

# BISCUIT ORGANOLEPTIC TEST OF DRAGON FRUIT (*HYLOCEREUS POLYRHIZUS*) AND MORINGA LEAVES FOR ANEMIA

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## Abstract

Anemia becomes an unsolved nutritional problem, the prevalence of anemia in adolescent girls increased continuously. Anemia in adolescents at 2018 reached 48.9%. The high prevalence of anemia is caused by: chronic blood loss, insufficient iron intake, inadequate absorption, consumed some drugs that inhibit iron absorption, increased need for iron. There have been many studies on processed food products and drinks made from fruits and vegetables, one of become a trend since 2009 is dragon fruit (*hylocereus polyrhizus*). In addition to dragon fruit, Moringa leaves one vegetable has a fairly complex nutritional content, one of is iron. Although there are many formulas of dragon fruit, but the study of fortification of dragon fruit with moringa leaves has never been done. The addition of moringa leaves extract will affect the aroma, taste, color, texture, so it is necessary to find the appropriate composition of dragon fruit skimmed addition and moringa leaves extract. So organoleptic testing will determine the acceptance of dragon fruit and moringa leaves fortification products. Organoleptic test using completely randomized design (CRD), with a total of 4 treatments. Data analyzed non-parametric using Kruskall Wallis and Mann Whitney tests with alpha 0.05. Results showed the fortification of 10% *hylocereus polyrhizus* and 5% Moringa leaves are the best and most preferred formula.

**Keywords:** Biscuit, Organoleptic, Dragon Fruit, Moringa Leaves, Anemia

## 1. Introduction

The National Research Master Plan 2017-2045 in the field of Health and Drug Research, focuses on the application of nutrition development technology [1]. This master plan is in line with nutritional problems in Indonesia that have not be resolved. Riskesdas 2018 reports that one of the nutritional problems that still dominates is anemia, the prevalence of anemia in adolescent girls has increased from 2013 (37.1%) to 48.9% in 2018 [2][3].

The high prevalence of iron nutrient anemia is caused by: chronic blood loss, insufficient iron intake, inadequate absorption, increased need for iron [4]. Anemia prevention measures need to be done because of the effects such as decreased endurance so that it can easily hurt, decreased activity

and learning achievement, reduce work productivity due to decreased fitness, not achieving optimal height [5]. In infants iron anemia is often a major factor causing stunting.

There have been many studies on processed food and beverage products based on fruits and vegetables, one of which has become a trend since 2009 is dragon fruit [6]. Arifin et al (2012) stated that dragon fruit (*Hylocereus undatus*) can increase hemoglobin and erythrocytes in female white mice.

Although there are many formulas of dragon fruit, but the study about fortification of dragon fruit with moringa leaves has never been done. Moringa leaves contain quite complex nutrients, namely protein,  $\beta$ -carotene, vitamin C, minerals especially iron and calcium, even in some literature it is explained that Moringa has 3 times the protein content of egg protein, 25 times iron and 3 times vitamin C spinach, 12 times calcium and 2 times milk protein. [7].

Given that anemia can be suffered by all ages, the researchers made a formula for high-iron food products that are ready-to-eat, affordable, easy to get and suitable for all age groups, namely biscuits. Consideration of abundant basic ingredients, the price of fruit is very cheap and even many are discarded during the harvest (Kompas, 2019).

The addition of Moringa leaves extract will affect the aroma, taste, color, texture, so it is necessary to study the composition of the addition of dragon fruit extract and Moringa leaves which is most appropriate to get good quality iron and organoleptics. It is hoped that the results of this fortification can later become an alternative solution to prevent anemia and add value to the use of dragon fruit from an economic perspective, so it is necessary to identify the "Organoleptic Test of Iron-Based High Biscuits Made from Dragon Fruit Fortification of Moringa Leaves for Anemia".

## **2. Research Method**

### **2.1 Materials and Tools**

#### **a. Materials**

The ingredients used to produce the biscuit formula in this study were moringa leaf flour, dragon fruit porridge, wheat flour, refined sugar, margarine, cornstarch, milk powder, baking powder, salt, egg yolks and water.

#### **b. Tools**

Blenders, sieves, basins, knives, spoons, scales, ovens, measuring cups, spatulas, cake molds, rolling pins, pans, spectrophotometers, and dehydrators.

