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**AFPS 2019**  
The Asian Federation for Pharmaceutical Sciences

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# Certificate of Appreciation

To:

**Damaranie Dipahayu**

*in recognition of the valuable contribution as:*

**Presenter in The Oral Session**

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Plenary Speaker: 4.5 SKP, Invited Speaker: 4.5 SKP, Workshop Speaker: 6.5 SKP, Presenter of Oral/Poster Session: 3 SKP, Judges: 3 SKP,  
Committee: 2.5 SKP, Workshop Participant: 6.5 SKP, Conference Participant: 10 SKP, Moderator: 1.5 SKP



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## **The Effects of Leaf Age and Simplicia Drying Method on Total Phenolic Content of *Ipomoea batatas* (L.) Antin 3 Leaves Extract**

### **Background:**

Antin 3 is the name of the purple sweet potato plant (*Ipomoea batatas* (L.) variety of Anthocyanin 3. It is originally named MSU 03028-'10. This plant is the result of the development of Malang-Indonesia Research Institute for Nuts and Tubers (BALITKABI), which is to provide a carbohydrate alternative food source. The tuber of Antin 3 has high micronutrient values, specifically anthocyanin content. However, the leaves are not optimally utilized yet. Meanwhile, 96 % ethanol extract of young leaves Antin 3, which is simply freeze dried at  $-45^{\circ}\text{C}$  for 48 hours, has a total flavonoid content of 2.16 times higher than the oven dried leaves at  $40^{\circ}\text{C}$  for 24 hours

### **Purpose :**

The aim of this study is to determine the polyphenol content of 70% ethanol extract of Antin 3 leaves (Antin 3 extract). The Antin 3 simplicia used in this study is both young leaves and old leaves. Both of them dried separately into two different methods, namely aerated at room temperature (air-drying) and freeze-drying. Through this research, it will discover part of leaf and drying methods that can produce the most optimal polyphenols, which is subsequently used as an anti-bacterial ingredient

### **Methods :**

Extraction:

Both of young and old Antin 3 leaves, were sorted wet separately and washed with running clean water. Then, simplicia Antin 3 leaf was stored in the refrigerator (temperature 4 °C) for 24 hours first and carried out at -45 °C at freeze-drying equipment for 48 hours. Meanwhile, Antin 3 leaves were wiped first and placed in a non-humid room with adequate air circulation and sunlight (indirectly) with a room temperature of  $35 \pm 1.0$  °C, it arranged in such a way so that they were not stacked to one another during the air-drying process for 120 hours until the leaves were destroyed when kneaded<sup>19</sup>. Then, the leaves were blended to become leaf powder. Extraction was carried out by kinetic re-maceration, soaking each leaf powder of Antin 3 as much as 40 grams into 500 mL of 70% ethanol solvent and stirred continuously using a magnetic stirrer for 3 hours, then filtering out. These steps were done twice. Total macerate thickened by rotary-rotavapour until ethanol is dripped then thickened again in the oven at 40 °C

Standart and test sample preparation:

The polyphenol level test was carried out by spectrophotometric method using gallic acid as the standard. The standard curve was made by making a series of gallic acid standard solutions at concentration of 5 ppm, 10 ppm, 15 ppm, 20 ppm, 25 ppm and 30 ppm. About 1.0 mL each of this solution then was put into the vials and added by 0.5 mL Folin-Ciocalteu. This solution was incubated for 5 minutes then added by 2.0 mL NaCO<sub>3</sub> solution and incubated one more time for 10 minutes

Each of extract Antin 3 (YFD; OFD; YA; OA) was weighed 50 mg and dissolved with 50.0 mL aquadest. About 5.0 mL of each solution then added aquadest ad 20.0 mL. About 1.0 mL of this each solution was then put into the vial then plus 0.5 mL Folin-Ciocalteu and incubated for 5

minutes. Each of them was then added by 2.0 mL NaCO<sub>3</sub> solution and incubated one more time for 10 minutes

#### *Determination of polyphenols level*

The concentration series of standard sample and test sample were measured at a 770 nm wavelength by the spectrophotometer uv-vis. Absorbance of the standard was used for standard curve, while test sample was used for counting their concentration

