Tri Yanuarto *et al*, International Journal of Pharmaceutical Sciences and Medicine (IJPSM), Vol.8 Issue. 11, November- 2023, pg. 1-7

ISSN: 2519-9889
Impact Factor: 5.9

PHYSICAL EVALUATION OF AQUOUS EXTRACT TELANG FLOWER (*Clitoria ternatea* L.) IN NATURAL DYEING POWDER FORMULATION

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DOI: 10.47760/ijpsm.2023.v08i11.001

Abstract:
Synthetic dyes are more popular among manufacturers because they are easier to find, have a higher price, and are more practical for many types of use. Choosing to use natural dyes in the manufacture of beverage or food products is a good step to protect consumers from the negative dangers of using synthetic dyes which have health risks. Making natural dye powder from butterfly pea flowers (*Clitoria ternatea* L.) is an effort to increase the durability and expand the application of natural dyes from butterfly pea flowers. This effort is not only to maintain nutritional content but also to provide added value. The advantages of natural dye powder include that it has a longer shelf life, is efficient in storage and has a lower water content. Making sea cucumber powder needs to be added with dextrin and lactose fillers because it is based on the properties of high solubility, ability to bind water and relatively low viscosity. The results of the physical evaluation show that all formulas meet the requirements of the organoleptic test, pH test, homogeneity test, water content test and degree of fineness test. Based on the research that has been carried out, it can be concluded that the essence of the butterfly pea flower (*Clitoria ternatea* L.) can be formulated into a water extract powder of the butterfly pea flower (*Clitoria ternatea* L.).

Keywords: Physical Evaluation, Butterfly Flower, Natural Dyeing Powder Formulation

Introduction

Utilizing color in an item is an important thing that can increase the selling value of the item. Coloring is one of the elements that buyers consider when assessing a food and beverage item. The reason for adding coloring to food products is to provide an attractive appearance according to the buyer's wishes, strengthen the existing natural color and prevent loss of color caused by excessive temperature, exposure to sunlight, stickiness and capacity conditions (Azmi dan Nurandriea, 2017).

Synthetic dyes are more popular among manufacturers because they are easier to find, have a higher price, and are more practical for various types of use (Ansel, 1989). Choosing to use natural dyes in the manufacture of beverage or food products is a good step to protect consumers or buyers from the negative dangers of using synthetic dyes. The use of synthetic materials can increase the risk to a person's health and is often used in the manufacture of food and beverage products (Rahayuningsih, *et al.*, 2022). Therefore, the use of

ISSN: 2519-9889
Impact Factor: 5.9

natural dyes is safe for consumers and is often used to make related products for food and drinks. Apart from being environmentally friendly, the advantages of natural dyes, the materials used are also easy to obtain (Azizah dan Hartana, 2018).

Natural coloring ingredients can be found in flowers, fruit and vegetables. One of the dyes can come from butterfly pea flowers (*Clitoria ternatea* L.). The blue color of the flowers indicates the presence of anthocyanins (Suebkhampet and Sotthibandhu, 2019). Butterfly flower (*Clitoria ternatea* L.). Apart from being a natural dye, the main use of anthocyanins is as an antioxidant (Vankar and Srivastava, 2013).

The anthocyanin phytochemical compound content in telang flowers has good stability, so local ingredients can be used in the food industry. Other phytochemical components found in butterfly pea flowers include flavonoids. The flavonoid content of telang flowers can function as an anti-oxidant. This flavonoid content can be grown in various plant industries. Therefore also butterfly pea flower (*Clitoria ternatea* L.). Can produce health-related effects (Pratimasari dan Lindawati, 2018). Making coloring powder from butterfly pea flowers (*Clitoria ternatea* L.) is an effort to increase the durability and expand the application of natural dyes from butterfly pea flowers. This effort is not only to maintain nutritional content but also to provide added value. The advantages of natural dye powder include that it has a longer shelf life, is efficient in storage and has a lower water content. Making powder products needs to be added with dextrin and lactose fillers because they are based on high solubility, ability to bind water and relatively low viscosity (Mauludifia dan Astrinia, 2020).

Methods

The research method used was experimental, starting from collection of materials, manufacture of extraction, formulation of natural dyeing powder.

Tools and materials

The tools used are digital pH meters, analytical scales, hot plates, vibration sieve, mixers, glassware.
The materials used were butterfly pea flower aquadest extract, Laktosa, Dekstrin dan Aqua dest.