### **2.2 Research methods**

Research carried out includes the process of making Moringa leaf flour by drying it using a dehydrator. The next process is the process of making biscuits by adding Moringa leaf flour and dragon fruit porridge to then analyze the Fe content in the biscuits that have been produced. Then the best formula is determined to get the best Moringa leaf flour and dragon fruit biscuit formula by conducting organoleptic tests on color, taste, aroma, and texture.

### **2.3 Stages of Making Dragon Fruit Porridge**

The procedure for making dragon fruit porridge includes:

1. The process of separating the flesh of the dragon fruit from the skin
2. Washing
3. Cutting or reducing the size of the dragon fruit meat
4. Destruction or refining of dragon fruit flesh

### **2.4 Stages of Making Moringa Leaf Flour**

The process of making Moringa leaf flour according to [8] which has been modified includes the following stages:

1. Washing of the moringa leaves which has been separated from the stem

2. Draining to remove water from the washing process
3. Blanching at 70 ° C for 5 minutes
4. Drying with a dehydrator at 60 ° C until the leaves are dry
5. Milling or reducing the size of dried Moringa leaves
6. After the grinding process, then the moringa leaf flour is sieved to obtain a finer flour

## 2.5 Stages of Making Moringa Leaf Flour Biscuits and Dragon Fruit Porridge

The procedure for making Moringa leaf biscuits according to (Soewitomo, 2006) which has been modified includes the following stages:

1. Mixing margarine, refined sugar, and eggs then stirring
2. Adding flour, cornflour, moringa leaf flour, dragon fruit porridge, salt, milk and baking powder, then stirring until smooth
3. The printing process
4. The molds are then placed on a baking sheet that has been smeared with margarine
5. The roasting process uses an oven with a temperature of 180° C for 20 minutes.
6. Cooling and packaging

## 2.6 Organoleptic Test Assessment and Hedonic Test

Observation variables for organoleptic and hedonic test analysis included color, taste, aroma, texture of the biscuit product of each treatment, to determine the biscuit product most favored by the panelists. This test uses 47 panelists. Rating scores given based on hedonic test criteria are listed in Table 1.

**Tabel 1. Organoleptic Test and Hedonic Test Assessment Score**

Score	Criteria
1	Very dislike
2	Do not like
3	Rather dislike
4	Normal / Neutral
5	I like it a little
6	Like it
7	Really like

## 2.7 Research design

This study uses a Completely Randomized Design (CRD), with 4 treatments namely 101 (dragon fruit: moringa leaf flour: wheat flour = 0: 0: 100), 112 (dragon fruit: moringa leaf flour: wheat flour = 10: 2 , 5: 97,5), 123 (dragon fruit: moringa leaf flour: flour = 10: 5.0: 95), 134 (dragon fruit: moringa leaf flour: wheat flour = 10: 7.5: 92.5 ). Data analysis was performed with the Crucial Wallis Test and the Mann Whitney Test at a 95% confidence level.

## 3. Result and Discussion

### 3.1 Organoleptic (Preferred) Biscuit Test Results

Organoleptic test is one of the methods used to determine the acceptability of a product and to assess the quality of a food and organoleptic research is an assessment by providing stimulation to organs [9]. That is because consumers' likes or dislikes of a food product are influenced by the color, aroma, taste, and texture of food products [10].

The results of Rudianto's research (2013)[11] showed that the different formulations of moringa leaf flour and wheat flour in the manufacture of biscuit products affected the water content, protein, fat, and total ash of the product. It also affects the organoleptic test results using the hedonic method.

The results of the analysis of the Kruskalwallis test and mann whitney biscuits product formulation of dragon fruit pulp and moringa leaf flour which included color, taste, aroma and texture. The results can be shown in table 2.