#### **Result**

The drying process of Antin 3 leaf simplicia in this research refers to the results of previous studies, in which the content of flavonoids in young leaves Antin 3, dried through freeze-drying method at -45<sup>0</sup>C for 48 hours, was 2.16 times higher than those dried by oven method at 40<sup>0</sup>C for 24 hours. Freeze-drying method effectively protects flavonoid components from degradation or damage compared to the oven-drying method <sup>2</sup>. In this study, the oven-drying method was replaced by aerating the research simplicia at room temperature to minimize the damage of flavonoids due to temperature factors. Simplicia of Dewa leaves (*Hynura pseudochina* (L.) DC.) dried through air-drying at room temperature have 2 times phenolic content compared to oven temperature drying of 40<sup>0</sup>C

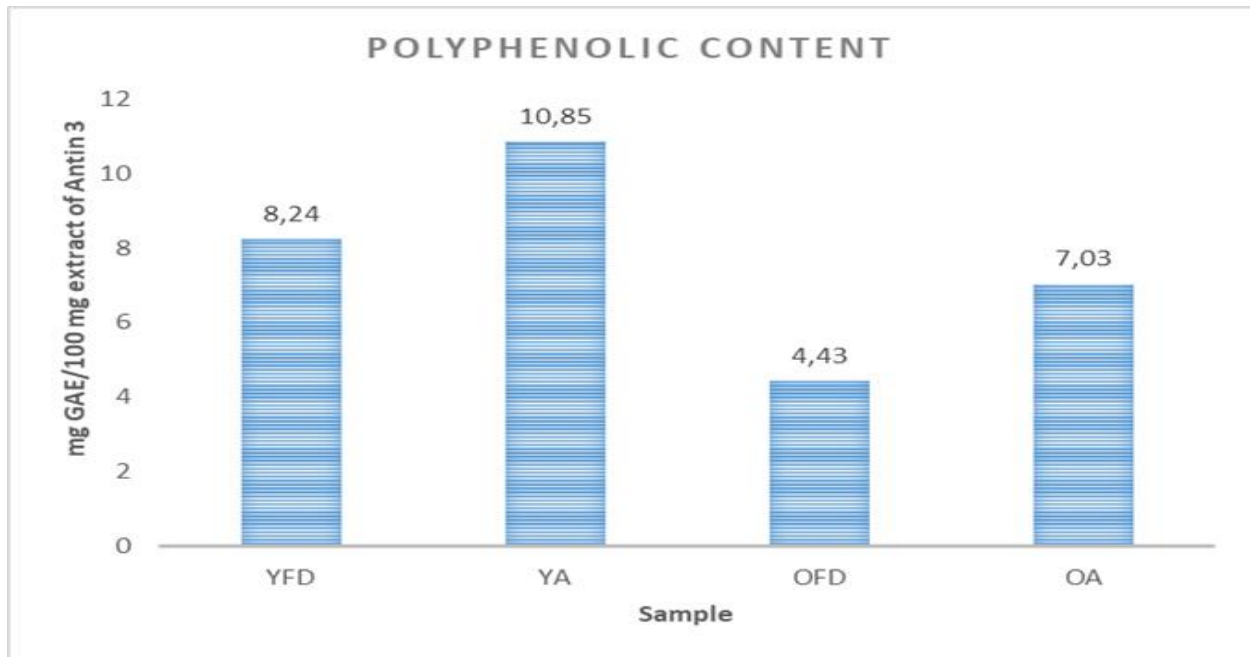


Figure 1. Polyphenolic content diagrams

As shown in figure. 1, young Antin 3 leaves have higher polyphenols content than the old one. Air-drying method on the young Antin 3 could considerably produce 1.3 times polyphenols higher than the freeze-drying method. Leaf part variables and simplicia drying methods influence the content of polyphenol extract Antin 3 significantly. Young leaves of Antin 3, coloured purple, indicates the majority of anthocyanins content. Anthocyanin is a flavonoid compound found in plants containing sugar groups which are compounded in one or more phenolic hydroxyl groups (polyphenols). Whereas, old green leaves Antin 3 with harder textures contain more chlorophyll and cellulosa.

