The Use Of Ethanol Extracts Of Banana Heart Petal (Musa Balbisiana Colla.) As Hair Dye With Others

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Abstract: One part of the plant that can be used as a natural hair dye is the bananas of the heart petal (*Musa balbisiana* Colla.) which produces brown pigments. Traditionally this banana heart petal is used as a cooking ingredient. The bananas of the stone contain alkaloids, steroids / triterpenoid compounds, tannins, flavonoids glycosity. The purpose of this study is to know that the bananas of the heart of the pisang stone in the form of ethanol extract can be formulated in dye hair dye preparations which in particular concentration can change the color of gray hair to black and does not irritate the skin. This study was conducted using experimental method using heartbeat material (Musa balbisiana Colla). Extract obtained by maceration using 96% ethanol solvent. Screening of phytochemicals on test material. Testing materials of ethanol extract of pisang stone heart were studied in various concentrations, ie 20%, 30%, 40%, and 50%, with the addition of auxiliary materials such as pirogalol, copper (II) sulphatee, and xanthan gum respectively 2% using aquades solvents. Each concentration was carried out by 100 shea soaking for 1-4 hours. Observations were performed by washing 20 times and exposure to sunlight for 5 hours on gray hairs and irritation test. The results showed that the stone bananas (Musa balbisiana Colla.) In the form of ethanol extract can be formulated in the dye hair dye preparation. The results of the phytochemical screening show that the true test material contains alkaloids, steroids / triterpenoid, tannin, flavonoid glycosity. The higher concentration of gray hair dyes in the preparation of ethanol extract of bananas heart petals, the gray hair color changes being examined becomes increasingly black. The best results were obtained in Formula C (40% banana heart ethanol extract, 2% pirogalol, 2% copper (II) sulphate and xanthan gum2%) which can change the color of gray hair to black. The result of stability test by washing method showed no color change after 20 times washing. The result of stability test with exposure in the sun for 5 hours showed no color change and the result of irritation test against volunteers did not show any irritation in the skin.

Index Terms: heart bananas (*Musa balbisiana* colla), petals, ethanol extract, hair dyes, gray hair.

1 INTRODUCTION

According to [1], cosmetics are derived from the word kosmein (Greek) which means "decorated". The material used in this self-beautification exercise was first ingrained from the natural ingredients surrounding it. Now cosmetics are made of human beings not only from natural ingredients but also synthetic materials with the intention of adding beauty. Hair dye is a cosmetics preparation used in hairdressing either to restore the original color/cover the original hair or to change the natural hair color into a new color [2]. Hair is a hair that grows from the scalp. The part of the hair out of the skin is called the hair shaft. Hair stems are the placement of different horn cells in length, thickness, and color. Hair does not have nervous taste so it does not hurt when trimmed [3], cosmetics comes from the word kosmein (Greek) which means "ornamented". Materials used in the business for beautify themselves, formerly mixed from natural ingredients that are surrounded. Now cosmetics are made man not only from natural materials but also synthetic materials with a view to adding beauty. Hair dye is a cosmetic preparation used in hair makeup either to restore the color of its origin/cover the original hair or to change the color of the original hair into a new color [2]. Hair is a feather that grows from the scalp. The hair part that comes out of the skin is called the hair shaft. Hair stems are the placement of different horn cells in length, thickness, and color. According to [3], [12], [16], the pigment sequence that determines the hair color from the brightest to the darkest is blonde, red, light brown, dark brown and black. Hair color is determined by the melanin pigment in the hair that exists in the cortical layer. The material of melanin pigment origin is melanocytes that are in the hair bulbs. Melanocytes are cells that produce pigments that cause genuine hair to have multiple colors [4] And [14]. Many hair dyes that have been circulating in the market, but contain ingredients that can increase the risk of disease. For example, the case of allergy in hair dye is generally caused by para-phenylenediamine (PPD), some hair dye also contains lead acetate which can cause poisoning if its concentration exceed the limit and inhaled by human. Then used natural ingredients as the main ingredient in the manufacture of liquid dye hair dye. Banana is a plant that is easily found throughout the territory of Indonesia. The heart of banana is one part of banana plants that generally have a purplish red color, traditionally used as the main ingredient in cooking. According to [13] and [5], the results of phytochemical tests show that the bone stone extract (Musa balbisiana Colla.) Contains flavonoid compounds, steroids, polyphenols, and tannins. The antioxiandt activity of banana stone extract is mostly derived from anthosinin compounds belonging to the flavonoid group. The color variation in the banana heart is related to the presence of anthocyanin. Anthocyanins are the pigment of almost all red to blue in flowers, leaves, and fruits on high plants. The liquid dye hair dye is chosen because it is considered easier at the time of its use, compared to the powder preparation which must be dissolved before the liquid dye can be applied directly to the hair. Based on the above, the authors are interested to try to study the preparation of liquid dye formulations using stone banana heart petals (Musa balbisiana Colla.) As a hair dye.

1.1 PROBLEM FORMULATION

Based on the description above the formulation of the problem is:

a. Whether the stone banana heart petal (*Musa balbisiana* Colla.) In the form of ethanol extract can be formulated into the dye preparation of gray hair.

b. Whether the ethanol extract of banana heart petals (*Musa balbisiana* Colla.) At a certain concentration can change the gray hair color to 'black' and not cause irritation.

1.2 Research Hypothesis

Hypothesis of this research are:

a. The stone banana heart petals (*Musa balbisiana* Colla.) In

the form of ethanol extract can be formulated into the dye preparation of gray hair.

b. At a certain concentration of ethanol extract the banana heart petals (*Musa balbisiana* Colla.) Can change the color of gray hair to 'black' and not cause irritation.

1.3 Research Objectives

The purpose of this research are:
a. To find out that the petals of banana stone (*Musa balbisiana* Colla.) In the form of ethanol extract can be formulated as dye hair grain dyes.

b. To find out at a certain concentration of ethanol extract the banana heart petals (*Musa balbisiana* Colla.) Can change the color of gray hair to 'black' and not cause irritation.

