

# PIE PRODUCT INNOVATION THROUGH MUNG BEAN FLOUR SUBSTITUTION TO INCREASE FAMILY ECONOMIC PASSION

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## ABSTRACT

The research objective was to determine the differences in the substitution of green bean flour with a percentage of 20% and 40%, the level of public preference, protein, and carbohydrate content in pies. The research used a pure experiment. The level of preference is done by providing products, questionnaires, and documentation. The data analysis technique used ANOVA analysis. The results showed: there were differences in color, texture, taste, and aroma in 20% and 40% green bean flour. Most of the panelists liked the color, taste, aroma, and texture of the 20% mung bean flour substitute pie. The substitution of 20% green bean flour has a high nutritional content of protein and carbohydrates. Thus, the substitution of mung bean flour into pie products is expected to increase family spirit and economic resilience.

**Keywords:** Pie, substitution of green bean flour, family economic

## INTRODUCTION

Pie is a food consisting of pastry skins and various fillings. The contents of pies can be fruit, meat, fish, vegetables, cheese, chocolate, custard, nuts, and others. The basic ingredients for making pies generally use wheat flour. The use of wheat flour as the main food ingredient is because wheat flour has high flexibility in various food preparations [1].

The large consumption of flour has caused an increase in imports of Indonesian flour. As an effort to reduce wheat imports, it is necessary to carry out several studies on the use of other foodstuffs as alternatives to food substitutions for food production and other purposes [2]

Currently, many cottage industries produce pies using only wheat flour. This is due to the lack of knowledge in the food industry regarding the use of local basic ingredients, even though many variations of the pie use raw materials other than wheat flour, such as green bean flour [3] which has a high protein content and is a very important source of minerals such as calcium and phosphorus. needed by the body. Mung beans are a type of plant that is relatively easy to grow plants that do not depend on a particular climate by paying attention to the

adequacy of external factors, such as water and minerals, humidity, temperature and light, green beans can grow well. From a marketing perspective, mung bean flour is relatively more practical, while from a product diversification perspective, mung bean flour is easier to process into other products, for example by adding to other foods without reducing the taste of these foods [4].

The making of mung bean flour begins with the selection of good quality green bean ingredients and the green beans used are green beans that have been peeled, before mashed, the green beans are dried in the sun until they are completely dry then mashed using a grinder after that they are sifted until into flour [5]. The reason for choosing mung bean flour is because of the good nutritional value of green beans, green beans are very easy to find and easy to plant, besides that green beans have not been fully utilized, especially in the form of flour but must be processed properly because the resulting aroma is somewhat musty and unpleasant. [6].

Mung bean flour contains many essential amino acids needed by the human body. Amino acid score is a way to determine protein quality

by comparing the essential amino acid content in food ingredients with the same essential amino acid content as the standard protein. The limiting amino acids in green bean flour are methionine and cysteine. Meanwhile, the content of other amino acids has met the standards, especially the content of lysine [7].

Mung bean flour also contains anti-nutritional compounds including antitrypsin, lectins and phytic acid. Antitrypsin is a compound that can inhibit trypsin enzyme activity in the digestive tract. Lectins are compounds that can coagulate red blood cells. Meanwhile, phytic acid is a source of phosphorus but cannot be digested in the body [8]. But some studies say that immersion can activate this compound. So that the anti-nutritional properties do not need to be worried, because in making it into flour it can activate the anti-nutritional compounds.

## METHOD

This type of research is pure experimentation (True Experimentation). The population of this study is green bean flour. The study sample was a green bean pie with a substitution percentage of green bean flour with a percentage of 20% and 40%.

Data collection is done by product delivery, questionnaire and documentation. Chemical data analysis technique is to test the results using organoleptic testing methods in ugm Yogyakarta Food Technology and Agricultural Products Test Laboratory. Favorite testing is done using a group trial design (RAK) continued with a variation of ANOVA one path and concluded with the formula BNT (Smallest Real Difference)

Table 1. Pie Making Material Composition

Materials	Control 1	Concentration 1	Concentration 2
wheat flour	250 gr	200 gr	150 gr
mung bean flour	-	50 gr	100 gr
butter	150 gr	150 gr	150 gr
fine granulated sugar	50 gr	50 gr	50 gr
Egg	1 egg	1 egg	1 egg

The population of this study is green bean flour with substitution samples of 20% and 40%. Data collection techniques use questionnaires and documentation, while due diligence on color, aroma, and taste criteria against 20 panelists who are experts in food. Instrument trials using organoleptic/physical test parameters and chemical quality or nutritional content trials on pies.

