

The Differences of Physicochemical Characters of Leaf Extract from The Red Binahong and The Green Binahong

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Abstract. This study is conducted to distinguish the extract of red-stemmed binahong leaves and the extract of green-stemmed binahong leaves and to physicochemically characterize them. Extraction is done by using water solvents. Extraction results are characterized physically and chemically. Physical characterization involves color, pH, viscosity, and density. Chemical characterization involves phytochemical testing of each binahong leaf extract. Physically the results show that in addition to the color difference, the three other physical properties of the two extract types are almost the same. Chemically, the two extracts have differences in the tannin and saponin contents. However, both extracts showed the presence of alkaloids, flavones, and steroids.

Keywords: *binahong; extract; physically; chemically*

1. Introduction

Binahong, which has recently been widely grown as an ornamental plant, has many properties in curing various kinds of minor and serious ailments. This plant originating from Korea is known to the Chinese by the name dheng san chi and has been consumed for thousands of years by the Chinese, Korean, Taiwanese and others.

Binahong is a kind of creeper. The roots are rhizome-shaped. The stems are soft, twine each other in green color (binahong with green trunk) and red color (binahong with red trunk). The different types of binahong based on the color of the stems distinguish their use as a traditional medicinal ingredient. Wound healing usually uses a type of binahong with a red trunk. Prevention of minor ailments generally uses the green trunked binahong type.

Binahong has single leaves, very short-stemmed, alternately arranged, green, heart-shaped. Binahong leaf blade is thin limp, pointed tip, grooved base, flat edge, smooth surface. The leaves are edible. This leaf part is widely used as a medicinal ingredient. Binahong leaves are thought to contain flavonoids, alkaloids, terpenoids, and saponins. The leaves of these plants have antibacterial properties and are cytotoxic. Binahong leaves also contain oleanolic acid which has anti-inflammatory properties to reduce pain such as burns.

Actually, almost all parts of the Binahong plant can be used as medicinal ingredients. Binahong is believed to have the potential as an antioxidant and cancer prevention agent. This plant is thought to have a high antioxidant and antimicrobial content (Priya, Gupta, Mahajan, Agnihotri, & Sharma, 2015). Binahong has the potential as an antioxidant and cancer prevention agent. Compounds that are thought to be antioxidants and anti-inflammatory are flavonoids contained in these plants. Phytochemical screening of binahong leaves showed that the flavonoids in binahong leaves which are antioxidants can inhibit the action of the xanthine oxidase enzyme. This can inhibit uric acid formation.

In general, binahong has great potential as a medicinal plant. Many things from this plant still need to be explored, especially as a phytopharmaca. Plants that spread through China to Southeast Asia are even known in European and American countries. However, experts from these countries have not been interested in researching binahong seriously and deeply (Manoi, 2009). Thus, on this

occasion, it is necessary to study the chemical content of the binahong plant with red and green trunk along with its physicochemical characteristics to ensure that binahong is a plant that has the potential for medicinal development.

2. Material and Method

Material

The main material of this research are binahong leaves with red stems and binahong leaves with green trunks harvested from the Banyuwangi environment of East Java.

Procedure

Binahong leaf extract preparation

Binahong leaf extract is prepared through a maceration technique involving solvents with different polarities, such as water, ethanol, hexane, and others. However, this research is limited by distilled water solvent. The extraction was carried out with the help of a rotary evaporator.

Binahong leaf extract characterization

The binahong leaf extract was characterized physically and chemically. Physical characterization is related to the organoleptic of the extract, viscosity, density, and others. Chemical characterization is carried out mainly to screen bioactive compounds which are responsible for the emergence of drug potential from binahong. This chemical characterization was carried out by means of a phytochemical test consisting of: carbohydrate test with molisch reagent, reducing sugar test with Fehling solution, tannin test with vanillin solution, saponin test with distilled water plus HCl, alkaloid test with dragendorff reagent, flavonoid test with ethanol added. Mg powder and 2N HCl then added with concentrated HCl, steroid test with anhydrous acetic acid plus concentrated H₂SO₄.

3. Result and Discussion

Research result

The resulting binahong extract consists of leaf extract from binahong with red trunk and leaf extract from binahong with green trunk which is extracted using distilled water. The leaf extract from binahong with red stems during extraction with water solvent is red, while the leaf extract from binahong with green trunk is yellow as shown in Figure 1.



Figure 1. Leaf extract from binahong with red trunk (a) and leaf extract from binahong with green trunk (b) when extracted

The red color of the leaf extract of the binahong with red trunk and the yellow color of the leaf extract of the green trunk lasted for 3 days after being stored in the refrigerator. After 3 days, it turns out that the colors of the two types of binahong leaf extract have changed to almost the same color, namely brownish-yellow as shown in Figure 2.