1.4 Research Benefits
To improve the power and efficacy of the banana heart petals (*Musa balbisiana* Colla.), By providing information to the society that, the stone banana heartbeat (*Musa balbisiana* Colla.) Can be used as a natural hair dye and does not irritate the skin.

2. RESEARCH METHODS

2.1.Research Design

This experiment was conducted by experimental method, various concentration of pisang stone heartbeat extract (*Musa balbisiana* Colla.) As independent variables, and various test parameters as fixed variable. The research was conducted at Laboratory of Pharmacy Faculty of Research at University of Tjut Nyak Dhien Meand, in July 2017 until October 2017, with work stages of preparation of tools and materials used, collection of pisang stone heart petals as a test material, identification of plants, making of simplisia, ethanol stone bananas, phytochemical screening, hair dye formulas, including the concentration of auxiliary material and the test materials used, the evaluation of the resulting doses includes testing the effects of the concentration of the materials used, the effect of soaking time, the effects of various additives, the color stability test of gray includes gray color stability test against washing and sun exposure, and irritation test against volunteers.

2.1.1. Tools
Tools used in this study are laboratory glassware, electric balance (Vibra Aj), blender (National), Mesh-100 sieve, sewing thread, rotary evaporator (Edwards) and container.

2.1.2. Materials
The materials used in this study were heart bananas, pirogalols, copper (II) sulphate, xanthan gum, aquades, 96% ethanol, shampoo (Pantene) and gray hair. Chemicals used except otherwise stated quality pro-analysis ie alpha naftol, concentrated ammonia, anhydride acetic acid, concentrated hydrochloric acid, concentrated sulfuric acid, nitric acid, bismuth (III) nitrate, ethanol, ethyl acetate, benzene, iron (III) chloride, chloroform, iodine, potassium iodide, n-hexane, isopropanol, methanol, sodium hydroxide, anhydrous sodium sulphatee, vanillin, H2SO4, mercury (II) chloride, magnesium powder, zinc powder and lead (II) acetate, boric acid, kerosene ether.

2.1.3. Work Procedures

2.1.3.1. Sample
In this study, the sample used was a bananas stone heartbeat (*Musa balbisiana* Colla.) For the preparation of hair dye preparations.

2.1.3.2. Sample identification
Determination of plant was done at Herbarium Meandense (MEDA) of North Sumatra University, Meand.

2.1.3.3. Collection of samples
Sample collection is done purposively, ie without comparing the same material from other areas. The plant part used is the pisang stone heartbeat (*Musa balbisiana* Colla.) Obtained from the fields of the rural community of Lau Bakkeriy, Deli Serandg District, North Sumatra Province.

2.1.3.4. Sample Processing
The stone bananas (*Musa balbisiana* Colla.) Were picked up in the petals, collected for washing to clean, drained and cut into small pieces ± 0.5 cm. Then the heart of the banana stone was dried in the drying cabinet at 30°-45°C for 2 days. Furthermore, the dry banana heart petals are smeared with blender and sifted with a Mesh-100 sieve, making it a fine powder, then the powder weighed 835 g. Powder washed 5 days using 75 parts ethanol solvent 96% as much as 7,50 liters, yielded (Maserat I), filtered and pulp retained for 2 days using 25 parts ethanol 96% solvent 2.55 liters, filtered so obtained results (Maserat II). Mixed maserate I and maserate II, obtained whole 5 liter maserate. Then maserate was concentrated with evaporator rotary device at ± 40 ° C until the solvent was evaporated and obtained a thick cauliflower extract of bananas of 48.61 g. The flow chart of the ethanol extract of the pisang stone heartbeat (Musa balbisiana Colla.) Can be seen in Appendix 5, page 67.

2.1.4 Manufacture of Reagent Solution

2.1.4.1. Bouchardat Reagent
As much as 4 g of potassium iodide was dissolved in the aquadest then 2 g of iodium was dissolved gradually, after all dissolved it was added to the volume of 100 ml [6].

2.1.4.2. Dragendorff Reagents
A 0.85 g bismuth (III) nitrate was dissolved gradually in glacial acetic acid to a volume of 100 ml and then added 40 ml of aquadest. In another container 8 g of potassium iodide is dissolved in aquadest up to volume of 20 ml, both solutions are mixed together. Then added 20 ml of glacial acetic acid and diluted with 100 ppm aquadest [6].

2.1.4.3. Mayer Reactions
As 1.35 g of mercury (II) chloride was dissolved in small quantities in the aquadest to volume 60 ml, then in another container as much as 5 g of potassium iodide was dissolved in 10 ml aquadest then both solutions were mixed and the volume was added to aquadest up to 100 ml [6].

2.1.4.4. Chloride Acid Solution 2 N
A total of 16.67 ml of concentrated chloride acid was diluted in the aquadest to a volume of 100 ml [6}

2.1.4.5. Iron Solution (III) Chloride 1%
1 g of iron (III) chloride was dissolved slightly in 0.5 N of hydrochloric acid and the volume was up to 100 ml [6].

2.1.4.6. Sulphatee Acid Solution 2 N
A total of 5.4 ml of concentrated sulfuric acid was diluted in the aquadest to a volume of 100 ml (M.M.I, 1995).

2.1.4.7. Nitric Acid 0,5 N
A total of 3.5 ml of concentrated nitric acid was added to the beaker glass containing 25 ml of aquadest and diluted [6].

2.1.4.8. Liebermann-Bouchard Reagents
As much as 5 ml of anhydride acetic acid mixed with 5 ml of concentrated sulfuric acid then added ethanol to volume 50 ml [6].

2.1.4.9. Molisch Reagents
A total of 3 g alpha napholol was weighed, then dissolved in nitric acid 0.5 N to volume 100 ml [6].

2.1.4.10. Lead Lead (II) Acetate 0.4 M
As many as 15.17 g of lead (II) acetate were dissolved in small quantities in the aquadest up to volume of 100 ml [6].