Chemical data analysis technique using the organoleptic test method in Laboraturium Test Technology Food and Agricultural Products UGM Yogyakarta. Data analysis techniques using group experiment design (RAK) with factorial 3 x 1 with 3 repetitions obtained 9 treatments, continued with a variation of ANOVA one path, and inferred with the formula BNT (Different Real Smallest).

## RESULTS AND DISCUSSION

Organoleptic test results of green bean flour substitution pie quality 20% and 40% can be seen on table 2

Table 2. Organoleptic Test Results

Organoleptic test results of 20% and 40% green bean flour substitution pie quality can be used to explain differences, people's favorite levels, and nutrient content of protein content. The difference in the use of green bean flour substitution with a percentage of 0% (control), 20%, and 40% against the organoleptic quality of green bean flour substitution pie and the level of public preference.

The results of the calculation of the description of organoleptic test scores of the quality of green bean flour substitution pie 20% and 40% are reviewed from the texture, color, texture, and aroma described as follows:

### 1. Color

Green bean flour substitution pie products are 20% earned an average value of 3.07, meaning panelists like the color of pies. Green bean flour substitution pie products 40%

obtained an average value of 2.00 meaning panelists do not like the color of the pie. Thus, it can be explained that panelists like the color of green bean flour substitution pie 20% compared to wheat flour and green bean flour 20%. The results of the double anova test color of green bean flour substitution products are presented in

Table 3. Double Anova Test Color Pie Substitution Green Bean Flour

ANOVA					
Color	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	7.644	2	3.822	7.082	.002
Within Groups	22.667	42	.540		
Total	30.311	44			

Based on Anova's output above, the value of significance is  $0.002 > 0.05$ , the substitution of green bean flour is 20%, and 40% and wheat flour differ manifestly against the color of the pie. Tukey HSD's advanced test results showed there was a difference between the color of wheat flour pie, green bean flour 40% and 20%. Most panelists prefer a 20% green bean flour substitution pie.

### 2. Taste

Green bean flour substitution pie products are 20% earned an average value of 2.93, meaning panelists like the taste of pie. Green bean flour substitution pie products 40% obtained an average value of 2.00 meaning panelists do not like the taste of pie. Thus, it can be explained that panelists like the taste of green bean flour substitution pie 20%. The test results of Anova's color green bean flour substitution pie product are presented in Table 4.

Based on Anova's output, the value of significance is  $0.000 < 0.05$ , so it can be concluded that the substitution of green bean flour 20% and 40% and wheat flour differently

and significantly against the taste of pie. Tukey HSD's advanced test results showed that there was a noticeable difference between the taste of pie and wheat flour and green bean flour by 20%. Most panelists prefer the taste of pie with a substitution of 20% green bean flour.

Table 4 Double Anova Test Taste Pie Green Bean Flour Substitution

### 3. Aroma

ANOVA					
Taste	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	18.711	2	9.356	21.355	.000
Within Groups	18.400	42	.438		
Total	37.111	44			

Green bean flour substitution pie product 40% average value 2.07 means panelists do not like the aroma of the pie. Thus, it can be explained that most panelists like the aroma of green bean flour substitution pie 20%. The value of significance of  $0.000 < 0.05$ , indicates the substitution of green bean flour 20%, 40%, and wheat flour differs noticeable and significant to the aroma of the pie.

Table 5 Double Anova Test Aroma Pie Green Bean Flour Substitution

Tukey HSD's advanced test results show that there is a noticeable difference between the aroma of pie and wheat flour and green bean flour of 40% and 20%. Most respondents preferred the aroma of pie with 20% green bean flour substitution.

#### 4. Texture

The 40% green bean flour substitution pie product is obtained an average value of 1.93 meaning panelists do not like the texture of the pie. Thus, it can be explained that most panelists like the texture of the green bean flour substitution pie 20%. The results of the double ANOVA's test texture of green bean flour substitution products are presented in Table 6.

Tabel 8. Double Anava Test Green Bean Flour Substitution Pie Texture

Based on Anova's output, it is known that the value of significance is  $0,000 < 0.05$ , so it can be concluded that the substitution of green bean flour 20%, 40%, and wheat flour differently and significantly against the texture of the pie. Tukey HSD further test results showed that there was a noticeable difference between the texture of pie and wheat flour, green bean flour 40%, and 20%. The results showed that most respondents were more likely to have a pie texture with a 20% green bean flour substitution. The nutritional content of water, protein, and carbohydrate content in green bean flour substitution pie 0% (control), 20%, and 40%.