Method For Making Butterfly Pea Flower Aquous Extract Powder

1. Preparation of aquous extract of butterfly pea flowers (*Clitoria ternatea* L.) obtained by heating at a temperature of 54°C for 15 minutes (Maran, *et al.*, 2014)
2. The dextrin / lactose was weighed at 5%, 10% and 15% respectively, put into a mortar, then 45 grams of water extract from butterfly pea flowers were added, mixed until homogeneous, then placed in a baking dish lined with aluminum foil marked (F1, F2, F3, F4, F5 and F6). Next, the preparation is dried in a drying cabinet at a temperature of 40 – 60^0 C until dry and becomes powder.

Table 1: Formulation Design

Ingredients	F1	F2	F3	F4	F5	F6
Aquous Extract Telang Flower (gram)	45	40	35	45	40	35
Dekstrin (%)	5	10	15	0	0	0
Laktosa (%)	0	0	0	5	10	15
Total	50	50	50	50	50	50

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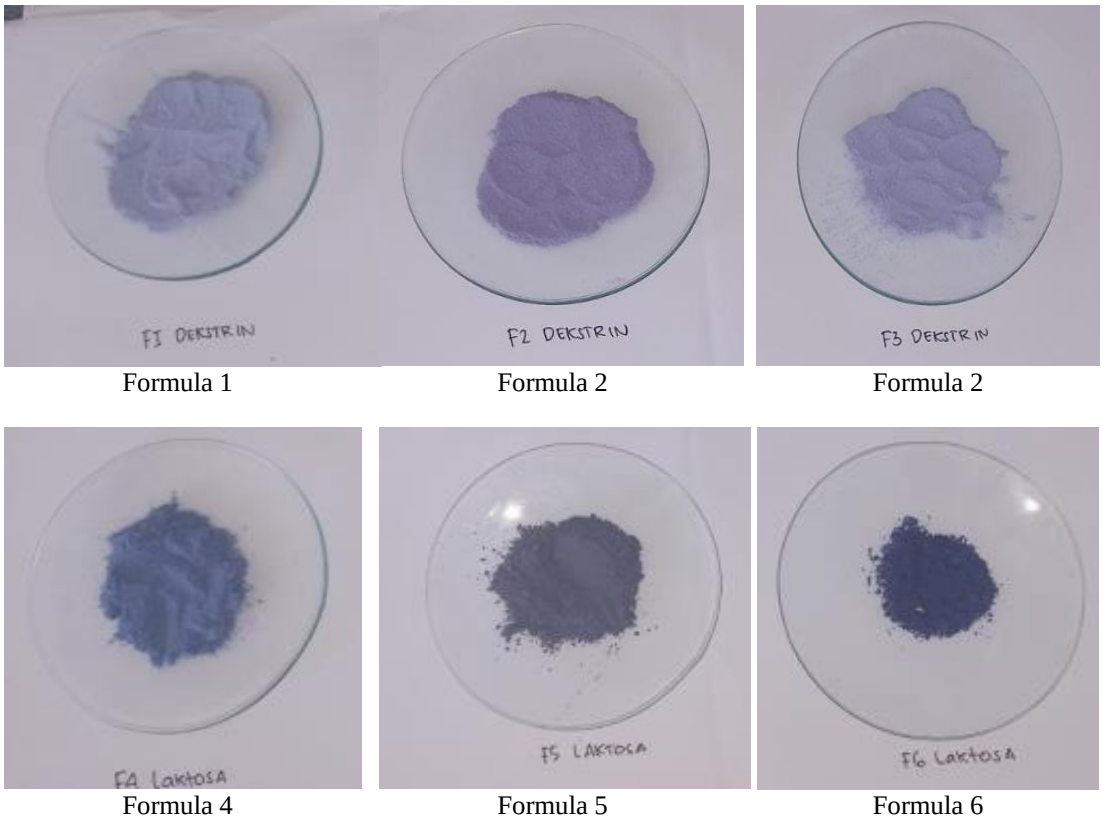
Result and Discussion

1. Organoleptic Test Results of Telang Flower Aquous Extract Powder

Organoleptic tests of aquous extract powder preparations from butterfly pea flowers (*Clitoria ternatea* L.) include observing changes in color, odor and shape that occur after 4 weeks of storage.

Table II. Organoleptic Results of Telang Flower Aquous Extract Powder

Sample	Organoleptic		
	Color	the aroma	the shape
F 1	Light blue	typical telang	Fine powder
F 2	Purplish blue	typical telang	Fine powder
F 3	Gray blue	typical telang	Fine powder
F 4	Blue	typical telang	Fine powder
F 5	Dark blue	typical telang	Fine powder
F 6	Deep blue	typical telang	Fine powder



Formula 1 Formula 2 Formula 2

Formula 4 Formula 5 Formula 6

Figure 1. Appearance of Butterfly Aquous Extract Powder (Clitoria ternatea L.)

