Acceptence and Iron Content in Amplang with Flour Spinach Substitution (*Amaranthus gangeticus*)

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ABSTRACT

Food is one of the primary needs for humans, because it is a source of nutrient intake for the human body. Of the many types of food ingredients that exist, one of which is a snack. The criteria for healthy snacks are vitamins, protein, and dietary fiber. One type of snack that many people like was amplang crackers. The aims of this study was to determine the acceptability and iron content of amplang with green spinach flour substitution. The type of research is experimental or laboratory research with Post Test Group Design research design. The results of the study based on the Friedman test for aspects of color, aroma, texture and taste, the best and preferred formula was X2 with a concentration of 10% and an iron content of 3.96 grams/100 grams by weight of amplang. In conclusion, green spinach flour substitution amplang is more preferred from the aspect of color, taste, aroma and texture. And it has a higher iron content than the original product.

Keywords: *Acceptance, Iron, Amplang, Green Spinach Flour*

INTRODUCTION

Food is a primary need for humans to meet the nutritional needs of the body, so food is needed. In the modern era like now, humans prefer something that can be eaten and processed in a simple and fastest way, and along with the progress of time and technology, humans are increasingly eager to innovate, such as finding ways of processing, finding spices, and new food ingredients. From many types of food ingredients that exist, humans can also make various types of processed foods, one of which is snacks (Ningsih, 2014).

Snacks is food that are served outside of the meal times. Healthy snacks are currently being talked a lot, because people are starting to realize the importance of the quality of the food consumed to maintain health. The criteria for healthy snacks are vitamins, protein, and dietary fiber. Sources of these nutritional content can be found in food materials such as vegetables, meat, and also fruits (Nurhayati et al, 2012).

Cracker is snacks that are in great demand by the public, currently there are various kinds of crackers on the market, one of which is amplang crackers. Amplang is one of the processed products made from fish, came from the city of Samarinda. Until now, the type of fish used by processors is mackerel (Wahyudi et al., 2008).

Fish is a food ingredient that contains a lot of nutrients, one of which is protein, besides the cheap price, the absorption of protein in fish is more than animal ingredients, because fish has shorter protein fibers than protein fibers in beef or chicken. (Suranaya Pandit et al., 2007). Fish protein gives results in the group of animal protein sources, around 57.2% (Depkes, 2008).

Mackerel (*Scomberomorus commersoni*) is a type of pelagic sea fish that has a distinctive taste that is liked so much by the public. According to the Ministry of Health, the protein content of mackerel is quite high, about 21.4 gr/100 gr of fish.

Most of the amplang produced are made from fish which is rich in protein

nutrients and to enrich the nutrients contained in the amplang, green spinach flour is substituted and hopes that in the future it can become a food product that can be an alternative to add or meet nutritional needs, especially need for iron.

Iron (Fe) is a micro mineral that is quite abundant in the human body, iron in food is in the form of heme which is found in hemoglobin and myoglobin, animal sources and non-heme foods are found in plant-based foods such as green vegetables and beans. Lack of iron (Fe) can cause nutritional problems, like anemia, and the richest source of iron is spinach. Spinach is a type of plant that is easily found in grocery shopping places (Juslina, Abdul Razak Thaha, 2019).

Data obtained from the BPS (2017), from 2010 to 2015, Indonesia produced 893.204 tons of spinach. In 2010 Indonesia received 152,334 tons, in 2011 it got 160.513 tons, in 2012 it got 155,118 tons, in 2013 it got 140.980 tons, in 2014 it got 134,166 tons, and in 2015 it got 150,093 tons. Green spinach contains more iron than red spinach.

According to the Indonesian Food Composition Table (2009, 17), the water content in spinach is 86.9%, which makes spinach cannot last longer. Effort that can be made to reduce the damage is by drying it so that it can be made into spinach flour.

As is well known, anemia is one of the most common micronutrient problems. Anemia is caused by a decrease in the number of erythrocyte mass (red cell mass) which is indicated by a decrease in hemoglobin levels, hematocrit, and red cell count. Anemia is characterized by a decrease in hemoglobin levels of less than 13.5 g/dL in men and less than 11.5 g/dL in women. Anemia is most common in pregnant women and adolescent girls. According to data from the World Health Organization (WHO) shows that 40-88% of anemia sufferers in the world are experienced by young women. Based on data from Riskesdas 2013 the incidence of anemia in adolescent girls was 37.1% and increased to 48.9% in the Riset Kesehatan Dasar 2018 (Mayasari, 2019)

Based on the description above, the researchers wanted to conduct research on the acceptability and analysis the iron content in amplang with green spinach flour substitution.

MATERIAL AND METHOD

The design of this research is *Post Test Group Design* and the type of experimental research is to make amplang using green spinach flour substitution. The three types of amplang were then tested for acceptance of the level of preference using a hedonic scale.