**Table 2. Organoleptic test results (passions) Product of dragon fruit biscuits and moringa leaf flour**

Observation Variable	Sample (N:K:T)	Organoleptic Mean	Sig.
<b>Organoleptic Test</b>	101 (0:0:100)	112.77	
<b>(Favorite) Color,</b>	112 (10:2,5:97,5)	85.77	<b>0.026</b>
<b>Taste, Aroma,</b>	123 (10:5,0:95)	97.60	
<b>Texture</b>	134 (10:7,5:92,5)	81.87	

Note: (N: K: T) =% Dragon Fruit (N),% Moringa Leaf Flour (K),% Wheat Flour (T)

Table 2 shows the organoleptic test results (likeness) of dragon fruit biscuit products and Moringa leaf flour which includes color, taste, aroma and texture showed a sig value < (0.05) so that there were significant differences between the samples. The most preferred sample is sample 101 (sample composition of 0% dragon fruit: 0% Moringa leaf flour: 100% wheat flour) and 123 sample (10% composition of dragon fruit sample: 5% Moringa leaf flour: 95% wheat flour). So it is also said that sample 123 is the most preferred sample and the biscuits have the best nutritional value compared to sample 101.

### 3.2 Organoleptic Test Results (Color, Taste, Aroma, Texture)

The results of the Kruskalwallis and mann whitney test results of the biscuit product formulation of dragon fruit pulp and moringa leaf flour which include color, taste, aroma, texture can be shown in Table 3

**Table 3. Organoleptic test results (likeness of color, taste, aroma, texture) of dragon fruit biscuit products and moringa leaf flour**

Sample (N:K:T)	Mean Colour	Sig.	Mean Taste	Sig.	Mean Aroma	Sig.	Mean Texture	Sig.
<b>101 (0:0:100)</b>	112.67		114.66		122.59		88.45	
<b>112 (10:2,5:97,5)</b>	86.17	<b>0.022</b>	77.27	<b>0.010</b>	80.49	<b>0.000</b>	91.17	<b>0.636</b>
<b>123 (10:5,0:95)</b>	98.33		93.97		93.07		93.07	
<b>134 (10:7,5:92,5)</b>	80.83		92.11		81.85		96.59	

Note: (N: K: T) =% Dragon Fruit (N),% Moringa Leaf Flour (K),% Wheat Flour (T)

Colors visually appear first and sometimes are decisive. An ingredient that is nutritious, delicious, and has a very good texture, not eaten if it has unsightly or unattractive color. Animals that give the impression that it deviates from the color it should [12]. Based on table 3 above, the organoleptic test results (color preference) of dragon fruit biscuit products and moringa leaf flour showed a value of sig. < (0.05) so that there were significant differences between samples. The biscuit sample with light brown color that is very preferred is in sample 123 (sample composition 10% Dragon fruit: 5% moringa leaf flour: 95% flour) (mean: 98.33).

Organoleptic test results for taste aims to determine the level of response of the panelists about their liking to the biscuits produced in each treatment. Food taste is one of the determinants of food ingredients. Foods that have good and interesting taste will be liked by consumers [11]. Based on table 3 above, the organoleptic (taste-like) test results of dragon fruit biscuits and moringa leaf flour showed

a sig value  $< (0.05)$  so that there were significant differences between the samples. sample 123 (sample composition of 10% dragon fruit: 5% moringa leaf flour: 95% wheat flour) (mean: 93.97). The addition of moringa leaf flour ingredients will affect the taste, it is in accordance with research [11] that the addition of Moringa leaf flour will reduce the preference for the biscuits, the most preferred biscuits is the addition of 25%. material consistency will affect the flavor caused by these ingredients[13].

Based on table 3 that the results of organoleptic test (aroma preference) of dragon fruit biscuit products and moringa leaf flour showed a value of sig.  $< (0.05)$  so that there was a significant difference between samples. The most preferred sample of biscuits with flavor was 123 (10% composition sample of Dragon fruit: 5% moringa leaf flour: 95% flour) (mean: 93.07).

Based on table 3 that the results of organoleptic test (Texture preference) of dragon fruit biscuit products and Moringa leaf flour showed a value of sig.  $> (0.05)$  so that there was no significant difference between samples, the addition of Moringa leaf flour and dragon fruit did not affect the panelists' assessment. This shows that the panelists gave the same assessment that they liked all the texture of the biscuits. In line with research [11] that the addition of Moringa leaf flour does not have a major effect on the level of crispness of the biscuits produced. The level of crispness of the biscuits is determined from the type of flour used, the higher the protein content of the flour, the less biscuits produced.

