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Lipstick Formulation To Use A Natural Dye From Rambutan (*Nephelium lappaceum* L.) Rind Extract.

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ABSTRACT

The red colour of rambutan (*Nephelium lappaceum* L.) rind is caused by anthocyanin compounds. Anthocyanin is a pigmen that can be used as a natural dye. The aim of this study was to formulate lipstick using rambutan rind extract as a natural dye and to study its stability during time of storage. Fresh rambutan rind was macerated using 96% ethanol, then solvent was evaporated to obtained viscous extract. The lipsticks were formulated with various concentrations of extract to which 25, 27 and 29%. Physical stability of lipstick tests were conducted by measuring melting point, breaking point and stability of shape alteration, homogeneity, spread ability and also as well as irritation and the hedonic test was also applied to assess users acceptability. Qualitative dye stability test was using paper chromatography to which the samples were stored at three different temperatures; 2-8^{o}C, 15-30^{o}C, and 40^{o}C. The results showed that the lipstick preparations gave pink to red colour, easy applied and stable during time of storage. Melting and breaking point fulfill requirement of lipsticks on the market. Paper chromatography results showed that rambutan (*Nephelium lappaceum* L.) rind extract as the natural dye remained unchanged at different temperatures of storage. The best formula was lipstick with 29% of extract because it had good physical quality (colour, homogeneity, melting point, physical strength, stability, and spread ability). The lipstick was easy well received by the panelist and did not give any irritations.

Keywords: Anthocyanin, *Nephelium lappaceum* L., lipstick, natural dye.

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INTRODUCTION

Nowadays, cosmetics is essential for life that widely used both for men and women. Cosmetics was used over and over every day throughout the body, from hair to toe, therefore it must be safe to used [1]. One type of cosmetics is lip color. There are in various forms, such as liquids, crayons, and cream. Lip color in the form of liquids and creams generally will give a color that is not durable and easily removed so it is not so fond of people, especially when compared with the lip color in the form of crayons which better known as lipstick [2, 3]. Lipstick is a cosmetic preparation used for coloring the lips with an artistic touch so as to enhance the aesthetics of make up. Lipstick is now available around the hundreds of types of colours just to meet the desires of consumers. But the red colour believed to show healthy and interesting facial expressions. Colour become one of the factors that influence consumer acceptance of a product lipstick. Typically the dyes used in the manufacture of lipstick is a synthetic dye. Some synthetic dyes was not safe to use because it is toxic, even some of them are carcinogenic [4].

Avoid the toxic effect of some synthetic dyes, it has been widely used healthy and safe natural dyes that are obtained from plants, for substitute the synthetic dyes. One of the natural sources that can be used as a natural dye is rind of rambutan (*Nephelium lappaceum* L.). It is contain anthocyanin which can be used as a natural dye [5]. Anthocyanins are secondary metabolites of the family of flavonoids, found in large quantities in fruits and vegetables. Anthocyanins are pigmen that soluble in water and most widespread in plants [6].

Rambutan (*Nephelium lappaceum* L.) is a kind of tropical fruits that originated from Indonesia and has spread to other tropical regions such as the Philippines, Malaysia and other countries of Latin America (Fig.1). Rambutan has between 15-25 m tall, branching twigs and leaves are green. Fruit shape is oval, three to five centimeters long with hair that limp until stiff. The color of rambutan rind is green, and change to yellow or red when fully ripe. Shape of fruits are elliptical, wrapped in transparent white flesh that can be eaten and contains a lot of water. Fruits has diverse tastes from sour to sweet and the seeds covered by a thin layer of woody [7]. Rambutan rind extract is also known to have antibacterial activity [8]. Currently, the rambutan is still favored by the people. But the red color of their rind is still not fully utilized. Therefore, this research aimed to formulate lipsticks using a natural dye from rambutan rind extract.

MATERIALS AND METHODS

Plant materials:

Rambutan rind was collected from BALITTRO, Bogor, West Java. Identification of plants were conducted in the Bogor Botanical Gardens, Indonesian Institute of Sciences, Bogor,West Java (Fig.2). All chemicals used in this research were recruited from different sources. They included cera alba, carnauba wax, cetyl alcohol, vaseline, lanolin, oleum ricini, propylene glycol, butyl hidroksitoluen, DMDM hydantoin, oleum jasmini, Whatman filter paper No.1, trisodium citrate and ammonia.

Chemical materials:

All chemicals used in this research were recruited from different sources. They included cera alba, carnauba wax, cetyl alcohol, vaseline, lanolin, oleum ricini, propylene glycol, butyl hidroksitoluen, DMDM hydantoin, oleum jasmini, Whatman filter paper No.1, trisodium citrate and ammonia.

Methods:

This research preparation of extract, formulation of lipsticks and evaluation of lipsticks. Preparation of extract was conducted by doing to macerated fresh rambutan rind using 96% ethanol, then solvent was evaporated to obtained viscous extract. The lipsticks were formulated with various concentrations of extract to which 25, 27 and 29%. Evaluation of lipsticks include physical stability tests and qualitative dye stability test. Physical stability tests were conducted by measuring melting point, breaking point, homogeneity, spread ability and also as well as irritation and the hedonic test was also applied to user's acceptability. Dye stability test using paper chromatography. The sample lipsticks were stored at three different temperatures; 2-8^{o}C, 15-30^{o}C, and 40^{o}C. Test was done before and after the storage, and then viewed under UV 254 nm.

