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ANTHOCYANINS ABSORPTION OF GRAPES (*Vitis vinifera*) ON FILTER PAPER, WHATMANN NO. 41 AND WHATMANN NO. 42 FOR IDENTIFICATION OF BORAX

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ABSTRACT

Anthocyanins Absorption of Grapes (*Vitis vinifera*) on Filter Paper, Whatmann no. 41 and Whatmann no. 42 for Identification of Borax. Borax detection can be done using the flame test method, volumetric titration, spectrophotometric analysis, and qualitatively using natural materials such as curcumin and anthocyanins. Acid-base titrations have the potential to utilize the high content of anthocyanins in grapes as an indicator of natural acid-base. The research objective was to determine the potential of anthocyanins in the flesh and skin of grapes in detecting natural borax, which is absorbed on filter paper, Whatmann paper no. 41, and Whatmann paper no. 42. We then tested it on meatball samples from five vendors in Samarinda Seberang and Mangkupalas village. The research method used is a quantitative analysis of the color changes that occur. Based on the research results, filter paper can have better absorption, as shown by the dark color on Whatman No. 41 and 42. Grape skin extract can detect borax more clearly than flesh by forming a dark purple ring when reacted with borax. In testing using meatball samples, the overall results of the samples contained borax. It was concluded that the filter paper from the absorption of grape skin anthocyanins could be used as an alternative for quantitatively testing the borax content in food.

INTRODUCTION

Borax included additives that are prohibited from being used in food. Consuming foods that contain borax will not have immediate bad consequences, but borax will accumulate little by little because it is absorbed through metabolism in the body. If you consume foods containing borax too often it will cause brain, liver and kidney disorders, and other chronic diseases [1]. Borax detection can be carried out using the flame test method, volumetric titration and spectrophotometric analysis. Each method has advantages and disadvantages, so it is not excessive if there are other alternative methods to add information about borax analysis methods that are faster, easier and cheaper. Because of this, it is necessary to look for alternative indicators [2], one of them is qualitatively using grapes.

There are several ingredients in grapes, one of which is anthocyanin [3]. Anthocyanin can be used to detect the presence of chemical compounds such as borax because borax is alkaline and will react when mixed with anthocyanin [4]. Anthocyanin polarity That's quite tall, many This causes anthocyanins to have the potential to be used in acid-base titrations as natural

acid-base indicators [5]. Anthocyanins were found in grapes of 26.7 – 190 mg/100 g or the equivalent of 0.0267 – 0.19% [6].

MATERIALS AND RESEARCH METHODS

Tool used are scales, blender, 50 ml measuring cup, glass jar, dropper pipette, glass cup, filter paper, tweezers, glass bowl, 10 ml measuring flask, and tray, scale, porcelain, mortar, measuring pipette, stick, paper filter, Whatmann paper no. 41, Whatman paper no. 42. The ingredients used are grapes (seedless), grape skins, 96% ethanol, 1% borax in 10 ml, 5 samples of meatballs and distilled water.

a. Preparation of Seedless Grape (Vitis vinifera) Fruit Extract with Skin and Grape Skin Extract
   Fresh purple grapes are selected, washed and weighed 100 grams, dried in the air to reduce the water content, seeds removed and blended. This is also done on the grape skins, separated from the grape flesh, then weighed 100 grams, dried and blended. Each sample was placed in a glass jar, soaked in 100 ml of 96% ethanol solution and incubated for 2x24 hours at room temperature and in a place not exposed to much light. The results of the extraction are filtered using filter paper and the filtrate is obtained. A solution of seedless grape extract along with skin and grape skin extract was pipetted 10 mL and then poured into a glass bowl each.[7].
b. Preparation of Various Seedless Grape Extract Filter Papers Along with Grape Skins and Extracts
   Whatman filter paper No. 41 and Whatmann No. 42, cut into 3x3 cm dimensions, 3 pieces then soaked in seedless grape extract with skin and 3 more pieces soaked in grape skin extract which has been poured into a glass bowl, soaked for 60 minutes until the color pigment is absorbed on the filter paper. After that, the filter paper was placed on a tray and dried at room temperature for approximately 3 hours. This filter paper is then called colored filter paper.
c. Indicator Test of various Filter Papers with Borax
   The results of the extraction of seedless grapes along with their skins and the extraction of the grape skins onto each filter paper are then reacted with borax by placing the indicator paper in a tray then dropping 1 drop of 1% borax in the middle of the indicator paper, wait 2 minutes then observe the color change.
d. Meatball Sample Trial using Grape Skin Extract and Curcumin Extract as a comparison.
   Samples of meatball pentol were taken from 5 (five) mobile meatball sellers around Samarinda Seberang to Mangkupalas who were taken randomly. Then a 1 g sample of meatball bulbs was weighed and then distilled water was added at a rate of 1:10. The sample was then crushed until smooth.[8]. As a comparison, samples were also tested using a toothpick soaked in curcumin extract to detect borax.

