



THE UTILIZATION OF BANANA BLOSSOMS ANTHOCYANIN EXTRACT (*MUSA SPP*) TO IDENTIFY BORAX AND FORMALIN IN DRIED ANCHOVY (*STOLEPHORUS SP*) FROM THE TRADITIONAL MARKET OF PALU

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ABSTRACT

Anthocyanins are red to blue pigments that are widely distributed in plants, one of which is the banana blossoms. This study aims to prove that banana blossoms anthocyanin extract can identify borax and formaldehyde in dried anchovies (Stolephorus sp) from Palu City Traditional Market. The proof was done through a qualitative test by observing the color change of banana blossoms anthocyanin extract on borax positive control, formalin positive control, and negative control as an indication of borax and formalin content in dried anchovies from Palu City Traditional Market. The color change indicates that banana blossoms anthocyanin extract can be used to identify borax and formalin. The color change that occurs is due to a change in the pH of the banana blossoms' anthocyanin extract. Based on the results of this study, the anthocyanin extract changed color to dark brown red when reacting with borax and changed color to red when reacting with formalin. When the anthocyanin extract was reacted with dried anchovies' filtrate, it did not show any color change, so dried anchovies from Palu City Traditional Market did not contain borax and formaldehyde. It can be concluded that banana blossoms' anthocyanin extract can be used to identify borax and formaldehyde in dried anchovies from Palu City Traditional Market as indicated by the color change.

Keywords: Anthocyanin, banana blossom, borax, formalin.

1. INTRODUCTION

Bananas blossoms are the remaining tips of banana blossoms and must be thrown away when the other parts grow into bananas, so as not to inhibit growth and prevent banana diseases so they are considered waste (Hastanto, 2015). The banana blossoms have the structure of the outer layer of skin which is reddish brown-purple, the inner layer of skin is white like milk cream and there is an arrangement of flowers in the shape of a finger between the outer skin (Gistari & Rosnina, 2019). Research conducted by Lestario (2018) tested the total anthocyanin content of Klutuk banana blossoms at 29.66/100 gr and Ambon banana blossoms at 43.74 gr/bb.

Anthocyanins are a group of red to blue pigments that are widely distributed in plants, which indicates the presence of natural dyes. Natural dyes can be used as indicators because they can change color in acidic and alkaline conditions. The occurrence of color changes is influenced by the stability of anthocyanins. Factors that influence the stability of anthocyanins are pH conditions, light, temperature, and solvent conditions when extracted (Gustriani, et al. 2016). Research conducted by Salzabilah, et al (2022) stated that the anthocyanin content in purple sweet potatoes can detect the presence of borax and formalin content.

In modern times, some manufacturers are sometimes still found mixing borax and formalin in the food they produce. These two ingredients should not be consumed by humans, because borax and formalin are commonly used as preservatives for corpses, disinfectants, cosmetic mixtures, and so on (Fitriani, et al. 2022). Based on the Regulation of the Minister of Health of the Republic of Indonesia Number 033 of 2012, types of food additives including preservatives that are prohibited from being used in food products include borax and formalin. Borax and formalin are often found in food ingredients as preservatives such as salted fish (Mirna, et al. 2016).



Salted fish is a traditional processed fish product that is widely consumed by the public. The salting process functions to preserve the fish so that it does not experience bacterial spoilage by adding 15-20% salt (Singgih, 2013). One type of fish that is often found and processed into salted fish is anchovies. Dried anchovies are very popular among people because they have a distinctive taste, scent, and texture (Savitri, et al. 2018). Based on research conducted by Madonsa, et al (2019), the test results of dried anchovy samples P1, P2, and P3 from the Winenet market and Girian market in Bitung City were positive for containing formalin. Research conducted by Aeni (2017) from the results of qualitative tests, 58.3% of anchovy samples were positive for containing borax.

2. METHODS

2.1. Sample preparation

Take the 3-4th layer of the outer skin of the Ambon banana blossoms which is not defective and not dirty. Cleaned using running water. Cut the banana blossom skin into small pieces and then dry at room temperature. Then, mash it using a blender and put the Ambon banana blossom peel powder into a closed container.