Preparation of aquous extract of butterfly pea flowers (*Clitoria ternatea* L.) obtained by heating at a temperature of 54°C for 15 minutes. The Aquous extract obtained was followed by making aquous extract powder from butterfly pea flower (*Clitoria ternatea* L.) made in six formulas with different gram weights of butterfly pea flower and using two ingredients, namely dextrin and lactose. The use of fillers aims to speed up the drying process, increase total solids, prevent damage due to heat during drying, coat flavor components and

ISSN: 2519-9889
Impact Factor: 5.9

increase volume (Yuliawaty and Susanto, (2015). Dextrin and Lactose have several differences, lactose has properties, including undergoing a dispersion process. fast, has high solubility, has low hygroscopic properties. And Dextrin has properties including undergoing a slow dispersion process, having low solubility, having high hygroscopic properties. Due to the addition of more dextrin, the color of the powder becomes faded and the brightness increases. And conversely, the more lactose you add, the more intense the color of the powder will be. However, lactose and dextrin are equally soluble in water (Ekafitri, dkk., 2016).

The purpose of adding dextrin and lactose was to see the ratio of butterfly pea flower aquous extract (*Clitoria ternatea* L.) made. Because dextrin and lactose are carbohydrates that are formed during the hydrolysis of starch into sugar through several methods. In the food industry, dextrin and lactose are used to improve the texture of food ingredients (Ekafitri, dkk., 2016; Hebbink, *et al.*, 2022).

Based on research results from the six formulas: the lower the concentration of butterfly pea flower aquous extract (*Clitoria ternatea* L.), the more intense the color of the powder will be, and vice versa, the higher the concentration of butterfly pea flower pollen (*Clitoria ternatea* L.), the resulting color will be more faded.

2. Homogenity Test Results of Telang Flower Aquous Extract Powder

Powder homogeneity is carried out on a glass plate visually by observing the presence or absence of particles on the glass object. Homogeneity is indicated by the absence of coarse grains visible on the glass object. The homogeneity testing process can be carried out after completion of the manufacturing process at week 0 to every week up to 4 weeks of storage (Warnida, dkk., 2018). The homogeneity test is carried out by weighing a 10 gram sample of each formula and placing it on a watch glass and placing the preparation on white paper and seeing whether the preparation is homogeneous or not. In Formulas 1, 2, 3, 4, 5 and 6, the powder placed on the watch glass is a fine powder. And during the homogeneity test there are no foreign particles or coarse grains.

3. pH Test Results of Telang Flower Aquous Extract Powder

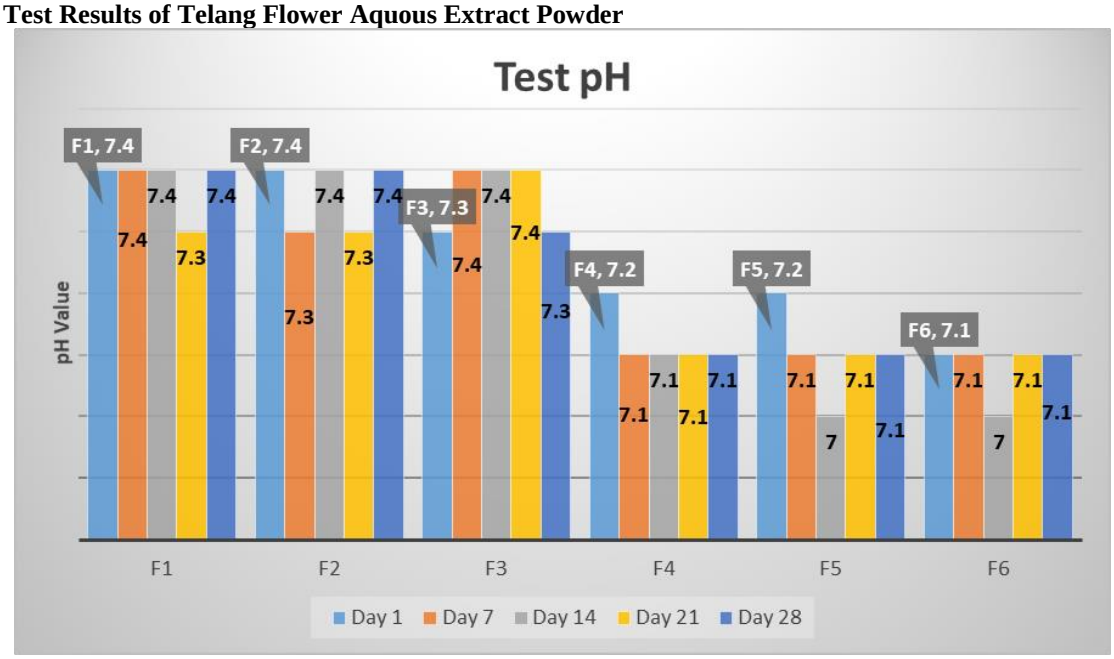


Figure 2. Diagram of pH Test Results for Aquaous Extract Powder of Butterfly Flower (*Clitoria ternatea* L.)