This research was conducted at BTP Tamalanrea Mas M1 No. 17, Quality Control Laboratory of SMK SMTI Makassar and Laboratory of Organoleptic Testing, Department of Nutrition, Poltekkes Kemenkes, Paccerakang Village, Biringkanaya District, city of Makassar. The time of the study was carried out from February to May 2021.

Tools and Materials

The tools used include: for produce green spinach flour, like baskom, oven, blender, spoon, bowl, sieve. The ingredients consist of: Green Spinach. Meanwhile, the tools for amplang are frying pan, spatula, baskom, spoon, cutting board, scales, blender. The ingredients consist of: mackerel, tapioca

flour, eggs, salt, sugar, garlic, baking powder.

Research Steps

Amplang that has been made is then taken by the researcher to the Organoleptic Test Laboratory of the Department of Nutrition, Poltekkes Kemenkes Makassar, to be tested for acceptance.

Processing and Analysis of Data

The data from the panelists were then input into Microsoft Excel and then processed using the SPSS computer program and analyzed using the Friedman test, if there was a difference, then using the Wilcoxon test.

RESULT

The results of the acceptability of amplang were carried out obtained the following data, from the aspect of color the acceptability of green spinach flour substitution amplang was the most preferred for the color aspect was the concentration of X1 as many as 14 panelists (56%). From the Friedman test results obtained a p value <0.05 (0.000), so that there is a color difference in each concentration of green spinach flour substitution amplang product. The Wilcoxon follow-up test was carried out because it showed color differences from each concentration. The results of further tests for concentrations of X1 with X2, X1 with X3, and X2 with X3 showed that there was a difference in the color aspect.

The aroma aspect shows the panelist assessments of the acceptability of amplang with green spinach flour substitution, the most preferred for the aroma aspect is X2 and X3 each with 15 panelists (60%) and the most preferred is X1 with 13 panelists (52%). Friedman test results obtained p value <0.05 (0.001) which indicates there is a difference in aroma in the concentration of amplang product with green spinach flour substitution. The Wilcoxon follow-up test was carried out because there were differences. The results of further tests for concentrations of A01 with X2, X1 with X3, and X2 with X3 showed differences.

The texture aspect shows the panelist assessments of the acceptability of amplang with green spinach flour substitution on the most preferred texture aspect is the concentration of X1 as much as 10 panelists (40%). Friedman test results obtained a p value <0.05 (0.000) which indicates there is a difference in texture preference for green spinach flour substitution amplang. The Wilcoxon follow-up test was carried out because there were differences in the texture of each concentration. Further results for the concentration of X1 with X2 showed no difference, while X1 with X3, and X2 with X3 all showed a difference.

The taste aspect shows the panelist assessments of the acceptability of amplang with green spinach flour substitution on the most preferred taste aspect, namely the concentration of X2 as many as 17 panelists (68%) then followed by a concentration of X1 as many as 12 panelists (48%) and at a concentration of X3 as many as 11 panelists (44 %) like. Friedman test results obtained a p value <0.05 (0.005) indicating that there is a difference in taste preferences in green spinach flour substitution amplang. The Wilcoxon follow-up test was carried out because there were differences in the texture of each concentration. Further results for the

concentrations of X1 with X2, X1 with X3, and X2 with X3 all showed differences.

Overall Acceptance

Acceptance of aspects of color, aroma, texture, and taste can be seen that X2 amplang with 10% green spinach flour substitution (12.5 grams) is the most preferred product by the panelists.

Iron Level

Based on the iron content test using the *Atomic Absorption Spectrophotometry* (AAS) method on 3 samples of amplang products, the results showed that amplang with 5% green spinach flour substitution was 0.1608 grams, amplang with 10% substitution was 0.1984 grams, and amplang with substitution 15% contained 0.2354 grams.

DISCUSSION

Acceptability

The color aspect of food has a very important role, because it greatly affects the appearance of food products, so that it can increase attractiveness. Color in food can also provide more information to consumers about the characteristics of food (Dian Asmaraningtyas, 2014). Food color can also affect people's preferences for food. The results of the organoleptic test assessment showed that there were differences in color at each concentration of amplang. The panelists' preference level for the color aspect was the substitution amplang for green spinach flour X1 with a concentration of 5%, while the least preferred by the panelists was amplang X3 with a concentration of 15%. The concentration of X1 and X2 did not show much significant differences from the color aspect, while the concentration of X1 and X3 showed strong differences in the color aspect, this is because the higher concentration of green spinach flour was used, the more concentrated the color produced. This is in line with the research of Chairul Salim, Vienna Artina S. (2019) that the significant color difference in klepon with the substitution of 30%, 60% and 90% spinach flour, is due to the presence of leaf green substance (*chlorophyl*) in spinach flour so it becomes more intense. The more percentages used, the more concentrated the spinach klepon was produced.