2.2. Banana Blossoms Anthocyanin Extraction

Weigh 20 grams of Ambon banana blossom peel powder. Put the banana blossoms peel powder into the Erlenmeyer. Add 200 mL of 96% ethanol solution, then acidify with 1% HCl solution. Cover the Erlenmeyer tightly using aluminum foil. Stir for 30 minutes using a shaker until the mixture is homogeneous. Leave the mixture at room temperature for 1×24 hours. Filter the Ambon banana blossoms extract using filter paper. Store the Ambon banana blossoms extract in an Erlenmeyer flask and cover tightly using aluminum foil (Sulfiani & Sukmawati, 2020).

2.3. Making positive controls and negative controls

1. Prepare 4 test tubes and put 1 mL of banana blossom extract into each test tube.
2. Add 2 mL of borax solution with varying solution concentrations, namely 0.5%, 1%, 5%, and 10% to each test tube, then stir the mixture as a positive control for borax.
3. Prepare 4 test tubes and put 1 mL of banana blossoms extract into each test tube.
4. Add 2 mL of formalin solution with varying solution concentrations, namely 0.5%, 1%, 5%, and 10% to each test tube, then stir the mixture as a positive formalin control.
5. Prepare 1 test tube and add 1 mL of banana blossom extract.
6. Add 2 mL of distilled water then stir the mixture as a negative control for borax and formalin.

2.4. Qualitative Test of Borax and Formalin using Banana blossoms extract

Weigh 5 grams of dried anchovy and grind the dried anchovy using a blender. Put dried anchovy powder into a porcelain cup. Then, add 10 mL of distilled water and stir the mixture. Leave the mixture for 30 minutes, then add 1 mL of banana blossoms extract. Filter the mixture using filter paper. Observe the color changes and compare them with the positive control and negative control.

3. RESULTS AND DISCUSSION

Table 1 Ambon Banana Blossoms Extract

Name	Extract Results
Ambon banana blossoms powder	The extract is orange-brown

Table 2 Positive control and negative control

Formalin positive control

Concentration of formalin solution	Extract color after reaction with formalin
0.5 %	Faded red
1 %	Red
5 %	Red



10 %	Red
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Description:(+) contains formaldehyde

Borax positive control

Borax solution concentration	Extract color after reaction with formalin
0.5 %	Dark brown red
1 %	Dark brown red
5 %	Dark brown red
10 %	Dark brown red

Description:(+) contains borax.

Negative control

Extract color before reacting with distilled water	Extract color before reacting with distilled water
Brownish orange	Brownish orange

Description: (-) does not contain borax and formalin.

Table 3 Identification of borax and formaldehyde in dried anchovies

Market Name	The color of the banana blossom extract reacts with the anchovy filtrate
Masomba Market	Brownish orange
Inpres Market	Brownish orange

Banana blossoms contain many ingredients, one of which is anthocyanin. According to Lestario, et al (2009), Banana blossoms contain anthocyanins such as Klutuk banana blossoms of 909.44 ± 225.97 mg/100 g and Ambon banana blossoms of 1515.40 ± 156.06 mg/100 g. Anthocyanins are natural components that accumulate in vacuoles and are responsible for giving red, blue, and purple colors to fruit, vegetables, flowers, and other plants (Ifadah, et al. 2021). Anthocyanins are found in the form of aglycones called anthocyanidins, in the form of glycones they are called sugars. Anthocyanins with an oxygen atom attached to three carbon atoms link two benzene aromatic rings ($C_6 H_6$) in the main structure. Anthocyanins have a characteristic carbon skeleton ($C_6 C_3 C_6$) with a basic structure of 2-phenyl-benzophyllium from Flavilium salt (Priska, et al. 2018).

