as strong antioxidants in granuloma tissue so that they are able to protect the area around the wound from free radicals that can inhibit wound healing through the destruction of fat, protein, collagen, proteoglycan and hyaluronic acid [12]. According to WHO it was 2008 noted that 68% of the world's population still uses traditional medicine, the majority of which involve plants to cure various diseases. More than 80% of the world's population uses herbal medicine to support their health.

One of the methods used to discover herbal remedies is by extracting the Anting-Anting Plant and drying using certain method so that good quality samples are obtained. The choice of extraction method certainly depends on the nature of the material and compounds to be isolated.

One of the methods used to discover herbal remedies is by extracting the Anting-Anting Plant and drying using certain method so that good quality samples are obtained. The choice of extraction method certainly depends on the nature of the material and compounds to be isolated. To get the optimum drying results as well as the extraction time and ratio of the extraction solvent, it is necessary to do this research. The purpose of this study was to utilize the extract of the Anting - Anting plant in identifying the effectiveness of flavonoids as antioxidants by isolating, extracting using ultrasonic extraction and optimizing the effect of variations in extraction time and solvent

2. Material and Methods

This research was conducted at the Chemical Engineering Laboratory, Universitas Muhammadiyah Jakarta. 3 months, starting from April 2022 to June 2022.

Materials used are Anting-Anting Plant, Ethanol, and Aquadest. Equipment used are Rotary EvaporatorDistillation, Ultrasonic Bath, Erlenmeyer Glass, Analytical Balance, Two-Neck Flask, Dehydrator, Cup, Grinder, 40 mesh sieve, UV-VIS Spectrophotometry

Research Procedure

1) Anting-Antings are washed with running water and then dried in the sun. All the ingredients are blended homogeneously. After that, it was sieved through a 40 mesh sieve. The retente was ground in the blender again to get the desired size of particles.

2) Water content in the material was checked by using a moisturebalance tool before the extraction process is was carried out.

3) Drying in a dehydrator was carried out with a temperature of 50°C and drying time variations of 30 minutes, 45 minutes, 60 minutes, 90 minutes and 120 minutes.

4) The extraction process was carried out by weighing the sample as much as 10 grams and then pouring into a two-neck flask with a volume of 200 ml and added 100 ml of ethanol solvent. Then the flask was equipped with a condenser and a thermometer was inserted into the ultrasonic cleaning bath. Ultrasonic wave-assisted extraction was carried out using an ultrasonic cleaning bath Bransonic 8510 with a frequency of 40 kHz. Extraction time variations 10 minutes, 15 minutes, 20 minutes, 25 minutes, 30 minutes. The extraction results were filtered and concentrated using a rotary vacuum evaporator at a temperature of 50^{o}C to obtain a thick extract.

3. Result and Discussion

3.1 Results of Anting-Anting Plant Drying with a dehydrator

In this study, the initial mass of sample was 50 grams with a temperature of 50 °C and variations in drying time of 30 minutes, 45 minutes, 60 minutes, 90 minutes and 120 minutes, The sample mass obtained after drying is shown in Table 1.

Table 1. Mass of the sample after drying at 50 °C

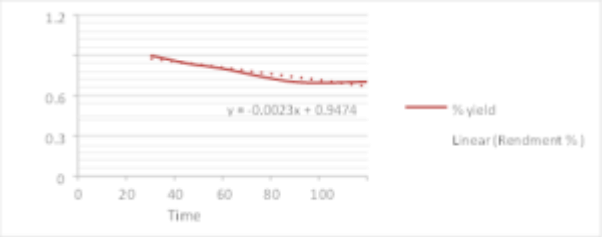
Drying Time (Minutes)	Mass After Drying (grams)	%Yield
30	45	0.9
45	42	0.84
60	40	0.8
90	35	0.7
120	35	0.7

According to McCabe (2002) [10], drying means reducing the amount of water or liquid from a solid material, so that the remaining water or liquid in the solid material has a low and acceptable content. The drying process on the material aims to reduce the moisture content of the material so that the material is more durable and avoids the growth of fungi and unwanted microorganisms. Regression graph of yield vs drying time is shown in Figure 1.

Figure 1 Effect of drying time variation on drying yield of Anting-Antings Plants

Figure 1 regression obtained y = -0.0023x + 0.9474 with R2 = 0.9023 where x is % yield and y is drying time. The drying yield of Anting-Anting Plants I was measured the yield which has a as constant values at a temperature of 90^{o}C.

This drying stage has the aim of removing excess water content in the sample and avoiding microbial growth. This brownish green dry sample is was then to obtain a fine powder sample that has of smaller size.



According to Voight (1995) [9], if the sample size is small, it can increase the surface area of the sample so that the extraction process becomes more leverage. Anting-Anting Plant Powder was and mashed and then sifted with 40 mesh sieve which aims to size variations, In addition, in a study conducted looking at the effect of drying on the total flavonoid content of onion varieties, the existing drying method affects the flavonoid content in the sample. Drying at high temperatures causes the flavonoid content to decrease. This is because at high temperatures, flavonoids have been degraded. According to Syafarida (2018) [11], The higher the temperature used in the drying process, the lower the flavonoid content in the sample. The flavonoid content decreased along with the increase of temperature used so that the phenol decomposition occurred which affected the flavonoid content. The decrease in moisture content occurs rapidly but then slows down with increasing drying time. At 50°C according to the reference. The best drying of the material for 90 minutes could reach watwe content of 30%, while the lowest decrease in water content of 10% is was observed at drying time of 30 minutes.

3.2 Effect of Solute: Solvent Ratio

The optimum yield was obtained at a solute:solvent ratio of 1:5 m/v. The result data obtained are presented in Table 2.