RESULTS OF RESEARCH AND DISCUSSION

a. Preparation of Seedless Grape (Vitis vinifera) Fruit Extract with Skin and Grape Skin Extract
   As a result of making grape skin extract, a deep purple solution is formed, and in the extract of grapes without seeds and skin, an orange solution is formed (Figure 1). These results are in accordance with previous researchers' statements that anthocyanins are responsible for providing orange, red, purple, blue and black colors in higher plants such as: flowers, fruits, grains, vegetables and tubers. Anthocyanin is a polar compound, so a polar solvent is needed to extract it. The solvent used in this research is ethanol because it has low toxicity and has better stability than other polar solvents [9]. The stability of anthocyanin is also greatly influenced by pH, so in a strong acidic environment it will remain red even when heated and in a strong alkaline environment it will remain yellow. Determination of anthocyanin levels was carried out using pH differences, namely pH 1.0

and pH 4.5. Anthocyanin at a very acidic pH, namely at pH 1.0 it will produce a red color in the form of the flavylium cation, while at a pH above 4 it will form a yellow anthocyanin (chalcone form), a blue compound (quinouid form), or a colorless compound (carbinol base)[10].

(a) (b)

Source: Primary Data

Figure 1. Anthocyanin Color Result of Grape Extraction. (a) Seedless Grape Extract, (b) Grape Skin Extract.

b. Preparation of Various Seedless Grape Extract Filter Papers Along with Grape Skins and Extracts

The grape skin extract and seedless grape extract with skin (Vitis vinifera) that have been obtained are then absorbed into filter paper by immersing the filter paper in the resulting grape skin extract and seedless grape extract with skin. The purpose of absorption into filter paper is to increase the ease of detection application and make it easier to store.The results of research on grape extracts absorbed onto various filter papers can be seen in Table 1.

Table 1. Results of Absorption of Grape Skin Extract and Seedless Grape Extract and Skin onto Filter Paper

Extract Type	Color of Filter Paper Before Absorption	Filter Paper Color After Absorption		
		Filter paper	Whatmann No. 41	Whatmann No. 42
Grape Skin Extract	White	Violet	Violet	Pink
Seedless Grape Extract With Skin	White	Pale pink	Pink	Pale pink

Application of seedless grape extract with skin on filter paper produces a pale pink color overall, while grape skin extract produces light purple color on filter paper, violet color on Whatman no. 41 and pink on Whatman No. 42. This means that the 2 extracts contain acid compounds. Very acidic pH conditions (pH 1-2) can further stabilize the stability of anthocyanins in the form of red flavium cations, whereas if the solvent is combined with a weak acid, the anthocyanin color will change to a faded red color at pH 3; purplish red at pH 4; purple at pH 5-6; and purple blue at pH 7.

c. Indicator Test of various Filter Papers with Borax

Test Results of various filter papersPlace 1 drop of 1% borax in the middle of the paper indicator and wait for 2 minutes then observe the color change which can be seen in Table 2.

Table 2. Test Results of various Filter Papers with Borax

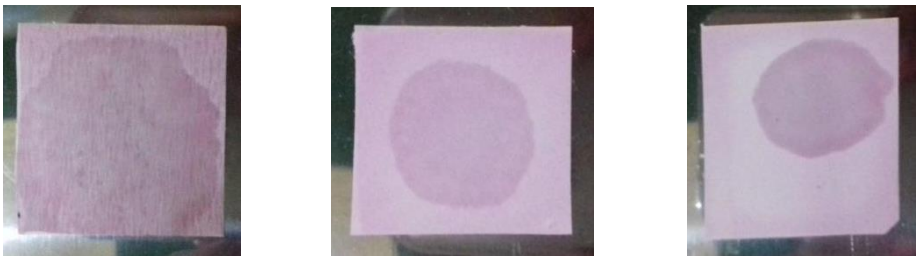
Extract Type	Paper Type	Filter Paper Color	
		Before Reacting with Borax	After Reacting with Borax
Grape skin extract	Filter paper	Violet	A dark purple ring forms
	Whatmann no. 41	Violet	A purple ring forms
	Whatmann no. 42	Pink	A circle is formed with purple edges, and a pink center
Grape extract without seeds and skin	Filter paper	Pale pink	A faint pink ring forms
	Whatmann no. 41	Pink	A faint pink ring forms
	Whatmann no. 42	Pale pink	A circle is formed with a firm pink edge, a pale pink center