Banana blossoms anthocyanin was macerated using 96% ethanol solvent which was then acidified with 1% HCl. Based on research conducted by Agustin & Ismiyati (2015) stated that the greater the concentration of ethanol used, the greater the anthocyanin levels obtained. Where the ethanol solvent with a concentration of 96% produces higher anthocyanin levels. Adding 1% hydrochloric acid (HCl) solution to the ethanol solution will denature the plant cell membrane and then dissolve the anthocyanin pigment out of the cell (Sulfiani & Sukmawati, 2020).

The extract results are stored in a place not exposed to direct sunlight. Because, light affects the stability of anthocyanin in formation and the rate of degradation, thus affecting the stability of the anthocyanin pigment contained in the extract and can increase the destruction of anthocyanin pigment. As a result, the color of the anthocyanin pigment extract will change (Surianti, et al. 2019).

The results of the extraction of banana blossoms anthocyanin were orange-brown in color. This is caused by the type of anthocyanin compound contained in banana blossoms. According to research by Lestario, et al



(2009), Klutuk banana blossoms only contain two types of anthocyanidins, namely cyanidin and delphinidin. while the blossoms of ambon banana contain 3 types of anthocyanidin, namely cyanidin, delphinidin and pelargonidin.

Based on research by Purnama & Jose, (2021), the results of anthocyanin extraction from hibiscus flowers are orange-brown in color, due to the anthocyanin content of the pelargonidin type, pelagornidin plays a role in giving the color orange, red-orange, to brown-orange.

The results of observations on the positive control of borax showed that the banana blossom anthocyanin extract changed color from orange-brown to dark red-brown. This is in accordance with research conducted by Purnama & Jose (2021) which stated that before the anthocyanin extract was reacted, the color of the anthocyanin extract was orange-brown, when it was reacted with meatballs containing borax it turned dark red brown, this was because the anthocyanin compound pelargonidin reacted with the compound. borax. Meanwhile, the formalin positive control showed a color change from orange-brown to red. A study conducted by Setyawan & Hanizar, (2021) stated that a color change from purple to red indicates that the sample is positive for formalin.

The concentration of the borax solution was varied to 0.5%, 1%, 5%, and 10% where the detection limit for the banana blossoms anthocyanin extract obtained in this study was 0.5% which showed a red-brown color change. The concentration of the formalin solution was varied to 0.5%, 1%, 5% and 10% where the detection limit of the banana blossoms anthocyanin extract obtained in this study was 1% which showed a red color change.

Color changes that occur due to color degradation are due to changes in the stability of anthocyanins due to changes in pH. pH is one of the factors that influences the stability of anthocyanins so that they experience color changes. The color change that occurs is caused by the amphoteric nature of anthocyanins, namely having the ability to react with both acidic and basic pH.

According to Setyawati and Daryanti (2020), anthocyanin compounds are influenced by pH or acidity level and will be more stable in an acidic or low pH environment. At low pH, anthocyanins change to red flavilium cations. The higher the pH, the color of the anthocyanin pigment will change to a colorless chalcone compound (Tensiska, et al. 2007).

Supiyanti, et al (2010) stated that the color change of plantain flower extract depending on the influence of pH is an indicator of the anthocyanin because it can change color depending on the acidity and alkalinity factors of the solution. So, the cause of the Ambon banana blossoms anthocyanin extract changing color is due to the difference in pH of formalin and borax.

Dried anchovy is obtained from traditional markets in the city of Palu, namely Masomba market and Inpres Manonda market. Based on the results of this research, it shows that dried anchovy from both markets do not contain borax and formalin as indicated by the absence of color changes in the extracts adjusted to the positive control and negative control.

4. CONCLUSION

Based on the research results obtained, it can be concluded that banana blossoms anthocyanin extract can be used to identify borax and formalin in dried anchovy from traditional markets in Palu City which are characterized by a red color change if it is positive for containing formalin and a dark red-brown color if it is positive for containing borax. It is recommended that future researchers examine borax and formalin using banana blossoms' anthocyanin extract strip indicators in other foods. As well as developing the use of banana blossom's anthocyanin extract as a food and non-food coloring agent.

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