2.1.4.11. Sodium Hydroxide Solution 2 N
A total of 8,002 g of pellet sodium hydroxide was dissolved in small quantities in the aquadest up to volume of 100 ml [6].

2.1.4.12. Reactor Fehling A
A total of 3.5 g of kupri sulphatee was dissolved in the aquadest up to volume of 100 ml [6].

2.1.4.13. Reactor Fehling B
A total of 173 g K-Na-tatrats were added 50 g NaOH dissolved in aquades up to volume 1000 ml [6].

2.1.5. Phytochemical Screening
Phytochemical screening was carried out on the ethanol extract of the pisang stone stone (*Musa balbisiana* Colla.), Including the examination of chemical compounds of alkaloids, glycosides, anthrachelon glycosides, saponins, flavonoids, tannins, and triterpenoid/steroids [7].

2.1.5.1. Alkaloid Examination
A total of 0,5 g of ethanol stone bananas extract was added 20 ml of 2 N hydrochloric acid, heated over the water bath for 2 minutes, cooled and filtered, then performed the following reaction: A total of 3 drops of filtrate was removed in the watch glass and 2 drops of Mayer reagent would form a white or yellow sediment soluble in methanol,
a) As many as 3 drops of filtrate were moved to the watch glass and added 2 drops of Dragendorff reagent would form brown deposits to black,
b) A total of 3 drops of filtrate was moved to the watch glass and added 2 drops of bouchardate reagent would form a chocolate deposition. If there is turbidity, the check is continued by shaking the filtrate residues with 3 ml ammonia and 10 ml mixture of 3 parts of the ether volume and 1 volume of chloroform volume. The organic phase was taken and added anhydrous sodium sulphatee, filtered. The filtrate was evaporated on top of the remaining water bath dissolved in a small amount of 2 N hydrochloric acid. Further experiment was conducted with Mayer, Bouchardat, and Dragendorf reaction as above. Samples contain alkaloids if at least give a positive result of sediment formation using two reagents [6].

2.1.5.2. Steroid/Triterpenoid Examination
Slightly extracted into the erlenmeyer, dissolved with ethanol- aquades (1: 1) 20 ml: 20 ml, put in a separate funnel, added 50 ml n-hexane, shake strongly (until the gas is dissolved) , take the top layer into the vaporizer, evaporated over the water bath until dry, leave to cool, add 2 ml of anhydride acetic acid, added 2 ml of concentrated sulfuric acid, going blue. Green blue indicates steroids and purple red show triterpen [8].

2.1.5.3. Examination of Glycosides
Some of the extracts included in the erlenmeyer added Pa 20 ml ethanol, covered with plastic, evaporated on water bath, cooled, filtered, took filtrate, inserted into new erlenmeyer, added 25 ml aquadest, added 25 ml of acetate Pb, stirred precipitated after settling , add in 15 ml, add 10 ml iso propanol, beaten until 2 layers are formed, top layer (sugar/ glycone) and bottom layer (non sugar/aglikon). For the top layer is done as follows:A total of 3 ml of the solution is included in each of the 2 reaction tubes:
a. Tube 1 was added Fehling A and Fehling B (1: 1) were evaporated on the water bath. Formed red brick.
b. Tube 2 heat up for 30 minutes, add aquades, add Molish (some drops), add 2N sulfuric acid, purple or chocolate ring.

For the bottom layer do the following:
The lower layers obtained are inserted into the erlenmeyer, add a little-demisedikit Na2SO4 to Na2SO4 insoluble, filtered, filtrate evaporated above the water purifier until half dried, cool, add 5 ml methanol in the separating funnel, shaken, methanol layer evaporated to dry, cool , add 2 ml of anhydride acetic acid, add 2 ml of sulfuric acid, blue/green [6].

2.1.5.4. Examination of Anthraquinone Glycosides
A little extract was added 2 ml of FeCl3 1% solution added 8 ml of aquadest and 5 ml of concentrated hydrochloric acid, boil 5 minutes after cold added 10 ml benzen, whipped and left. Benzen coated shades with 2 ml of NaOH 2 N, restored to the red NaOH layer and colorless benzen lining indicate the presence of anthrax glycosides [6].

2.1.5.5. Tanning Inspection
A few extracts were added to the erlenmeyer, added to the aquadest, taken 1 ml, inserted into aqueous reaction tubes with aquades to colorless, treated with FeCl3 10%, blackish green/blackish color (MOH RI, 1995).

2.1.5.6. Saponin Examination
Few extracts are added into the reaction tube, added 10 ml of hot, cooled heat and then shaken strongly for 10 seconds. If a solid foam is formed no less than 10 minutes, as high as 1 cm to 10cm and not lost by adding 1 drop of hydrochloric

acid 2 N indicates saponin [6].

2.1.5.7. Flavonoid Examination

A small amount of extracts added into the erlenmeyer is added with 30 ml of ethanol Pa, added 10 ml of concentrated HCl to acid, heated 1 hour, cooled, put in the separating funnel, added 10 ml 10 ml petroleum ether, whipped, silted, taken down layer (methanol) , evaporated on a water bath, cooled, added 10 ml of ethyl acetate, divided into 2 different cups. :

1. First cup (1) evaporated to dry, added 2 ml of ethanol P.a (until dissolved), added Zn powder, added concentrated HCl, waited, added concentrated HCl, red occurred.
2. Second cup (2) evaporated, added ethanol, added Mg powder, added concentrated HCl, orange yellow color [6].

2.1.6. Hair Formula Forming

2.1.6.1. Formulation of the Formula

The formula selected based on the standard formula contained in Formularium Cosmetics Indonesia (1985). The standard formula can be seen in Table 1.