Borax is a weak base with a pH (9.15 – 9.20). Borax is generally soluble in water. The solubility of borax is around 62.5 g/L at 25°C. The solubility of borax in water will increase as the water temperature increases. Borax does not dissolve in alcohol compounds [11]. Before the reaction, the indicator paper that was absorbed into the grape skin extract was light purple in color, when reacted with 1 drop of borax it turned into a dark purple ring (Figure 2). Meanwhile, the indicator paper that was absorbed into the seedless grape extract with the skin was pink, when reacted with 1 drop of borax it turned into a dark pink ring (Figure 3). The color formation on each indicator paper is due to the property of borax which can dissolve dyes. Anthocyanin can be used to detect the presence of chemical compounds such as borax because borax is alkaline and will react when mixed with anthocyanin. Based on the results of other research, it is stated that in dark colored grape skins the total flavonoids produced range from 1055.0 – 1380.7 mg RE (Rutin Equivalents)/kg FW (Fresh Weight) [12].

(a b c)

Source: Primary Data

Figure 2. Positive results for Borax on each filter paper using grape skin extract. (a) Positive results for borax on ordinary filter paper; (b) Positive results for borax on Whatmann No. paper. 41; (c) Positive results for borax on Whatman paper No. 42.



(a b c)

Figure 3. Positive results for Borax on each filter paper using Seedless Grape Extract and Skin. (a) Positive results for borax on ordinary filter paper; (b) Positive results for borax on Whatmann No. paper. 41; (c) Positive results for borax on Whatman paper No. 42.

The indicator paper that was absorbed into the seedless grape extract along with the skin was pale pink, when reacted with 1 drop of borax it turned into a faint pink ring. This is possible because seedless grape extract and skin have a higher sugar content and water content than grape skin extract. It was also proven that during the research, many ants were found approaching this seedless grape extract with skin. When blended, grapes without seeds and skins are also easy to crush and don't take a long time because they are helped by the water content of the grapes without seeds and skins.
Based on the results obtained, grape skin extract showed clearer color changes compared to seedless grape extract and skin in detecting borax naturally. Based on these results, we used grape skin extract for further research using meatball pintol samples.

d. Meatball Sample Trial Using Grape Skin Extract and Curcumin Extract as a Comparator
The test results using meatball pintol samples obtained from 5 (five) meatball sellers around Samarinda Seberang to Mangkupalas using grape skin extract filter paper and toothpicks with curcumin extract were obtained in Table 3.

Table 3. Test results of pentol samples from 5 different sellers using grape skin extract filter paper and toothpicks with curcumin extract

Pentol Sample	Treatment	
	Filter Paper with Grape Extract	Toothpick with Curcumin extract
Seller 1	Positive for Borax	Positive for Borax
Seller 2	Positive for Borax	Positive for Borax
Seller 3	Positive for Borax	Positive for Borax
Seller 4	Positive for Borax	Positive for Borax
Seller 5	Positive for Borax	Positive for Borax

(a) (b)

Source: Primary Data

Figure 4. Positive Test Results for Borax on Meatball Pentol Samples. (a) Filter Paper using Grape Skin Extract; (b) Toothpick with Curcumin Extract

Based on the results of the borax test for the meatball bulb sample (Figure 4), using filter paper that had been treated with grape skin extract, which was originally light purple in color, after being dropped on the bulb sample, the color changed to form a dark purple circle on the filter paper. The toothpick that had been treated with curcumin extract, which was originally yellow, turned reddish orange after being inserted into the meatball pin sample.
Anthocyanin is extracted from grapes to identify formalin in white tofu, showing a pink color change in formalinized tofu [13]. The most commonly found anthocyanin compounds are pelargonidin (marked in orange), cyanidin (orange red), peonidin (orange red), delphinidin (blue red), petunidin (blue-red), and malvidin (blue-red). red) [14]. The color produced by anthocyanins depends on the acidity level (pH) of the environment. The colors produced are red (pH 1), reddish blue (pH 4), purple (pH 6), blue (pH 8), green (pH 12), and yellow (pH 13). The properties and color of anthocyanins in plant tissue are

influenced by several factors such as the amount of pigment, the location and number of substituted hydroxyl and methoxyl groups and various environmental influences.[15].
A clear color change on toothpicks occurs when soaked in curcumin extract with different soaking times. The yellow color change on the toothpick is caused by the curcumin content in the turmeric solution [16]. The main content of curcuminoids is curcumin which is orange yellow in color. The curcumin content in turmeric is around 34% so it can be used as an acid-base indicator [17].

CONCLUSIONS AND RECOMMENDATIONS

Based on research results, filter paper for the absorption of grape skin anthocyanins can be used as an alternative to quantitatively test the borax content in food because it has a deep color and shows the clearest color changes when compared to other filter papers. Suggestions if this research is continued, pResearch is needed to determine the optimal concentration of grape skin extract applied to filter paper so that it can provide the best color and results when identifying borax.

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