The aroma aspect is an odor that is difficult to measure, so it is common to get different opinions in determining the quality of the aroma. This difference is caused by differences in smell, although they can distinguish scents, but everyone has different preferences (Andriana, 2017). The results obtained, amplang with green spinach flour substitution showed that there were differences in the panelists' preference for the aroma aspect, the most preferred were X2 and X3 with a concentration of 15% with a concentration of 10% and X1 with a concentration of 5% due to the higher percentage of substitution of green spinach flour in amplang make the aroma is also getting stronger, and then the panelists dislike the most is amplang with code X3 as many as 6 people (24%). This is in line with the research of Dyas Indraswari H, Farida Wahyu Ningsih (2017) that catfish leg nuggets with the addition of 30% spinach flour are preferable to the addition of 40% this is because the greater the addition of spinach flour, the panelists' preference tends to decrease because of the smell or strong

unpleasant aroma in spinach.

The texture aspect is one of the panelists' assessments of acceptability (Setyaningsih D, et al, 2010). The results of the amplang study with the substitution of green spinach flour found that there were differences in the texture aspect, the most preferred being X1 concentration of 5%, followed by X2 of 10% concentration and X3 of 15% concentration. The decrease in panelists' acceptance of the texture aspect was because the green spinach flour formula was not too smooth so it still affected the amplang texture in general. This is in line with the research of Mychael F. Naibaho, Dewita Buchari (2011) that a large amount of spinach flour formulation can affect the elasticity of the product because a large amount of starch causes a denser texture and tends to be harder.

The taste aspect of food is one of the determining factors for panelists' preference for a food product. Food that has a good and attractive tastes will be liked by consumers (Asmaraningtyas, 2014). The results of the amplang study with the substitution of green spinach flour found that there was a difference in the taste aspect, the most preferred was X2 with a concentration of 10%, followed by X1 with a concentration of 5% and then X3 with a concentration of 15%. This shows that the substitution of green spinach flour with a concentration of 10% can still be accepted by the panelists from the aspect of taste. Panelists dislike because the taste produced by green spinach flour is slightly bitter. This research is in line with the research of Dyas Indraswari H, Farida Wahyu Ningsih (2017) showing the more use of spinach flour, the less the panelists' preference level because the more use of spinach flour the more unpleasant the taste produced in the nuggets.

CONCLUSION

The most preferred amplang acceptability was based on aspects of color, taste, aroma, and texture, which was X2 concentration with 10% green spinach flour substitution. Amplang formula with the best substitution of green spinach flour from the results of acceptance is a concentration of 10% and the iron content per 100 grams is 3.96 grams.

ACKNOWLEDGEMENT

The author would like to thank to Director Health Polytechnic of Makassar which has provided financial assistance for the implementation of this research and all team for their supporting during research.

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Tabel 01. Distribusi Daya Terima Terhadap Aspek Warna Amplang Substitusi Tepung Bayam Hijau

Daya Terima	Formula						*p*
	X1		X2		X3		
	n	%	n	%	n	%	
Sangat Tidak Suka	0	0	0	0	3	13	
Tidak Suka	6	24	4	16	14	56	
Suka	14	56	9	36	5	20	0,000
Sangat Suka	5	20	12	48	3	12	
Total	25	100	25	100	25	100	

Tabel 02. Distribusi Daya Terima Terhadap Aspek Aroma Amplang Substitusi Tepung Bayam Hijau

Daya Terima	Formula						*p*
	X1		X2		X3		
	n	%	n	%	n	%	
Sangat Tidak Suka	0	0	0	0	0	0	
Tidak Suka	1	4	3	12	6	12	0,001
Suka	11	44	15	60	15	60	
Sangat Suka	13	52	7	28	4	16	
Total	25	100	25	100	25	100	

Tabel 03. Distribusi Daya Terima Terhadap Aspek Tekstur Amplang Substitusi Tepung Bayam Hijau

Daya Terima	Formula						*p*
	X1		X2		X3		
	n	%	n	%	n	%	
Sangat Tidak Suka	3	12	3	12	10	40	
Tidak Suka	1	44	10	40	10	40	
Suka	10	40	7	28	4	16	0,000
Sangat Suka	1	4	5	20	1	4	
Total	25	100	25	100	25	100	

Tabel 04. Distribusi Daya Terima Terhadap Aspek Rasa Amplang Substitusi Tepung Bayam Hijau

Daya Terima	Formula						*p*
	X1		X2		X3		
	n	%	N	%	n	%	
Sangat Tidak Suka	0	0	0	0	1	4	
Tidak Suka	2	8	2	8	8	32	
Suka	12	48	17	68	11	44	0,005
Sangat Suka	11	44	6	24	5	20	
Total	25	100	25	100	25	100	

Tabel 05. Total Skor Daya Terima Panelis Terhadap Amplang Substitusi Tepung Bayam Hijau

Konsentrasi	Total Skor
X1	304
X2	305
X3	248

Tabel 06. Kadar Zat Besi pada Amplang

Sampel	per 5 gram	per 100 gram
Amplang substitusi tepung bayam hijau 5%	0,1608	3,36
Amplang substitusi tepung bayam hijau 10%	0,1984	3,96
Amplang substitusi tepung bayam hijau 15%	0,2354	4,70