Tabel 1. *Formula Standard*

Composition	Light Brown	*Dark* Brown	Black
Henna powder	30	83	73
Pirogalol	5	10	15
Copper(II) sulphate	5	7	12

Based on the data in Table 1 above, the standard formula composition in Formularium Cosmetics Indonesia uses inorganic powder and in this study using ethanol extract of bananas stone petal (EEKJPB) to be formulated into hair dye preparation in various concentrations, added with auxiliary material of pirogalol and copper (II) sulphate and xanthan gum. Prior to hair dye formulation, hair orientation was first performed to determine the amount of auxiliary concentrations to be used with note that the pirogalol concentration was no more than 5% [9]. The concentration determination of the concentration of the test material can be seen in Table 2.

Table 2. *The Orientation of Concentration of Testing Materials*

Composition	Formula (g)			
	A	B	C	D
EEKJPB	2	4	6	8
Akuadest destilate	20	20	20	20

Description:

EEKJPB: Ethanol Extracts of Banana Heart Petals Extract
Formula A: EEKJPB 10% in 20 ml aquades
Formula B: EEKJPB 20% in 20 ml aquades
Formula C: EEKJPB 30% in 20 ml aquadest

Based on the data in Table 3.2 above, the orientation was performed by using ethanol extract of bananas stone heartbeat (EEKJPB) which was mixed with aquades, each of 20 ml each resulting in liquid preparation. The next step is to immerse the four sashes of ± 100 pieces each with a length of ± 5 cm, washed with shampoo and dried, put in each of the above formula and let the hair soaking for 4 hours. Then lifted, washed, and observed the color that occurs in gray hair visually. Classification of hair color is done according to cominica.net. Natural colors levels can be observed in Figure 1 below.

Figure 1. *Natural Colors Levels (Anonim 2017)*

1. Black
2. Darkest brown
3. Dark brown
4. Medium brown
5. Light brown
6. Dark blonde
7. Medium blonde
8. Light blonde
9. Very light blonde
10. Lightes blonde

extract of bananas heart petal extract showed that 40% of banana stone petal ethanol extract (EEKJPB) gave a color that approached the color at level I, so to obtain the concentration of auxiliary color supporter will be used ethanol extract of pisang stone heart (EEKJPB) 40%. The orientation to obtain the concentration of auxiliary material was carried out using 40% banana stone ethanol (EEKJPB) ethanol extract mixed with pirogalol and copper (II), xanthan gums each in 1% and 2% concentrations in beaker glass so that the liquid prepared 50 ml, then into the beaker glaze, put in a piece of ± ± 100 pieces with a length of ± 5 cm, which was washed with shampoo and dried, then allowed to soak hair for 4 hours. It is then lifted, washed, and observed by the gray hair color visually and compared to the classification of hair color according to natural colors levels [17,18,19]. The determination of concentrations of the use of auxiliary material of auxiliary material can be seen in Table 3.3.

Table 3. *The Orientation of the Determination of the Use of Color Power Auxiliary Material*

Composition	Formula (g)	
	A	B
EEKJPB	20	20
Pirogalol	1	2
Ferrum (II) sulphate	1	2
Xanthan gum	1	2
Akuades ad	50	50

Description:

EEKJPB: Ethanol Extracts of Banana Heart Petals Extract
Formula A: EEKJPB 40%, 1% pirogalol, 1% copper (II) sulphatee, xanthan gum 1%
Formula B: EEKJPB 40%, 2% pirogalol, 2% copper (II)

sulphate, xanthan gum 2% Based on the data in Table 3 above shows that the orientation results using 40% banana stone (EEKJPB) ethanol extract were mixed with pirogalol and copper (II) sulphate xanthan gum 2% concentration, giving a black color, then based on the result this orientation is made of hair dyes pre-existing formula using various concentrations of bananas heart petals: 20%, 30%, 40%, and 50%, mixed with auxiliary materials of pirogalol, copper (II) sulphate, xanthan gums of 2%.
From the results of the above orientation, a formula with a variety of ethanol extracts of bananas stone heartbeat (Musa balbisiana Colla.). Hair dye formulas made can be seen in Table 4.

Table 4. *Formula of Hair Henna Made*

Bahan	Formula (%)			
	A	B	C	D
EEKJPB	10	15	20	25
Pirogalol	1	1	1	1
Cuprum (II) sulphate	1	1	1	1
Xanthan Gum	1	1	1	1
Aquadest	37	32	27	22

Description:
EEKJPB = Ethanol Extracts of Heart Bleeding Heart
Formula A = EEKJPB 20%, 2% pirogalol, 2% copper (II) sulphatee, and 2% xanthan gum.
Formula B = EEKJPB 30%, 2% pirogalol, 2% copper (II) sulphatee and 2% xanthan gum.
Formula C = EEKJPB 40%, 2% pirogalol, 2% copper (II) sulphatee, and 2% xanthan gum.
Formula D = EEKJPB 50%, 2% pirogalol, 2% copper (II) sulphatee, and 2% xanthan gum.

2.1.6.2. Procedures for Hair Dye Preparation Work
Formula concentrations made by EEKJPB 20%, EEKJPB 30%, EEKJPB 40%, and 50% EEKJPB, mixed with 1 g of pirogalol, 1 g of copper (II) sulphate, and xanthan gum 1 g into each formula to be made into lumped and homogeneous. Moved mass into beaker glass, then fed to aquadest up to 50 ml. Furthermore the formula that has been made is evaluated through various tests.

2.1.6.3. Visual Observation
This observation is done on each formula for each soaking time. From the results of the experiment, the optimum immersion time was determined by comparing the staining results after 1 to 4 hours of soaking. Then each formula observed the final coloration of the color and the color was classified according to Cominica.net as Figure 1.