Freeze-dried simplicia produces less polyphenols than air-dried because freeze-drying process could shrink the pores and structure of the leaves so that the polyphenol component cannot get out of the leaf matrix maximally . Freezing procedures before the freeze-drying process produces crystals ice, which can damage phenolic components. Meanwhile, the air-drying method, utilizing

room temperature and pressure either indirect solar lighting as well as good air circulation, considerably makes the leaves of Antin 3 damaged so that it can maximize the polyphenol component when extracted.



# The Effects of Leaf Age and Simplicia Drying Method on Total Phenolic Content of *Ipomoea batatas* (L.) Antin 3 Leaves Extract

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RISET, TEKNOLOGI DAN PENDIDIKAN TINGGI





# Outlines of Presentation

1. Background
  2. Purpose
  3. Research Methods
  4. Result
  5. Conclusions and suggestions
- 



# 1. Background



**ANTIN 3 (MSU 03028-10) is a New Variety of *Ipomoea batatas* (L.) :**



- the result of the development of Research Institute for Nuts and Tubers (BALITKABI) Malang- Indonesia
- Providing carbohydrate alternative food source.
- Containing 150,67 mg anthocyanins /100 g tuber (Yusuf et al, 2013)
- Leaving a portion of the leaf as a waste

***Ipomoea batatas* leaves can be used as a potential source of natural antioxidants and antibacterials (Hue et al, 2012 ; Fajar, 2013)**

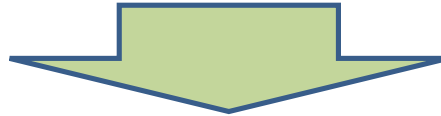
- **The total phenolic content :**
  - a. Leaves extract of Indon variety is  $5.35 \pm 0$  grams GAE / 100 grams DW
- **The total flavonoid content :**

simplicia freeze dried of Antin 3 young leaves at  $-45^{\circ}\text{C}$  (48 hours) $\gg\gg$ (2.16 times) than oven dried at  $40^{\circ}\text{C}$  (24 hours)

# 2. Purpose

## LITERATURE REVIEW

1. The drying method of simplicia becomes an important point that influences the number of components extracted by solvents (Gumilang, 2016)
2. The ages of leaves can also affect the number of polyphenol components (Permata and Asben, 2017)



“ Find out which **parts of the leaves** and **drying methods** that are suitable for releasing the most optimal polyphenols”

# 3. Methods (1)



Total Phenolic content

4.

Determine the total phenolic content  
(spectrophotometri UV Vis Method  
and gallic acid standard )

3.

Thick extract

Freeze-drying  
-45 °C for 48 hours

1. Air-drying  
room temperature for  
120 hours

Dried Simplicia

2.

1. 70 % ethanol as a solvent
2. Re-maceration kinetic in room temperature
3. Evaporation solvent by rotary rotavapor

# Methods (2) : Preparation standard and sample

## Gallic acid standard series solution

5 ; 10 ; 15 ; 20 ; 25 and 30 ppm.

1.0 mL of each concentration  
added 0.5 mL of Folin-Ciocalteu  
and incubated for 5 minutes

added by 2.0 mL of 10 %  $\text{NaCO}_3$  solution  
and re-incubated for 10 minutes

measured at 770 nm wavelength  
by the spectrophotometer uv-vis

## Sample solution

Each of extract (YFD, YA, OFD, OA)  
was weighed 50,0 mg  
added aquadest up to 50,0 mL

