



The thermal resistance anthocyanin from *Ficus padana* burm. F as an alternative source of food dye

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ABSTRACT

Ficus Padana Burm f fruit research has potential as a potent source of anthocyanin, which is based on allegations of analysis of HPLC-DAD-MS concluded that the main components of anthocyanins contained in acidified ethanol extract of *Ficus* fruit Burm.f Padana is pelargonidin 3 (6''-p-coumarylglucoside) -5 (4'' '- Malonylglucoside) and pelargonidin 3 (6' '- malonylglucoside). Anthocyanins from *Ficus* fruit Padana Burm.F which is a type of acylated anthocyanins which is one reason why anthocyanins that found in fruit extracts of *Ficus Padana* burm.f have stable properties of the influence of temperature. In experiment that given four treatments temperature (30,50,70,100 °C) to the 3 three different pH solution (pH1,3,9) where the data obtained that the absorption spectrum of UV-Vis of the three solutions were not decreased significantly.

Keywords : Anthocyanin,*Ficus Padana* burm.f, Temperature

INTRODUCTION

Anthocyanin is a water-soluble compounds and classes of compounds including flavonoids. Anthocyanin pigments are generally colored red, blue, and violet, are usually found on flowers, fruits, and vegetables [1] anthocyanins are one of the first flavonoids to be analyzed because their visibility is very clear in plain and easy to be isolated and anthocyanins are found in significant amounts [2]. In its application as product food additives, anthocyanins can undergo a process of degradation during the process of extraction, processing and storage. There are several factors that influence anthocyanin stability, among others, the presence of specific modifications in the structure of anthocyanin (glycosylated, acylated with aliphatic or aromatic acid), pH, temperature, light, the presence of metal ions, oxygen, sugar, enzymes and the effect of sulfur dioxide. Temperature is one factor that can shift the equilibrium anthocyani. heat treatment) can cause anthocyanin equilibrium forms are not inclined toward colored, the carbinol base and chalcon

Previous *Ficus Padana* Burm f fruit research has potential as a potent source of anthocyanin, which is based on allegations of analysis of HPLC-DAD-MS concluded that the main components of anthocyanins contained in acidified ethanol extract of *Ficus* fruit Burm.f Padana is pelargonidin 3 (6''-p-coumarylglucoside) -5 (4'' '- Malonylglucoside) with the data m / z 827.2029 and pelargonidin 3 (6' '- malonylglucoside) with the data m / z 519.1139 [3]

Observations of anthocyanin extracts from fruits of *Ficus Padana* Burm.f on solution pH 1, 3 and 9 showed no existence although the color red in a more concentrated solution of pH 1, this shows that anthocyanins present in the fruit extracts of *Ficus Padana* Burm. F has a fairly good stability in solution of pH 3 and pH 9. Based on these data the authors further examine the nature of anthocyanin that is based on the thermal stability properties of the respective extracts at pH , pH 3 and pH 9 with Spektrofotometry method.

EXPERIMENTAL SECTION

Materials

Plant samples

The fruit samples were picked at Andalas University botanical garden in West Sumatera, and transported to the laboratory immediately.

The fruits sample was identify at Research Centre of Biology, Indonesian Institute of Sciences with identification number 1168/IPH.1.02/if.8/VI/2013

Chemicals

HPLC-grade water, ethanol and buffer solution were obtained from Merck , Germany. All chemicals used in this study were analytical grade.

Instrumentation

Shimadzu spectrophotometer UV1800, Water bath (Memmert), Stove

Procedure

Extraction of anthocyanins

Acidified of ethanol pH 1,5 were prepared by mixed of ethanol with citric acid 35 %(3:7). 200 ml acidified ethanol was added into 1000 ml Erlenmeyer flask containing 100 g fruit. Anthocyanins were extracted at room temperatur for 6 hours in dark environment; this procedure was repeated three times to collect the extract solution. The extraction was concentrated under vacuum at room temperatur using a rotary evaporator until left 1/3. About 10 ml of extracted solution was passed through a 0.45 µm millipore filter for analysis.[3]

Measurement of the stability of anthocyanin extract from temperature treatment

Measurement of the color intensity of anthocyanin extracts performed on the anthocyanin solution dissolved in three different solution pH conditions (pH 1,pH 3, and pH 9) with four temperature treatment (30 °C,50 °C, 70 °C and 100 °C). Each solution was measured with a maximum wavelength double beam spectrophotometer Shimadzu UV-1800 with an area measuring wavelengths between 200-800 nm

RESULTS AND DISCUSSION

Anthocyanin extracts that obtained being conducted the stability testing on the effect of pH. pH treatments were 1, 3, and 9. The colors of anthocyanin extracts at various pH conditions provide different color, which are also followed by differences in the maximum wavelength of absorbance of each extract at each pH condition. Observation of uv-vis spectrum of pH 5 and pH 7 has been report that not give any significantly adsorption in UV-Vis spectrum.