2.1.6.4. Evaluation of Hair Dye Formula Preparation
Evaluation of the dye hair dye formula produced was performed with several tests as follows:

2.1.6.4.1. Test of the concentration of the test material on the staining of gray hair.
Hair dye preparations were made of various formulas with variation of ethanol extract of ethanol ethanol extract (EEKJPB), EEKJPB 20%, EEKJPB 30%, EEKJPB 40%, and EEKJPB 50%. To find out the concentration that gives black (level 1) to gray hair is done by the following tests: Four hair bands with each ± 100 pieces cut in length ± 5 cm, washed with shampoo and dried, put into a beaker glass containing 50 ml of each dye formula formula, immersed for 4 hours. Then hair is taken ash, washed with shampoo and dried. Then observed the visually and comparable color and clarified according to Cominica.net, so that the formula that gives gray hair to black (level 1), and shows the concentration of the test material (EEKJPB) that can give black (level 1).

2.1.6.4.2. Test effect of immersion time on staining on gray hair
The test results of the influence of the concentration of the test material on the staining of gray were known that the formula gave the gray color to black, then this formula was used to test the effect of soaking time on gray staining in the following ways: Four hair bands with ± 100 pieces cut into pieces with ± 5 cm long, washed with shampoo and dried, put into a beaker glass containing 50 ml of hair dye formula tested, immersed in 1-4 hours. Then every one hour taken a hair tie washed, dried and separated and observed the colors that were formed according to their respective immersion time visually and compared to the soaking time the formula needed to give the color of gray hair to black.

2.1.6.4.3. Effect of adding material and material mixture to gray color change
The test result of the influence of the concentration of the test material on the gray color was known as the concentration formula (EEKJPB) which gave the color of gray to black, then the gray hair test was done to determine the effect of the addition of the material and the mixture to the gray color change by adding the following:
1. Hair gray (blank).
2. Curly hair is immersed in EEKJPB
3. Coarse hair immersed in 2% pirogalol.
4. Gray hair soaked in 2% copper (II) sulphatee.
5. Coarse hair immersed in xanthan gum 2%.
6. Coarse hair immersed in 2% pirogalol plus 2% copper (II) sulphatee.
7. Curly hair is immersed in 2% pirogalol plus xanthan gum 2%.
8. Coarse hair immersed in copper (II) sulphatee 2% plus xanthan gum 2%.
9. Coarse hair immersed in 2% copper (II) sulphate plus 2% pirogalol and 2% xanthan gum.
10. Biscuit hair is soaked in a formula that gives gray hair to black.

Hairy hairs of each ± 100 pieces cut in length ± 5 cm, washed with shampoo and dried, put into each ingredient or mixture of ingredients, immersed for 4 hours, then removed, washed, and dried. Then observed the color change visually and the color is classified according to Cominica.net as shown in Figure 3.1, page 33.

2.1.6.4.4. Color stability tests that have been absorbed by the washings
Once observed the dye staining of viscous hair visually from various immersion times, it is known that the formula produces the darkest black color and the soaking time required. Furthermore, to determine the color stability of the dyestuffs absorbed by the gray hair after washing in the

following manner: Others who have been given hair dye preparation from the best formula with soaking for 4 hours, are washed 20 times by using shampoo and dried. Each time after hair washing is finished, it is observed that color changes are visually and comparable to Cominica.net.

2.1.6.4.5. Test of color stability that has been absorbed by the exposure to sunlight
It has been characterized by 4 hours soaking using a formula that produces gray hair to be black, rinsed to clean, and left exposed to direct sunlight for 5 hours starting from 10:00 am to 3:00 pm, after which visually observed color changes and compared with classification according to Cominica.net, before and after exposure in the sun.

2.1.7. Biological tests (irritant test)
Based on [8], volunteers being paneled in irritation test and determination of dosage ability in reducing water evaporation from skin amounted to 12 people with the following criteria:
1. Women
2. Physically and spiritually healthy
3. Age between 20-30 years.

There is no history of allergy-related illness:
1. Be willing to volunteer
Regarding volunteers is the closest person and often around the test so it is more readily monitored and observed when there is a reaction that occurs on the skin being tested. Examples of formats of approval letter on volunteer irritation test. Testing was performed on the skin of the back ear of the volunteer, and the formula tested was a formula that could alter the color of the gray to black (level 1). Voluntary skin to be tested cleaned and circled with a pencil pencil (diameter ± 2 cm) on the back of the ear, then the hair dye formula prepared was applied using cutton buds at the place to be tested which was marked, then left for 24 hours observed every 4 hours if redness on the skin, itching on the skin, the skin becomes rough [9] and [15]. For possible reactions are given the following:
No reaction = -
Redness on the skin = +
Itchy skin = ++
The skin becomes rough = +++
The result of this research was using the test of pisang stone heart disease (*Musa balbisiana* Colla.) In the form of identification of pisang stone heart plant, making of pisang stone heart simplisia, making banana stone ethanol extract, phytochemical screening, hair dye formulation, , color stability test for gray hair, and skin irritation test against volunteers.

3.RESULTS AND DISCUSSIONS

3.1. Identification of Plants
The research was started with plant identification used as a test material, by way of being sent to Herbarium Meandense (MEDA) of North Sumatra University. Plant identification results prove that the plant used is a bananas (*Musa balbisiana* Colla.).

3.2. Phytochemical Screening Results
Phytochemical screening was carried out to determine the content of the group of chemical compounds found in the ethanol extract of the pisang stone heart petals. The data of the phytochemical screening test can be seen in Table 5.

Table 5. *Data Results of Fitochemical Screening Test*

No	Chemistry form	Screening test
1.	Alcaloid	+
2.	Steroid/triterpenoid	+
3.	Tanin	+
4.	Saponin	-
5.	Glikosida	+
6.	Glikosida antrakuinon	-
7.	Flavonoid	+

Description:
(+) = Contains tested compound
(-) = Does not contain the tested compound

Based on the data in Table 5 above, the results of the phytochemical screening test of ethanol extracts of the pisang stone heart (*Musa balbisiana* Colla.) Contain alkaloids, steroids/triterpenoid, tannins, glycosides and flavonoids.