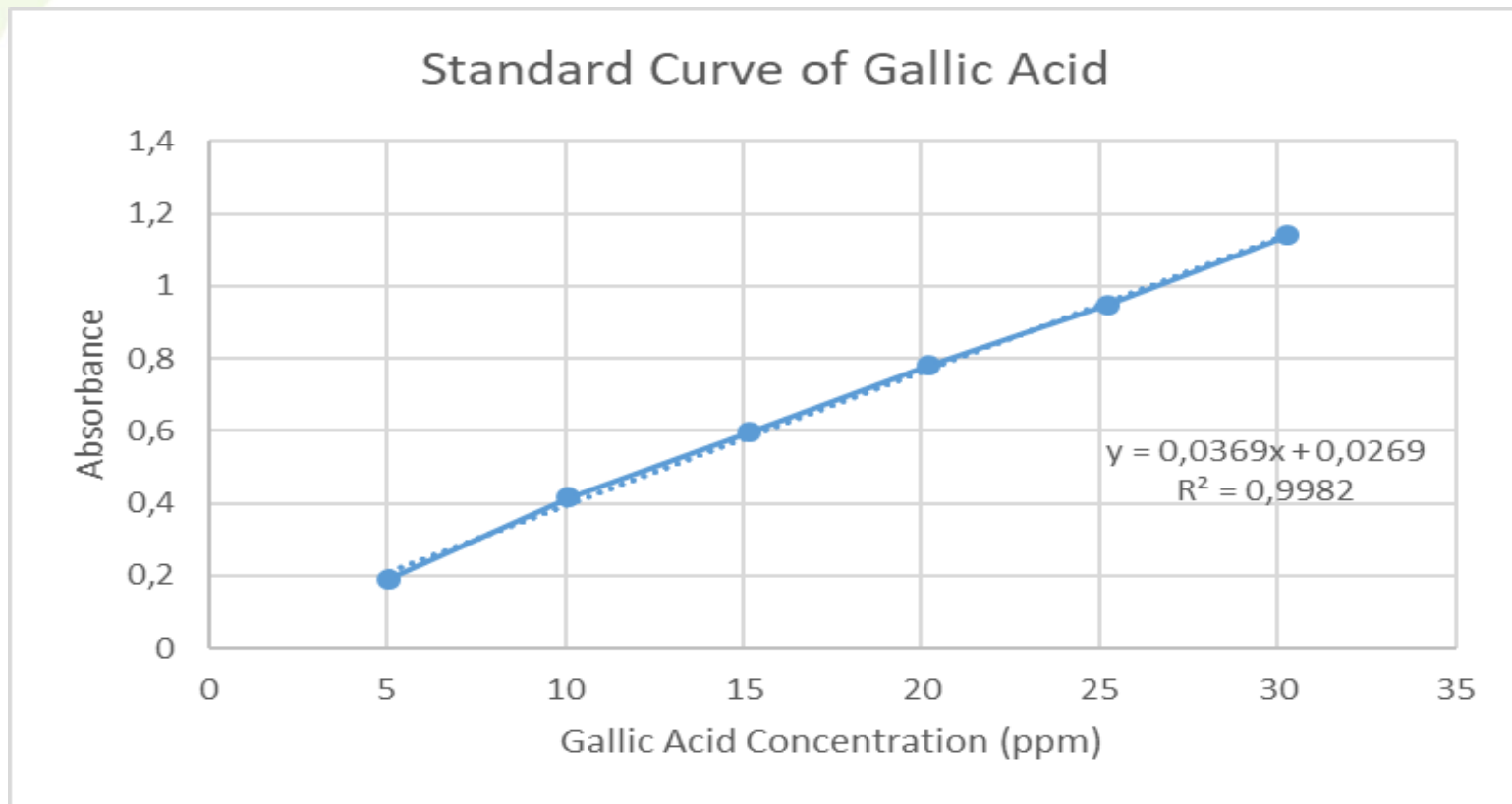
About 5.0 mL of each solution  
added aquadest up to 20.0 mL  
( dilution 4x)

1.0 mL of each sample solution  
added 0.5 mL of Folin-Ciocalteu  
and incubated for 5 minutes