At the first treatment, the sample extract is given heat with 30 °C temperature variation (as a control), 50 °C, 70 °C and 100 °C for 15 minutes in a water bath, the point is to see the percentage of anthocyanins degradation or damage to the given temperature treatment. The reason why taking the temperature variation above is for the application as a dye for food and beverage processing, because in general the food and beverage processing using an aqueous system that uses temperature boiling point of water is 100 °C [4]. The effect of temperature observations to the treatment given to the three pH treatments, namely pH 1, pH 3 and pH 9, are because based on the effect of pH on the stability of anthocyanins in the fruit extracts of *Ficus Padana* Burm in getting three pH conditions still provide absorption in the visible region of the spectrum light (visible) to give a red observations in the extracts

For the temperature treatment of liquid conditions with pH 1.5 can be seen from the data table attached that the temperature treatment between 30 °C -70 °C gave no effect on the spectrum of existing anthocyanin compounds, whereas for treatment at 100 °C which may affect the absorbance values obtained will rise the spectrum of the UV-Vis wavelength and there is a slight shift in the wavelength of 278 nm 276 nm wide. Increase in the absorbance value at a wavelength in the visible spectrum (526 nm) showed concentrations of anthocyanin compounds present in the extract mixture, also indicated by the increasing of red colour.

With increasing temperature, the bonding between organic acids with anthocyanin molecules will break up so it will make the pH of the solution becomes more acidic, thus making the stability of anthocyanins is increasing.

For the extract mix with buffer solution pH 3 and pH 9 showed the data that the temperature treatment between 30 °C -100 °C gave no effect on the spectrum of existing anthocyanin compound, which can be seen from the

absorbance values are given at a wavelength in the visible light region that have no significant change, as attached in Table 2 and Table 3.

Table 1 .Observation of the color and UV-Vis absorbtion of temperature treatment of extract of *Ficus Padana burm.f* fruits at pH 1 Solution

No	Temperature (°C)	Colour	Absorbance	
			$\lambda=278$	$\lambda=526$
1	30	Red	2.261	0,115
2	50	More Red	2.261	0,115
3	70	More Red	2.261	0,115
4	100	More Red	2.516 (λ 276)	0,185

Table 2 .Observation of the color and UV-Vis absorbtion of temperature treatment of extract of *Ficus Padana burm.f* fruits at pH 3 Solution

No	Temperature (°C)	colour	Absorbance	
			$\lambda=276$	$\lambda=510$
1	30	Less Red	2.210	0,097
2	50	Less Red	2.339	0,109
3	70	Less Red	2.414	0,110
4	100	Less Red	2.313 (λ 274)	0,111

Table 3 .Observation of the color and UV-Vis absorbtion of temperature treatment of extract of *Ficus Padana burm.f* fruits at pH 9 Solution

No	Temperature (°C)	Colour	Absorbance	
			$\lambda=276$	$\lambda=512$
1	30	Less Red	2.271	0,055 (λ 514)
2	50	Less Red	2.305	0,059
3	70	Less Red	2.359	0,062
4	100	Less Red	2.390	0,062

Having no impact with the temperature treatment on the absorbance values given by the sample extract extract mixture at pH 1, pH 3 and pH 9 may be caused by glycolated bonds or acylated anthocyanins contained in the existing compound. Binding is likely to provide protection against the existing stability of anthocyanin compounds [5].

Based on the data obtained from the analysis of HPLC-DAD-MS allegedly main compound anthocyanin extracts from samples were pelargonidin 3-(6"-p coumarylglucoside) -5 (4' '- Malonylglucoside) and pelargonidin 3-(6' '- malonylglucoside). From these data it is known that the main anthocyanins contained in anthocyanin extract is a type of acylated with organic acids.

CONCLUSION

Anthocyanins from *Ficus* fruit *Padana* *Burm.F* which is a type of acylated anthocyanins is one of the alternative sources that can be developed as a source of natural dyes in food because it is not easily degraded by the effect of temperature (heat).

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