Table 2 Yield of Anting-Anting Plants Powders at Various Solute: Solvent Ratios

Ratio (m/v)	Anting-Anting Plant Extract Mass (g)	Yield (%)
1:1	0.49	5
1:2	0.73	7
1:3	1.06	11
1:4	1.65	16
1:5	1.87	19

In this study, the Anting-Anting plant powder had the best drying yield for 90 minutes at a temperature of 50^{o}C with a mesh of 40 sieve. Anting-Anting plants that had been sifted and dried were taken 10 grams each for ultrasonic extraction with a wavelength of 40 kHz with ethanol solvent, then carried out sonication with solute:solvent ratio variations of 1:1, 1:2, 1:3, 1:4 and 1:5 m/v. The samples were then it is filtered by evaporating the ethanol solvent to obtain the extract. Evaporation was then carried out in a rotary evaporator to separate the solvent from the solution to obtain a higher extract concentration. The best yield was then tested for the characteristics using proximate test analysis, total antioxidant testing using the dpph, DPPH test procedure. The table data of the extraction yield of Anting-Anting Plants at various solute:solvent ratios is presented in Figure 2.

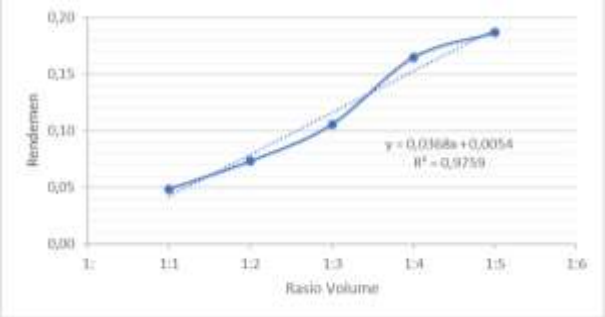


Figure 2 Effect of solute:solvent ratio on the yield of Anting-Anting Plants

In Figure 2, the regression result is y = 0.0368x – 0.9759 with R^2 = 0.9759 where x is the yield and y is the variation of the solute:solvent ratio. The best yield of the best Anting – Anting plant extract of 19% was obtained at the solute:solvent ratio of 1:5 m/v. This results is in accordance with the research conducted by Januarti et. al (2017) who performed ultrasonic extraction [4] who carried out ultrasonic extraction on soursop leaves, that The greater the ratio of solute: solvent and the longer extraction time, the greater the average yield. This extraction principle utilizes ultrasonic waves transmitted through the solvent to cause micro cavitation around the material to be extracted so that heating occurs and finally releases the extract compound. The mechanical effect break down the plant cell walls while increasing mass transfer so that the phytochemical compounds contained in plants diffuse to the solvent effectively.

3.3 Effect of Extraction Time

The data obtained for various the ultrasonic-assisted extraction times, namely at various 10 minutes, 15 minutes, 20 minutes, 25 minutes and 30 minutes are contained in Tabel 3.

Table 3. Results of Varying Ultrasonic-Assisted Extraction Time on the Yield of Anting-Anting Plants Extract

Extraction Time (minutes)	Extract Weight (grams)	Yield(%)
10	0.49	5
15	0.73	7
20	1.06	11
25	1.65	16
30	1.87	19

From the data in Table 3, a

Extraction Time (minutes)	Extract Weight (grams)	Yield(%)
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15	0.73	7
20	1.06	11
25	1.65	16
30	1.87	19

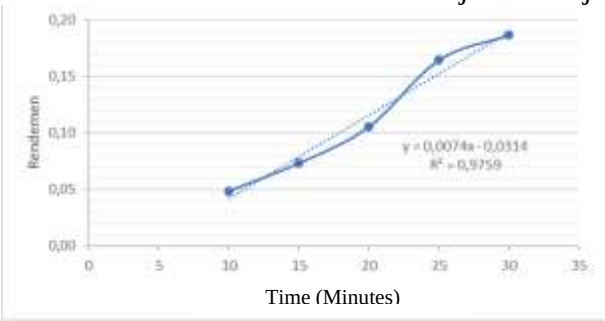

Figure 3. The Effect of Extraction Time on the Yield of Anting-Anting Plant Extract

Based on Figure 3, the extraction time affects the yield following the linear regression equation y = 0.0074x – 0.0314, where the value of y is the yield and x is the sonication time. The value of R^2 is 0.9759, this shows showing a close correlation and influence between y and x, where the longer the extraction time, the greater the yield. The best yield of Anting - Anting plant extract 19% was obtained at the longest sonication time 30 minutes. Result is in accordance with the research conducted by who carried out ultrasonic extraction of Anting-Anting Plants, that the longer the extraction time, the greater the chance of contact between the material and the solvent so that the results will continue to increase.

This result proves that the ultrasonic-assisted extraction method is better than other extraction methods, because cavitations formed in the samples when treated with ultrasonic waves can break the cell walls of the material. Therefore ultrasonic extraction techniques can be used as a more efficient and faster alternative in extracting natural materials. The advantage of the ultrasonic method is to speed up the extraction process and enlarge the extraction results.

4. Conclusion

1. Effect of drying time with a dehydrator on the yield obtained the regression equation of y = 0.0074x - 0.0314 , R^2 = 0.9759, this This value shows that there is a close correlation and influence between y= sonikasi time and x = rendemen, where the longer the sonication time,drying time the greater the yield.

2. The best yield of 19% was found at a ratio of powder:ethanol 1:5.

3. Sonication time affects the yield following the linear regression equation y = 0.0074x – 0.0314, R^2 = 0.9759 , The best yield of 19% was obtained at the longest sonication time of 30 minutes.

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