3.3. Orientation Results Determination of Concentration of Testing Materials
The orientation was done by using ethanol extract of bananas stone petals (EEKJPB) 10%, 20%, 30%, and 40% respectively. In each mixture it is inserted ± 100 pieces of hair with a length of ± 5 cm, which has been washed with shampoo and dried, then allowed to soak hair for 4 hours. Then lifted, washed, and visually observed gray hair changes occur. The orientation of the determination of the concentration of the test material showed that EEKJPB concentrations of 40% and 50% could give significant color change, while at concentrations of 10%, 20%, and 30% only gave slightly dark gray hair changes.

There is no history of allergic-related diseases:
1. Willing to Volunteer

About volunteers are the closest people and are often around testing so they are more easily monitored and observed when there is a reaction to the skin being tested. An example of the format of approval letter of the voluntary irritant test. The test is performed on the skin of the volunteers on the back of the ear, and the formula tested is a formula that can change the color of gray to black (level 1). The skin of the volunteers to be tested is cleaned and circled with a lip pencil (± 2 cm diameter) on the back of the ear, then a prepared hair dye formula smeared with cutton buds at the marked test spot, then left for 24 hours with observed every 4 hours once whether there is redness in the skin, itching on the skin, the skin becomes rough [9]. For reactions that may occur are marked as follows:
No reaction = -
Redness on skin = +
Itching on skin = ++
Skin becomes rough = +++

The results obtained from the research using stone banana heart test (*Musa balbisiana* Colla.) In the form of identification of banana stone heart plant, making of banana

stone heart simplicia, making of stone banana stone ethanol extract, phytochemical screening, hair dye formulation, evaluation of the resultant dosage, color stability test on gray hair, and test of irritation to skin of volunteer.

3.4. Orientation Result Determination of Concentration of Use of Substance Substance Substance

The orientation was carried out using 40% of banana stone ethanol (EEKJPB) extract formula with variation of the concentration of auxiliary material ie pirogalol and copper (II) sulphate 1% and 2% respectively. In each mixture it is inserted ± 100 pieces of hair with a length of ± 5 cm, which has been washed with shampoo and dried, then allowed to soak hair for 4 hours. Then lifted, washed, and visually observed gray hair changes occur. Data on the orientation of the use of auxiliary auxiliary material can be seen in Table 6 and the effect of the differences in the auxiliary concentrations on gray color changes with 4 hours soaking time can be seen in Figure 6.

Table 6. *Data on the Orientation of Use of a Power Plant Auxiliary Material*

No	Used of materials	Colour products
1.	EEKJPB 40% + Pirogalol 1% + Copper (II) sulphate 1% + *Xanthan gum* 1%	Dark Brown (level 2)
2.	EEKJPB 40% + Pirogalol 2% + Copper (II) sulphate 2% + *Xanthan gum* 2%	Black (level 1)

EEKJPB 40%, pirogalol 1%, tembaga (II) sulfat 1%, and *xanthan gum*

EEKJPB 40%, pirogalol 2%, tembaga (II) sulfat 2%, and *xanthan gum*

Figure 2. *Effect of Different Concentrations of auxiliary Material to Uban Color Changes with 4 Hours Soaking Period.*

Based on the data in Table 5 and Figure 2 above shows that the higher concentrations of the auxiliaries used will produce a gray-gray color tested increasingly concentrated. At 1% concentration produces a 'very dark brown' color, whereas at 2% concentration produces a 'black' color. Thus, the concentrations of pyrogalol, copper (II) sulphatee, and xanthan gum to be used in the hair dye formulas were 2%, respectively. Because the dyed hair dye made with desiccated black gray hair. The color produced in hair gray is less good if only use the extract of banana stone heart ethanol as a natural dye, then added with auxiliary materials are pirogalol, copper (II) sulphatee, and xanthan gum as a color generator on gray hair. In the irritation test of six volunteers showed no irritation reaction, thus the dye preparation of ethanol extract of stone banana heart petals (Musa balbisiana Colla.) Can be developed into a dye preparation of gray hair.

3.5. Evaluation of Hair Dyes on Uterine Staining Results

Evaluation of the dye preparation that has been formulated was done by examining the effect of difference of ethanol extract concentration of stone banana stone EEKJPB on gray hair, the influence of the immersion time on the coloring of gray hair, and the influence of various variations of the addition of ingredients and auxiliary mixture to the change of hair color of gray hair.

3.5.1. Test results of the effect of the addition of materials and mixture of materials to the change of gray.

Based on the results of the experiment, the effect of the extract concentration of banana heart stone (EEKJPB) on the coloration of gray hair, obtained formula that gives the color of 'black' that is Formula C (EEKJPB 40%, pyogalol 2%, 2% copper (II) sulphatee, and xanthan gum 2 %), to investigate the effect of additional ingredients of pyrogalol, copper (II) sulphatee, and xanthan gum on the formula, tests of the effect of adding the ingredients and mixture of additives to gray staining.
Into each mixture was inserted gray ± 100 strands with length ± 5 cm, which had been washed with shampoo and dried, allowed to immerse for 4 hours, then gray was lifted and observed colors that occur in gray visually, and classified according to [20,21,22,26], data of test result of effect of addition of material and mixture of material to change of hair color of gray hair can be seen in 6.

Table 6. *Data Test Result Effect of Material Addition and Material Mixture to Change Color of Hair Uban*

No.	Colour results	Mixed materials
1.	 White	Grey hair
2.	 Blond light (level 8)	Grey hair + EEKJPB 40%

3.	 Blond dark (level 7)	Grey hair + pirogalol 2%	8.	 White greenish	Grey hair + Copper (II) sulphate 2% + *xanthan gum* 2%
4.	 White greenish	Grey hair + Copper (II) sulphate 2%	9.	 Middle brown (level 4)	Grey hair + pirogalol 2% + Copper (II) sulphate 2% + *xanthan gum* 2%
5.	 the brightest blonde (level 10)	Grey hair + *xanthan gum* 2%	10.	 Black (level 1)	Grey hair + EEKJPB 40% + pirogalol 2% + Copper (II) sulphate 2% + *xanthan gum* 2%
6.	 Medium brown (level 4)	Grey hair + pirogalol 2% + Copper (II) sulphate 2%			
7.	 Blond light (level 8)	Grey hair + pirogalol 2% + *xanthan gum* 2%			