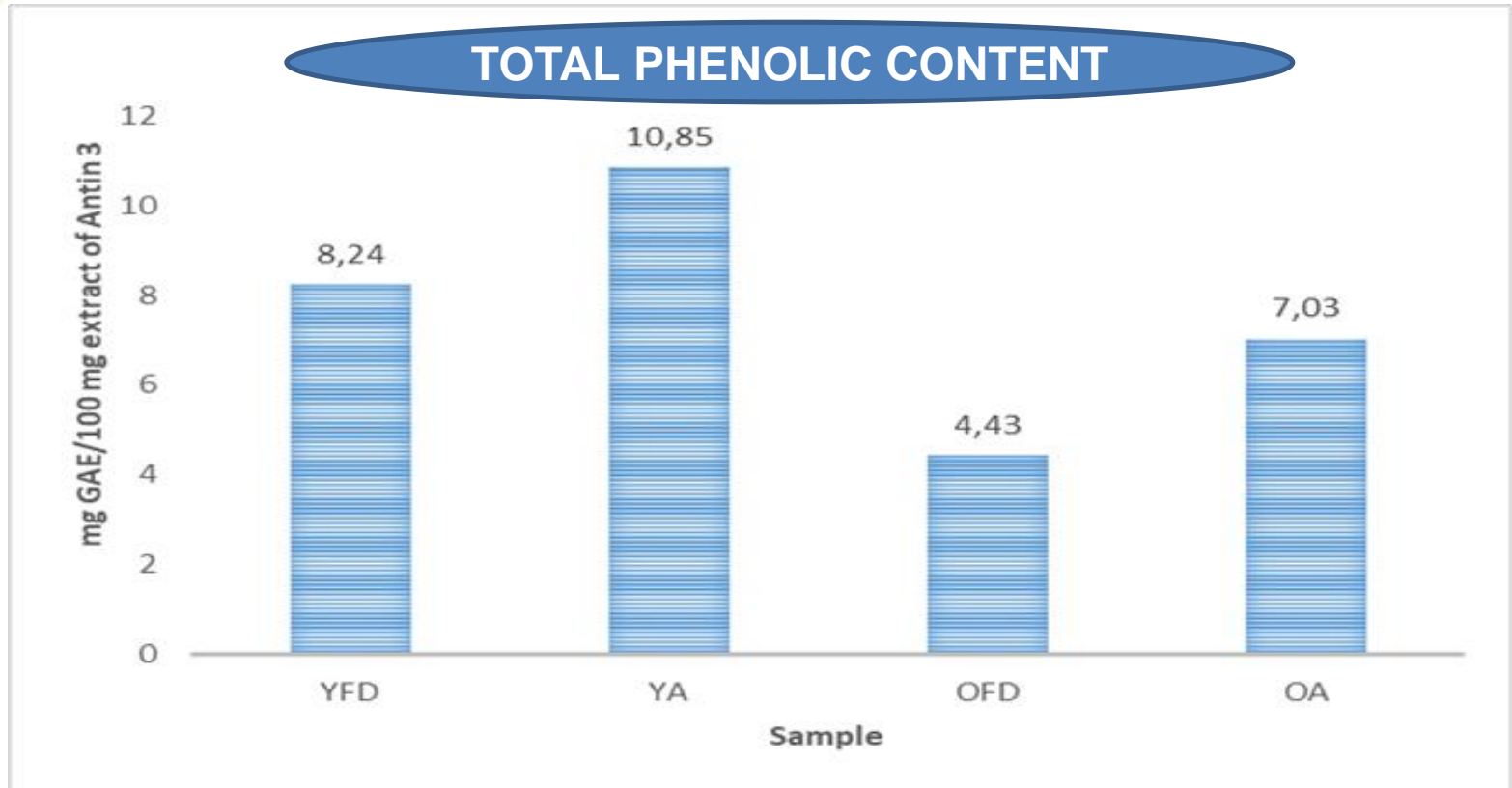
added by 2.0 mL of 10 %  $\text{NaCO}_3$  solution  
and re-incubated for 10 minutes

measured at 770 nm wavelength  
by the spectrophotometer uv-vis

## 4. Result (1)



## Result (2)



# Discussion :

	<b>Age of leaves</b>		<b>Drying simplicia methods</b>
1.	Majority component of Antin 3 young leave is Anthocyanins (Flavonoids) (Djamilah and Dipahayu, 2018)	1.	Freeze-drying process could shrink the pores and structures of matrix leaves that does not make polyphenols extracted maximally (Khalloufi, 2010)
2.	Majority component of Antin 3 old leaves are chlorophyll and cellulose (Adip et al, 2014)	2.	Air-drying process can damage the matrix of the leaves which enable for polyphenols to come out when extracted (Gumilang, 2016)

# 5. Conclusions and Suggestion

## Conclusions :

1. Young leaves of Antin 3 produce higher polyphenols than old leaves.
2. Air-drying method is an effective method to produce polyphenols more optimal than freeze-drying.

## Suggestion:

1. Employ other drying methods and other solvents to further optimize the extraction of polyphenols from leaves of Antin 3



The image features a vibrant green background. On the left side, there is a close-up of a green leaf with several clear water droplets of varying sizes. On the right side, there is a circular graphic with a white border and a light green, scalloped inner edge. Inside this circle, the words "THANK YOU" are written in a bold, dark green, sans-serif font.

**THANK YOU**