Based on the degree of acidity, a food ingredient can be classified into three categories of degree of acidity: the first is a low degree of acidity at pH 4.5 to 5.3; the second category is medium pH 4.5 to 3.7 and the third category is high with a pH value below 3.7 (Kailaku, Sumangat and Hernani, 2012). The pH test was carried out to determine the pH of aquous extract powder from butterfly pea flowers (*Clitoria ternatea* L.). The

ISSN: 2519-9889
Impact Factor: 5.9

pH value was measured using a pH meter on a 10% sample solution, which was made by dissolving 1 gram of sample in 9 mL of water.

Based on the pH test results data, it was found that the average pH of preparations produced from aquous extract powder of Telang Flower (*Clitoria ternatea* L.) ranged from 7.0 - 7.6 which tends to be neutral. This is due to the pH of the aquous extract of butterfly pea flowers (*Clitoria ternatea* L.) being 7.3, which also tends to be neutral. Comparative substances such as dextrin and lactose also have the same pH, namely lactose has a pH of 7.7 and dextrin has a pH of 7.1.

4. Water Content Test Results of Telang Flower Aquous Extract Powder

The water content test is carried out to determine the water content in the powder preparation, according to (Firdausni, dkk., 2011) the requirement for a good water content is < 3%. The average water content produced in this study ranged from 1.67 – 2.03%. This shows that the water content of butterfly pea flower powder (*Clitoria ternatea* L.) complies with the powder requirements of SNI 01-4320-1996 with a maximum requirement of 3%.

Table III. Water Content Test Results of Telang Flower Aquous Extract Powder

Replication	Formula (%)					
	F1	F2	F3	F4	F5	F6
1 X	1,9	1,8	1,8	1,8	1,8	1,7
2 X	1,9	2,1	1,9	1,8	1,7	1,7
3 X	2,0	1,9	1,9	1,8	1,8	1,6
Average value	2,03	1,93	1,86	1,8	1,76	1,67

The interaction of treatment with variations in dextrin and lactose levels and heating temperature had an influence but was not significant. The water content obtained in each treatment shows that the greater the concentration of dextrin and lactose used, the lower the water content in the preparation. This shows that dextrin and lactose are polysaccharide and disaccharide compounds that are very soluble in water and can bind hydrophobic substances Winarno (2004). The more dextrin or lactose added, the lower the moisture content of the material. According to (Ekafitri, dkk., 2016) dextrin has a lower molecular weight (less than 4000) and a simpler molecular structure, so that free water and water bound to the material can be easily removed during the drying process.

5. Powder Fineness Test

The powder fineness test was carried out using a sieve. The finished powder is put into a sieve to see the fineness standard, according to the standard method for determining the degree of fineness, namely that all powder can go through the sieve with the lowest number and no more than 40% through the sieve with the highest number (Anonim, 1979).

Table IV. Result of Powder Fineness Test

Formulasi Sediaan	Nomor Pengayak	Average value uji derajat kehalusan (%)
F I	100	5,5
F II	100	1,5
F III	100	2,3

ISSN: 2519-9889
Impact Factor: 5.9

F IV	100	2,8
F V	100	1,5
F VI	100	1,8

The degree of powder fineness is expressed by one or two numbers. The degree of fineness the powder is stated as one number, it means that all the powder can pass through the sieve with that number. If expressed with two numbers, it means that all powder can pass through the sieve with the lowest number and no more than 40% through the sieve with the highest number. The classification of the degree fineness test for aquous extract powder from butterfly pea flowers (*Clitoria ternatea* L.) is expressed in one sieve number, namely no. 100 mesh, indicating that all dosage formulations are fine powder.

Conclusion

Aquous extract of butterfly pea flower (*Clitoria ternatea* L.) can be formulated into natural coloring powder. Variations in dextrin and lactose can influence the physical properties of the aquous extract powder formulation of butterfly pea flower (*Clitoria ternatea* L.) as a natural dye.

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