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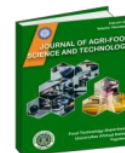
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**Formulation and Sensory Reception of Steamed Brownies with
Avocado (*Persea americana*) Seeds as Additive**

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ABSTRACT

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Avocado (*Persea americana*) is a fruit part of the Lauraceae family, which can be widely found in tropical and subtropical regions. With an annual harvest of more than 300,000 tons in Indonesia and only flesh as edible part, avocado has large byproducts such as skin and seed. The later contains 23% of starch and fat, which can be utilized as an alternative source of starch. This study aimed to examine consumer preference for steamed brownies with avocado seed as additive. Preference was measured using a hedonic test on 55 untrained panelists at a measurable scale of 1-7. Results showed that brownies made by 90 g shredded avocado seed and 80 g wheat flour had the highest hedonic score for color, appearance, texture, aroma, and flavor of 4.4, 4.2, 4.1, 3.75, and 3.7, respectively. These results indicated the possibility to develop a better formula to produce steamed brownies with avocado seed preferable by consumers.

1. INTRODUCTION

Indonesia is a tropical country. Tropical countries produce many popular fruits, liked by the community, and even exported abroad. Fruit is one of the agricultural commodities contributing to food diversity and the public's nutritional adequacy since it contains vitamins, minerals, and fibers. Yellow-to-reddish fruits are rich in vitamins A and C (Winarno, 2004). Some fruits even produce energy, such as bananas, jackfruits, *sawo*, avocados, and durian. Among many tropical fruits, avocado is one of the preferred fruits. Avocado (*Persea americana*) is a fruit part of the *Lauraceae* family, grows in tropical and subtropical regions. They are popular due to its delicious taste. Avocados also contain high antioxidants, so they are good to be consumed (Katdja, 2009).

According to Statistics Indonesia (BPS, 2018), the production of avocados in the last five years is stable at over 300,000 tons per year. It shows that the market is never down, and avocados become the preferred variety of fruits; thus, their production number stays high. Avocado consists of skin, thick flesh, and a seed in the middle. People commonly

consumed its thick flesh. Meanwhile, the skin and seeds are a byproduct or waste (Dewi & Sulistyowati, 2013). The avocado seed is known to have 23% starch. This number opens the possibility to utilize avocado seeds as an alternative source of starch (Zuhrotun, 2007). Avocado seeds have a hypoglycemic effect as a traditional medicine to treat kidney diseases, toothache, chronic ulcers, hypertension, and diabetes mellitus (Monica, 2006).

The use of avocado seeds as food ingredients is still limited. However, avocado seeds have been studied to be processed into *dodol* as an alternative to consumption for people with kidney disease (Halimah et al., 2014). Besides, avocado seeds also have been used as an additive in ginger cookies (Septiaji et al., 2017). Avocado seeds even can be utilized as a food ingredient for brownies cake.

Brownies cake is a solid chocolate cake originally made of wheat flour, eggs, fat, sugar, and chocolate, baked in an oven. It is included in moist cakes and has a dry texture on its top (Ismayani, 2007). The formulation of brownies variants is highly developed nowadays. The development comes with the emerge of foodstuff utilizations and new food processing technologies. Thus, the production of brownies cakes with avocado seed as an additive can be done. Avocado seeds can enhance the flavor and antioxidant activity until up to 70% of the original (Wahyuni, 2016). It is necessary to test consumer acceptance of the products produced to assess avocado seeds' potential as an additive. This study aimed to determine the potential of avocado seeds as a fiber source in brownies and the level of consumer acceptance of the avocado seed brownies formulation.

2. RESEARCH METHOD AND MATERIALS

2.1. Research Tools and Materials

Ingredients used in the research are avocado seeds, wheat flour, vanilla powder, eggs, margarine, sugar, cacao powder, cooking compound chocolate, lime leaves, and salt. The research tools are a digital scale, steam pan, glass bowl, knife, baking sheets, shredder, stove, hand mixer, and washbowl.

