

SENSORY QUALITY OF BROWNIES SUBSTITUTED WITH MUNG BEAN FLOUR

Nurul Azizah Choiriyah

Akademi Kuliner dan Patiseri OTTIMMO Internasional
Jalan Citraland Surabaya No. 3 Kec Sambikerep, Surabaya, Jawa Timur 60217
Email : nurul.azizah.choiriyah@gmail.com

Article Info	ABSTRACT
<p>Article history: Received January 15th, 2022 Revised February 20th, 2022 Accepted March 25th, 2022</p> <p>Keyword: Brownies; Hedonic Test; Mungbean Flour</p>	<p><i>Wheat flour is imported material, so the Indonesian people need to limit the use of this flour. However, brownies are a popular product in Indonesia. Mung bean flour can be used to replace wheat flour in making brownies. This study aims to evaluate the brownie formula using wheat flour and mung bean flour with various concentrations to produce brownies that the panelists prefer. The treatments in this study were the ratio of wheat flour: mung bean flour = 75:0 gram (sample 186), the ratio of wheat flour: mung bean flour = 50:25 gram (sample 318), the ratio of arrowroot flour: banana fruit = 25:50 gram (sample 283). Using mung bean flour with a ratio of mung bean flour: wheat flour = 25:50 produces brownies with sensory characteristics that consumers favor. The use of mung bean flour that exceeds wheat flour can reduce panelists' preferences regarding smell, taste, and overall product. Therefore, using the ratio of mung bean flour: wheat flour = 25:50 is an alternative way to reduce the use of wheat flour in brownie products.</i></p>

BACKGROUND

Brownies are baked or steamed cakes in squares with a balanced chocolate flavor made from essential ingredients such as flour, eggs, butter, chocolate, eggs, and sugar. It is usually consumed as a dessert, and the texture can be either fudgy or cakey, depending on individual preferences (Selvakumaran et al., 2019).

Wheat flour is imported material, so the Indonesian people need to limit the use of flour to achieve food security. One of the local raw materials that can be used to replace wheat flour in making brownies is mung bean flour. According to a previous study, mung bean flour contained high protein (18.42 %) and high iron (89.62 mg/100 g) (Setyaningsih et al., 2019), calcium (21,50 mg/100 g), and vitamin A (265 µg RE/100 g) (Onwurafor et al., 2014). In addition, mung bean flour has been shown to increase protein levels in cookies (Pasha et al., 2011) and vitamin A in pastries (Pakhri et al., 2020).

There are several studies about the substitution of wheat flour using local ingredients, such as the addition of durian seed flour (25 %) was able to produce a favorable taste acceptance and was not different from the control (Mulyati et al., 2018), brownies with banana flour substitution (45 %) were the highest organoleptic score than brownies with 50 % and 55 % banana flour (Hidiarti & Srimati, 2019). Therefore, this study aimed to evaluate the brownies formulation using comparisons of wheat flour and mung bean flour to produce good brownies.

MATERIAL AND METHODS

Materials

The materials used for brownies preparation were: wheat flour "Segitiga Biru," dark chocolate compound "Chefmate," Golden churn butter, egg, light brown sugar, icing sugar, cocoa powder "chefmate," margarine "Blue band," instant coffee "Nescafe," vanilla powder "koepoe koepoe," and salt. The materials used for the organoleptic test were mineral water for neutralizing the tongue. The equipment used for the organoleptic test was the hedonic form.

Method

The research design used Complete Randomized Design. The variable used was the comparison of wheat flour and mung bean flour, including sample "186" (wheat flour: mung bean flour = 75:0 grams), sample "318" (wheat flour: mung bean flour = 50:25 grams), sample "283" (wheat flour: mung bean flour = 25:50 grams). Data were analyzed statistically using ANOVA with DMRT at a p-value <0.05).

Research Procedure

Brownies preparation

Margarine and dark compound chocolate were melted. Icing sugar, brown sugar, and egg were mixed using a mixer at moderate speed until well mixed, and the sugar was dissolved. The margarine liquid and chocolate liquid were added to the egg and sugar mixture until well mixed using a whisk. The dry materials (wheat flour and mungbean flour according to the variable, chocolate powder) which have been sifted were added and stirred. The dough was baked at 170°C for 30-40 minutes.