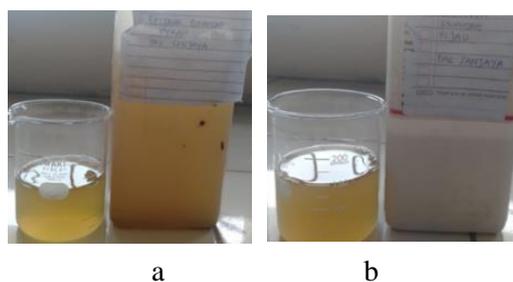


Figure 2. Leaf extract from binahong with red trunk (a) and leaf extract from binahong with green trunk (b) after being stored for 3 days

The physical properties other than the color of the binahong leaf extract with red trunk (BLERT) and the binahong leaf extract with green trunk (BLEGT) are shown in Table 1 below.

Table 1. Physical properties of the leaf extract from the binahong with the red and the green trunk

Type of material	pH	Density	Viscosity
BLERT	6	0.970736	9.83
BLEGT	7	0.970836	9.84

Analysis of the chemical content of leaf extracts from binahong with red trunk and leaf extract from binahong with green trunk through qualitative phytochemical tests is shown in Table 2.

Table 2. The results of the analysis of compounds in the leaf extract of binahong with the red and the green trunk

Type of Compound	BLERT	BLEGT
Carbohydrate	-	-
Reducing sugar	+	+
Tannins	-	+
Saponins	-	+
Alkaloids	+	+
Flavonoids	+	+
Steroids	+	+

Discussion

The leaf extract from the binahong with a red trunk and the leaf extract from the binahong with a green trunk has different color characteristics in the initial extraction results. This is thought to occur because there are different organic compounds responsible for these color differences. The red color in the leaf extract of the red trunked binahong is thought to be due to the presence of betalains (Pawar, Shinde, & Junna, 2018). A red-purple coloring pigment that has a structure like Figure 3. The yellow color in the leaf extract of the green trunk indicates the presence of flavone and chalcone compounds. (Masniah & Manurung, 2019).

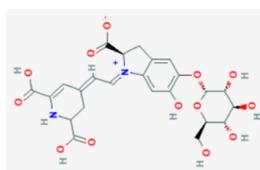


Figure 1. Betalain, a red-purple pigment in the leaf extract of binahong with red trunk

The organic compounds responsible for the color difference between the leaf extract of the binahong with the red trunk and the leaf extract of the binahong with the green trunk appear to be unstable on storage. Apart from being easily oxidized, many factors change their stability, causing discoloration and loss of functional properties (Herbach, Stintzing, & Carle, 2006). This is evidenced by the browning of the stored extracts after a storage period of 3 days, as shown in Figure 4.2. The easily oxidized nature of the organic compounds contained in each leaf extract from binahong is very important related to the use of leaf extract from binahong as an antioxidant and/or reducing reagent.

Based on physical characteristics, apart from color, the two-leaf extracts from binahong are not much different. The leaf extract from binahong with a red trunk is more acidic with a density and consistency slightly smaller than the leaf extract from binahong with a green trunk. The pH of the two types of extracts tends to be neutral and not too acidic. This is predicted to be very well used as a base for the cosmetic and drug industries. Regarding the cosmetic industry, the pH of each leaf extract from binahong is close to the pH of the skin which is around pH = 5. Based on the proximity to the pH of the skin surface, the pH of the leaf extract from binahong with the red trunk is better than the pH of the leaf extract from binahong with the green trunk.

Qualitatively, the leaf extract from the binahong with red trunk and the leaf extract from the binahong with green trunk was different in the presence of tannin and saponin compounds. The first type of extract did not show but the second type of extract showed the presence of these two kinds of compounds. Both types of extracts show the presence of alkaloid compounds, flavonoids, and steroids. However, it has not been identified each type of the alkaloid, flavonoid, and steroid compounds.

4. Conclusion

The leaf extract from the binahong with red trunk and the leaf extract from the binahong with the green trunk is physically different in the color produced during extraction, which is red for the first type of extract and the second type is yellow. Both of them were unstable and easily oxidized, evidenced by storage after 3 days, both of them were browned so that they were almost the same color. Other physical properties are relatively not different even though the pH, density, and viscosity of the leaf extract from binahong with the red trunk are lower in value than the leaf extract from binahong with the green trunk. The two types of leaf extracts from binahong have differences in the content of tannins and saponins. However, both of them contain alkaloid compounds, flavonoids, and steroids.

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