### 3.6 Hedonic Test Results (Biscuit Quality)

Organoleptic properties testing uses a hedonic quality test that is a more specific hedonic test which usually aims to determine the panelist's response to the general organoleptic quality properties, such as texture, odor / taste and color. While the preference test is one type of acceptance test[14].

The results of the Kruskalwallis and mann whitney test results of the biscuit product formulation of dragon fruit pulp and moringa leaf flour which can be shown in table 4

**Table 4. The results of the hedonic test analysis of the quality of dragon fruit biscuits and Moringa leaf products**

Sample (N:K:T)		Mean	Sig.
		Organoleptic	
Uji (Quality) taste, Aroma Textur	Hedonic	116.00	<b>0.016</b>
	color,	89.73	
	Aroma dan	89.22	
		83.04	

Note: (N: K: T) =% Dragon Fruit (N),% Moringa Leaf Flour (K),% Wheat Flour (T)

Based on table 4 that the results of the hedonic test (color quality) of dragon fruit biscuit products and Moringa leaf flour showed a sig value  $< (0.05)$  so that there were significant differences between the samples. A very good sample is 112 samples (10% composition sample Dragon fruit: 2.5% moringa leaf flour: 97.5% wheat flour)

### 3.7 Hedonic Test Results (Color Quality, Taste, Aroma, Texture)

The results of the Kruskalwallis and mann whitney test results of the biscuit product formulation of dragon fruit pulp and moringa leaf flour which includes the quality of color, taste, aroma, texture can be shown in Table 5

Table 5. Results of hedonic test analysis (color quality, taste, aroma, texture) of dragon fruit biscuits and Moringa leaf products

Sample (N:K:T)	Mean Color	Sig.	Mean Taste	Sig.	Mean Aroma	Sig.	Mean Textur	Sig.
101 (0:0:100)	162.21		126.61		138.52		96.45	
112 (10:2,5:97,5)	97.80	<b>0.000</b>	88.44	<b>0.000</b>	79.38	<b>0.000</b>	85.15	<b>0.535</b>
123 (10:5,0:95)	68.44		85.35		83.51		101.06	
134 (10:7,5:92,5)	49.55		77.61		76.59		95.34	

Note: (N: K: T) =% Dragon Fruit (N),% Moringa Leaf Flour (K),% Wheat Flour (T)

Based on table 5 that the results of hedonic test (color quality) of dragon fruit biscuit products and moringa leaf flour showed a sig value  $< (0.05)$  so that there were significant differences between the samples. A very good sample is 112 samples (10% composition sample Dragon fruit: 2.5% moringa leaf flour: 97.5% wheat flour).

Based on table 5 that the results of hedonic test (taste quality) of dragon fruit biscuit products and moringa leaf flour showed a sig value  $< (0.05)$  so that there were significant differences between the samples. The most preferred sample of biscuits with taste quality was sample 112 (10% composition sample of dragon fruit: 2.5% moringa leaf flour: 97.5% wheat flour) (mean: 88.44).

Based on table 5 that the hedonic test results (aroma quality) of dragon fruit biscuit products and moringa leaf flour showed a sig value  $< (0.05)$  so that there were significant differences between the samples. Samples of biscuits with good quality taste were 123 samples (10% composition sample Dragon fruit: 5% moringa leaf flour: 95% wheat flour) (mean: 83.51).

The hedonic test results (texture quality) of dragon fruit biscuit products and Moringa leaf flour in figure 5 show the sig value  $> (0.05)$  so that there is no significant difference between the samples. It is said that the addition of dragon fruit and Moringa leaves does not affect the quality of the texture and assess the quality of the texture of the biscuits all the same.

#### 4. Conclusion

The formula of dragon fruit biscuits & Moringa leaves on organoleptic characteristics in making biscuit products has very significant effect on the characteristics of organoleptic test and hedonic test of color, aroma, taste, and texture. Biscuits with formulation Dragon fruit: Moringa leaf flour: Wheat flour = 10: 7.5: 92.5 have the highest level of preference and quality against organoleptic & hedonic parameters compared to other biscuit products.

#### 5. Acknowledgement

Thank you very much to Politeknik Negeri Jember for PNPB funding 2019, so this research have done on time.

## 6. References

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