Analysis

The analysis carried out was the hedonic test. In this study, several 30 moderately trained panelists were used. The panelists were asked to analyze three samples of brownies with different codes. Each time they tasted one sample, the panelists were asked to drink mineral water first. After tasting one sample, the panelists filled out an assessment on the hedonic test form provided. Panelists were prohibited from discussing with each other. In addition, panelists who were sick and had recently finished smoking were excluded from the study. The brownie's attributes assessed were color, aroma, taste, texture, and overall. The criteria for this study's assessment score were 1 = strongly dislike, 2 = dislike, 3 = rather like, 4 = like, and 5 = very much like.

RESULT AND DISCUSSION

Color

The result of the organoleptic test for the color score is shown in Table 1. Brownies' color scores were 3.73-3.84. The panelist assessed liking the color of the brownies product. There is no significant difference in color preference scores between samples. All brownie samples had a dark brown color.

Table 1. Organoleptic Test Analysis Data On Color Scores

Sample	Color score
186	3.84 ^a
318	3.76 ^a
283	3.73 ^a

The different lowercase letters indicated significant differences (p<0.05).

Scent

The result of the organoleptic test for the scent score is shown in Table 2.

Table 2. Organoleptic Test Analysis Data On Scent Scores

Sample	Scent score
186	3.89 ^b
318	3.85 ^b
283	3.31 ^a

The different lowercase letters indicated significant differences (p<0.05).

Brownies' scent scores were 3.31-3.89 (The panelists gave a rather like-like assessment of the scent of brownies products). Even though sample 186 had the highest score in terms of scent, there is no significant difference with sample 318. Sample 283 was the sample with the lowest preference score in terms of scent and was significantly different from other samples. This was because sample 283 had a strong nutty scent. Same with Hartati and Royanda's (2021) research that mung bean flour gave a distinctive scent to pie products. The distinctive scent of mung bean flour was because of lipoxigenase activity during flour preparation, which gives a characteristic unpleasant scent (Anggraeni *et al.*, 2021).

Taste

The taste parameter was the second parameter after an appearance as a consumer consideration in choosing a product (Hartati & Royanda, 2021). The results of the organoleptic test analysis on the taste score are presented in Table 3. The Brownies' taste score was 3.08-4 (the panelists gave a rather like-like assessment of the brownies' taste). Brownies 318 had the highest score in terms of taste, but the difference was not significant with sample 186. Sample 283 was the sample with the lowest preference score in terms of taste and is significantly different from other samples. The use of mung bean flour that exceeds wheat flour (ratio of mung bean flour: wheat flour = 50:25) makes the distinctive taste of mung bean stand out or dominate in brownies products). Research by Dabels *et al.* (2016) stated that using mung bean flour by 15 % -30 % reduces the bread taste score because the bread produced has a beany flavor. Beany flavor was caused by the activity of the lipoxygenase enzyme in the manufacture of mung bean flour.

Table 3. Organoleptic Test Analysis Data On Taste Scores

Sample	Taste score
186	3.89 ^b
318	4.00 ^b
283	3.08 ^a

The different lowercase letters indicated significant differences ($p < 0.05$)

Texture

The results of the organoleptic test analysis on the texture score are presented in Table 4.

Table 4 Organoleptic Test Analysis Data On Texture Scores

Sample	Texture
186	3.89 ^a
318	3.81 ^a
283	3.54 ^a

The different lowercase letters indicated significant differences ($p < 0.05$)

Brownies' texture score was 3.54-3.89. The panelists liked the brownies' texture. Based on the DMRT test, there is no significant difference between all brownies.

Overall

The results of the organoleptic test analysis on the overall score are presented in Table 5. Brownies' overall score was 3.27-3.89. Panelists gave a rather like-like assessment for brownies' *overall* parameter. Brownies 318 had the highest score and no significant difference from sample 186. Sample 283 had the lowest score for the overall parameter. The overall parameter was influenced by scent, taste, and texture parameters.

Table 5 Organoleptic Test Analysis Data On Overall Scores

Sample	Skor <i>overall</i>
186	3.81 ^b
318	3.88 ^b
283	3.27 ^a

The different lowercase letters indicated significant differences ($p < 0.05$).

CONCLUSION

The use of mung bean flour with a ratio of mung bean flour: wheat flour = 25:50 produced brownies with sensory characteristics that consumers favor. The exceed of mung bean flour concentration can reduce panelists' preferences regarding taste and overall product. Using the ratio of mung bean flour: wheat flour = 25:50 was an alternative way to reduce the use of wheat flour in brownies.

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