The best products of pie are obtained from the substitution of green bean flour with a percentage of 20%. The results of laboratory tests, the best water content in green bean flour substitution 20% at 2 repeats of 9.37%, and

percentage of 40% at 1 repeat of 8.62% close to the water standard on pastries 5%. The best protein in green bean flour substitution with a percentage of 20% at 1 repeat of 7.86% and 40% percentage on replay 2 of 9.07% close to the standard carbohydrate on pastries 6.25%. The best carbohydrates on green bean flour substitution with a percentage of 20% at 1 repeat of 56.93% and a 40% percentage on replay 2 of 55.31% are close to the standard carbohydrates on pastries 70%.

Tabel. 9 Standard and Best Product Chemical Test Results in Water, Protein, and Carbohydrate Elements

#### Discussion

The results showed that the best protein content in green bean flour substitution pies was 20% at 7.86% replay and 40% percentage at 2 repeats of 9.07% close to the carbohydrate standard on pastries of 6.25%. According to Winarno (2002), green bean flour contains several essential amino acids required by the human body. Amino acid scores are a way of establishing protein quality by comparing the content of essential amino acids in food stubs with the same essential amino acid content as the benchmark protein. The limiting amino acids found in green bean flour are methionine and cysteine. While the content of other amino acids already meets the standard, especially the lysine content.

The difference in the use of green bean flour substitution with a percentage of 20% and 40% against the organoleptic quality of green bean flour substitution pie and the level of popular preference is explained as follows. The results of the analysis showed that panelists liked the color of the green bean flour substitution pie 20%, and Tukey HSD's advanced test results showed that there was a noticeable difference between the color of the pie with wheat flour and green bean flour of 40% and green bean flour of 20%. The substitution of green bean flour affects the color of the resulting pastry which is the more the use of green bean flour produces a brownish cream color. The results of hedonic test studies on the taste aspect of green bean flour substitution pastry have the effect of substitution of green bean flour on the manufacture of pastries.

Green bean paste as a filling has a significant influence that is the distinctive taste of green beans on the product. Also, the substitution of green bean flour in each treatment as much as 15% gives a significant flavor influence. Green beans have a good taste so it is suitable for mixed ingredients of food products.

The results of the analysis showed panelists liked the taste of green bean flour substitution pie 20%. The savory taste of the pie skin using wheat flour is caused by the use of fat. "The fat used in biscuit making is useful to improve the taste", while the savory taste in the pie that gets the treatment will combine with the sweetness that green beans have. Therefore, panelists prefer the savory taste of pie skin with green bean substitution because it is typical of green beans rather than pie skin with wheat flour[10].

The results showed that panelists liked the aroma of green bean flour substitution pie 20%, and Tukey HSD's advanced test results showed that there was a noticeable difference between the pie's aroma and 40% wheat flour and green bean flour with 20% green bean flour. The results showed that most respondents preferred the aroma of pie with a 20% green bean flour substitution. There is a noticeable difference

between the aroma of pie due to the use of green bean flour and the use of butter so that the distinctive aroma of green bean flour affects the aspect of green bean pastries.

The results showed that panelists liked the texture of green bean flour substitution pie 20%, and Tukey HSD's advanced test results showed there was a difference in the texture of wheat flour pie, green bean flour 40%, and 20%. The resulting difference in texture depends on the characteristic of green bean flour, green bean flour has very low gluten content and high fat. If the use of green bean flour is multiplied then the more fragile the pastry is produced. In the manufacture of pastries use butter that is functioned to make the texture of pastry crispy, not hard, and not easily crushed. Aspects of texture are also affected by the roasting process.

## CONCLUSION

There is a difference in the quality of the pie of green bean flour base material 20%, and 40% is reviewed from aspects of color, texture, aroma, and taste. Color, flavor, aroma, and texture aspects in the best sample of green bean flour substitution pie 20%. Laboratory test results showed the best water, protein, and carbohydrate content in green bean flour substitutions was 20% close to the standard on 70% pastries. Thus, the use of green bean flour in the manufacture of pie products is expected to increase people's fondness for pies and the family economy of pie producers can increase.

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