Based on the data in Table 4.3 above shows that, in point 2, the color of gray hair resulting from immersion of ethanol extract of stone banana petals (EEKJPB) 40% without using the color generating aids produces less dark color that is blonde medium (level 8). seen on point 3 using one of the coloring materials also produces dark blond color (level 7), point 4 produces a bluish green color, and 5 points produces the brightest blond (level 10). Therefore, to get a formula that gives black color (level 1) is given additional dyes of copper metal (II) sulphate, pyrogalol coloring agent, and xanthan gum. In point 10 using 40% EEKJPB assay with 2% pyrolysol coloring auxiliary materials, 2% sulphate 2% copper (II) sulphate, and 2% gum xanthan yielded black (level 1). Natural dyes are difficult to penetrate into the hair cortex, but only deposited on the surface of the hair shaft and thin channel, can be lost by washing, therefore to obtain optimal results then natural dyes are used in conjunction with metal dyes and coloring agents. The use of natural dyes with the help of dyes of metal compounds and coloring agents will produce stronger and more stable colors [9,23,24]. The mixing of ethanol extract of stone banana heart petals (EEKJPB) with pyromalol-colored ingredients, and copper (II) sulphate can improve the stickiness and the dye of EEKJPB attaches strongly to the hair stalk, this is because the molecules attach to the cuticle and enter into the hair cortex resulting in a change of color in gray hair [9, 25].

3.5.2. Test results influence the immersion time to the results of hair grain staining

The result of observation on the effect of ethanol extract concentration of stone banana stone petals (EEKJPB) in hair dye formula to hair gray coloring, it is known that the best formula is Formula C that is EEKJPB 40% combination added with pyrocololol, copper (II) sulphate , and xanthan gum were 2%, respectively. The duration of immersion time is likely to affect the result of dye staining on gray hair, so to know the time required to produce the most optimal black hair coloring (black) as desired, tested EEKJPB 40% formula with gray hair immersion time for 1-4 hour, and every hour of gray hair is taken, and the colors produced on the gray are observed visually, and are classified according to Cominica.net. Data on the effect of immersion time on the gray hair coloring results can be seen in Table 7.

Table 7. *Influence of Immersion Time Data on the Result of Hair Coloring*

Colour results	Soaking time
 Dark brown	1 hour (level 3)
 Dark brown	2 hours (level 3)
 Very dark brown	3 hours (level 2)
 Black	4 hours (level 1)

Based on the data in Table 7 above shows that, gray hair coloring occurs gradually change the color of gray hair to black hair. In 1 hour immersion, the first result was 'medium brown', soaking for 2 hours resulted in a 'dark brown' color, soaking 3 hours resulted in a 'very dark brown' color, and at 4 hours immersion being 'black'. This shows that the longer time soaking hair color gray hair will be more black. From the visual observation of the experimental results, the formula yielded changes of gray to black, which consisted of EEKJPB 40%, 2% pyrogalol, 2% sulphate copper (II) sulphate, and 2% gum xanthan. Then this is the formula used for the evaluation test.

3.5.3. The test results influence the difference of EEKJPB concentration to the change of gray color

Tests were performed using various concentrations of ethanol extract of stone banana heart petals (EEKJPB) which added 2% color-generating auxiliaries. Data of visual observation effect of EEKJPB concentration on the change of gray color can be seen in Table 8.

Table 8. *Visual Observation Result Data Effect of EEKJPB Concentration on Uban Color Changes*

No.	Colour results hair grey	Formula
1.	 Dark brown (level 3)	EEKJPB 20% + pirogalol 2% + Copper (II) sulphate 2% + *xanthan gum* 2%.
2.	 Very dark brown (level 2)	EEKJPB 30%, pirogalol 2%, Copper (II) sulphate 2% and *xanthan gum* 2%.

3.	 Black (level 1)	EEKJPB 40%, pirogalol 2%, Copper (II) sulphate 2%, *xanthan gum* 2%.
4.	 Black (level 1)	EEKJPB 50%, pirogalol 2%, Copper (II) sulphate 2%, *xanthan gum* 2%.

Based on the data in Table 8 above shows that, the higher concentration of ethanol extract of stone banana heart petals (EEKJPB) used in the hair coloring formula, the more concentrated the color produced on the gray tested. The formula with the lowest EEKJPB concentration of 20% in 4 hours immersion produces 'brown seandg' color. In the 30% EEKJPB formula at 4 hours immersion produces a thicker color that is 'dark brown'. In the EEKJPB formula 40% produces 'black' (level 1), and on EEKJPB formula 50% also produces 'black' (level 1) color. Thus, it can be concluded that the color produced in the EEKJPB 40% formula has stabilized and EEKJPB concentration need not be increased again, then the best dye-producing formula is the formula C with the concentration of ethanol extract of stone banana heart petals (*Musa balbisiana* Colla.) 40 %, which can change the color of gray hair to 'black'. Mixing the extracts of the heart of a pyrocallol stone banana, and Copper (II) sulphate can improve the adhesion of color to the hair. The ethanol extract of the stone banana heart petals (*Musa balbisiana* Colla.) Can be attached more firmly to the hair stalk, this is because the molecules are attached to the cuticle and into the hair cortex resulting in discoloration of the hair [9,10]. From the mixing of ethanol extract the petals of banana stone, pyrogalol, copper (II) sulphate, and xanthan gum can be obtained some advantages, among others: better produced color (lead to dark color), and more stable (not easy to fade).

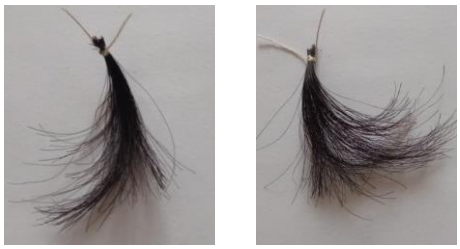
3.5.4. Color Stability Test on Hair

Stability test of staining dye on gray hair is done to determine the durability of gray hair color has absorbed the color of the dye dye, done by testing stability against washing and with exposure in the sun.