Preparation of Extract:

The dried powdered rinds of rambutan (1 kilograms) were extracted with ethanol 96% (1:6) for 32 hours. After completion of extraction, the defatted extract was filtered through Whatman filter paper No.10 to remove any impurities if present. Then solvent was evaporated to obtained viscous extract.

Formulation of Lipsticks:

The lipsticks were formulated with various concentrations of extract to which 25, 27 and 29%; then were denoted by F1, F2, F3 respectively. The ingredients used in these lipsticks formulation are shown in Table 1**.** The process of making a lipstick base can be done by dissolving butyl hidroksitoluen in oleum ricini, then to stir until homogeneous (mass A). DMDM hydantoin is dissolved in propylene glycol (mass B). Mass is mixed A and B to obtain a single phase. Created phase two which contain cera alba, carnauba wax, cetyl alcohol, lanolin and vaselin. Phase two is melted above the bath until the material melts, then add phase one, stirring until evenly distributed. Added perfume, then immediately poured into a lipstick printer, wait until it hardens, then put into containers roll up.

Evaluation of Lipsticks:

Physical Stability Test:

Determination of melting point is important to show the limit temperature of safe storage. Good lipstick has melting point above 50°C [9]. The sample lipstick put in a dish and be heated with a starting temperature of 50°C for 15 minutes. Then temperature was increased 1°C every 15 minutes, where the temperature at which the sample started to melt was noted as the melting point of lipstick.

Evaluation of breaking point was done to demonstrate the strength of lipstick. It was conducted by putting the lipstick horizontally. At a distance of approximately ½ inch from the edge, hung load that serves as ballast. The weight was gradually increased by a specific value (10 grams) every 30 second, and the weight at which the sample broke was the breaking point.

The homogeneity of formulated lipstick was determined by applying amount of lipstick on a transparent glass. It must show homogeneous composition and no coarse grains [9].

Spread ability test was done visually by applying lipstick on the skin back of hand and then observing the colors that stick with treatment five times basting at a particular pressure as we usually use lipstick.

Skin irritation test was carried out by applying lipstick on the skin for 10 minutes. Usually, the most appropriate locations used area skin irritation test is part of the back, arms, and the skin behind the ear. The hedonic test was carried to study acceptance of the lipsticks. The sample of lipsticks were shown to the 30 female panelists and percentage of acceptance was calculated.

Qualitative Dye Stability Test using Paper Chromatography

Stationary phase used Whatman filter paper No.1 and mobile phase used trisodium citrate 2 grams dissolved in ammonia 5% (100 ml). The sample lipsticks were stored at three different temperatures; 2-8^{o}C, 15-30^{o}C, and 40^{o}C. Test was conducted before and after the storage, and then viewed under UV 254 nm.

Data Analysis

The data analysis was conducted by using One Way ANOVA statistics.

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RESULTS AND DISCUSSION

The results showed that the lipstick preparations had a pink to red colour and easy applied (Fig. 3). All preparation of lipsticks were homogeneous, had melting and breaking point fulfill requirement of lipsticks on the market (Table 2.). Paper chromatography results showed that the natural dye from rambutan (*Nephelium lappaceum* L.) rind extract remained unchanged at different temperatures of storage (Table 3.).

Table 1. Formulation of Lipsticks

Ingredients (%)	F1	F2	F3
Rambutan Rind Extract	25.0	27.0	29.0
Cera alba	27.0	27.0	27.0
Carnauba wax	1.9	1.8	1.7
Cetyl alkohol	3.1	2.9	2.8
Vaseline	20.0	19.0	18.0
Lanolin	13.0	12.3	11.5
Oleum ricini	2.5	2.5	2.5
Propylene glycol	5.0	5.0	5.0
Butil Hydroksitoluen	1.7	1.7	1.7
DMDM Hydantoin	0.6	0.6	0.6
Oleum jasmini	0.2	0.2	0.2

Table 2. Evaluation of Lipsticks

Evaluation parameters	F1	F2	F3
Color	pink	pink	red
Melting point	64.62 ± 0,01	65.23 ± 0.39	66.03 ± 0.66
Breaking point	96.11 ± 1.32	93.94 ± 0.57	91.11 ± 1.80
Homogeneity	homogeneous	homogeneous	homogeneous
Spread ability	good	good	good
Dye Stability	stable	stable	stable
Skin irritation	no irritation	no irritation	no irritation
Hedonic test	16.67 %	30.00 %	53.33 %

- A good lipstick has a high melting point (above 50°C) (Health of Department RI)
- Lipsticks on the market have 95 grams of breaking point

Table 3. Result of Qualitative Dye Stability Test Using Paper Chromatography

Formulation of lipsticks	Rf			
	Before storage	After storage		
		Temperature 2-8° C	Temperature 15-30° C	Temperature 40° C
F1	0,29	0,24	0,26	0,22
F2	0,29	0,25	0,24	0,24
F3	0,28	0,26	0,25	0,23

CONCLUSIONS

The best formula was lipstick with 29% of extract because it had good physical quality (colour, homogeneity, melting point, breaking point and spread ability). The lipstick was easy well received by the panelist and did not give any irritations.

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