3.5.4.1. Result Of Color Stability Test On Gray Against Leaching

The color dye stability test of hair dye on gray for washing is done by gray hair that has absorbed the color of the best formula (yielding level 1 black) ie Formula C (EEKJPB 40%, 2% pyrogalol, 2% Copper (II) sulphate, and xanthan gum 2%) then washed with shampoo, and dried. This washing was done 20 times, the result was observed by looking at the color change aandya before and after washing. The color of gray before and after the washing can be observed. From the washing results it can be seen that the result of gray hair that has absorbed the color before and after the washing remains the same, The result of color stability test on washing can be seen in Figure 3

Before wash After 5 times washed After 10 times washed



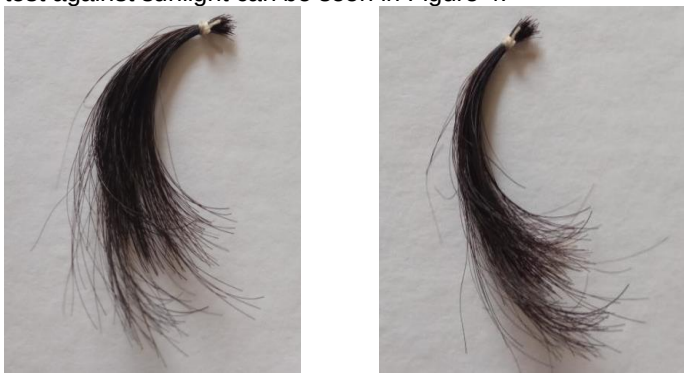
After 15 times washed After 20 times washed

Figure 3. *Stability Test Result Color to Washing*

Based on Figure 4.2 above shows that, the color of gray hair that has absorbed the dye from the dye preparation with the concentration of ethanol extract of stone banana petals (EEKJPB) 40% combined with pyrocololol, Copper (II) sulphate, and xanthan gum each 2% produces a 'black' (level I) color, slightly changed color after 20 washes, slightly faded but still 'black', meaning dye preparation produced by ethanol extract of stone banana heart petals (*Musa balbisiana* Colla) 40% are semi-permanent.

3.5.4.2. Result Of Color Stability Test to Sunlight

The color dye stability test of hair dye on gray to sun exposure is done by gray hair that has absorbed the color of the best formula that produces 'black' colors ie Formula C (EEKJPB 40%, 2% pyrogalol, 2% Copper (II) sulphate, and xanthan gum 2%), exposed in direct sunlight for 5 hours, starting from 10:00 to 15:00 pm. The results of color stability test against sunlight can be seen in Figure 4.



Before exposure the sun After exposure the sun in 5 hours

Figure 4. *Stability Test Results Color to Sunlight*

Based on Figure 4.3 above shows that, the color of gray hair that has absorbed the dye from the dye preparation with the concentration of ETC 40% combined with the ingredients of pyruvalol, Copper (II) sulphate, and xanthan gum each 2% stable against sun exposure, after 5 hours of direct exposure of the sun does not change color, remain 'black', this is probably due to the color has been absorbed in gray and not decomposed with exposure to sunlight.

3.6. Irritant Test Result

Hair dye preparations to be marketed to consumers should be clearly marked on the use, composition, and content of the substances used. In addition, the etiquette should indicate whether or not to be tested for irritation before use. The test is performed to ensure that in the formulation of dye preparations hair reaction occurs between the components to form substances that are irritant or toxic. This test was performed on six volunteers, the formula chosen was the best formula that gives the color 'black' on gray hair that is Formula C (EEKJPB 40%, pyogalol 2%, Copper (II) sulphate 2%, and xanthan gum 2%) . Test results can be seen from the observation data conducted on each volunteer. Observation data of irritation test on volunteer skin can be seen in Table 9.

Table 9. *Observation Data of Irritation Test on Volunteer Skin*

No Volunteer	Statement	Categorized 1 2 3 4 5 6
1	Redness on the skin	- - - - - -
2	Itching on the skin	- - - - - -
3	Skin becomes rough	- - - - - -

Information :
- = No reaction occurred
\+ = Redness on the skin
++ = Itching on the skin
+++ = Skin becomes rough

Based on the data in Table 4.6 above shows that the formula used is 40% petal banana ethanol extract (*Musa balbisiana* Colla.) 40% does not cause irritation to the skin. From the results of all tests that have been done on hair dye formula using natural ingredients as hair dye that is ethanol extract petal banana heart stone showed that the petals banana stone can change the color of gray until finally obtained the color 'black'. It is proven that the higher concentration of ethanol extract of stone banana heart petals used then the resulting gray hair becomes increasingly black

4.CONCLUSIONS AND SUGGESTIONS

4.1. Conclusions

Based on the results of research conducted on stone banana heart petals (*Musa balbisiana* Colla.) Can be concluded that:

1. The stone banana petal (*Musa balbisiana* Colla.) In the form of ethanol extract can be formulated into the dye preparation, where phytochemical screening proves that the stone banana heart petals (*Musa balbisiana* Colla.) Contain alkaloid, steroidtriterpenoid, tannin, glycoside and flavonoids.
2. The higher the concentration of gray hair dye from the ethanol extract of the stone banana heart petals (*Musa balbisiana* Colla.) Used, the change in the color of gray hair produced becomes increasingly 'black'. The dye preparation of gray hair from ethanol extract of banana heart petals (*Musa balbisiana* Colla.) In 40% concentration of Formula C, is the best preparation because it can change the color of gray hair to 'black', which is stable against 20 washes and direct sun exposure for 5 hours as well as not causing irritation to the skin.

4.2 Suggestions

Subsequent researchers suggested to formulate the petals of the heart.

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