2.2. Research Methods

The making of avocado seed brownies began with peeling the avocado seed of juice processing waste. Then, the avocado seeds were reduced in size by shredding. The mixture of 100 grams of sugar, two eggs, and some vanilla powder, was mixed until fluffy. After the dough expands, 50 grams of margarine and 50 grams of steamed cooking chocolate, salt, Ovalet emulsifier, lime leaf juice, 80 grams of wheat flour, and 10 grams of cocoa powder were added and stirred until blended. The dough was then poured into a pan that had been greased with margarine. The brownies were then steamed for 15-20 minutes.

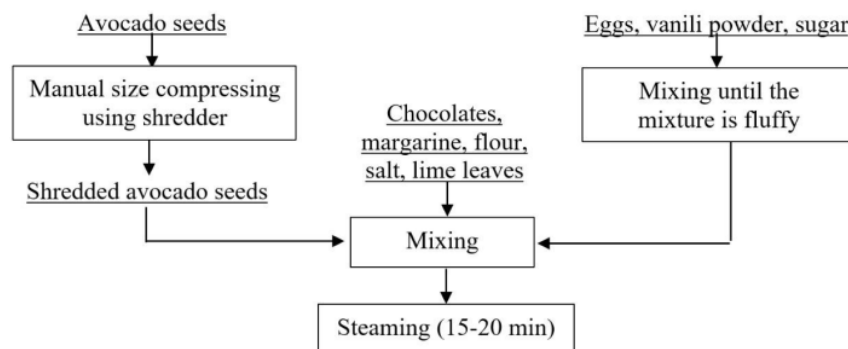


Figure 1. Flowchart of avocado seeds brownies production

3. RESULT AND DISCUSSION

Avocado consists of 73% water, 20% organic fats, and 10% minerals. It also contains protein and vitamins such as A, B, B1, B2, E, and C; beta-carotene, linoleic acid, lecithin, calcium, the 8 iron elements, pantothenic acid, potassium, phosphorus, niacin, and natural vegetable oil. Avocado seeds are enriched by complex compounds of polyphenolics and alkaloids, which act as anti protozoa, anti microbes, anti-cholesterol, and lowering blood pressure (Leite et al., 2009). With the benefit contents inside the avocado seeds, the utilization of juice processing byproducts from shops near the Universitas Ahmad Dahlan campus was done.

The initial stage of the research was conducted with surveys as literatures, a survey with questionnaires, and business visits. Business visits were done to assess if there was any utilization of avocado and durian seeds as byproducts and to determine the public consumption level of products made of those two byproducts. The business visits resulted in several assessments. At Wulan Juice and Duta Fruit Jus business shops, there was utilization for avocado seeds. However, the processed product resulted from the utilization was unknown. Avocado seeds as waste from the juice shops were not sold. According to shops' owners, customers who want to utilize the avocado seed may reserve it first to be separated and taken.

The next step was to conduct research surveys to respondents randomly using Google Form. As many as 55 respondents participated in the surveys. The Google Form consists of questions about respondents' knowledge and interest in the utilization of avocado seeds.

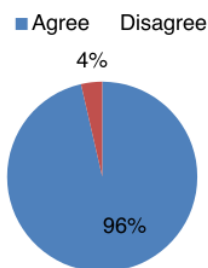


Figure 2. Respondents' Interest Level in Steamed Brownies with Avocado Seeds as an Additive

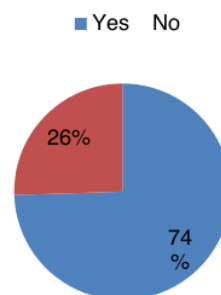


Figure 3. Respondents' Knowledge Percentage in Avocado Seeds Utilization

Based on Figures from the questionnaire result, as many as 74% of respondents have no knowledge of avocado seeds utilization. The addition of avocado seeds to brownies cake was done by adding the shredded avocado seeds directly by considering the high-fat content of avocado seeds as additional value to the resulted product.

The production of avocado seeds brownies cake was done by mixing 2 eggs, 100 g sugar, 50 g margarine, 50 g cooking compound chocolate, 10 g cacao powder, 90 g avocado seeds, 80 g wheat flour, vanilla powder, salt, lime leaves, and emulsifier. Avocado seeds brownies cake was then given to 15 respondents, who are Teknologi Pangan students on progress report session as evaluation. The organoleptic test was done using a hedonic test with a scale of 1-4 for dislike to very-like.

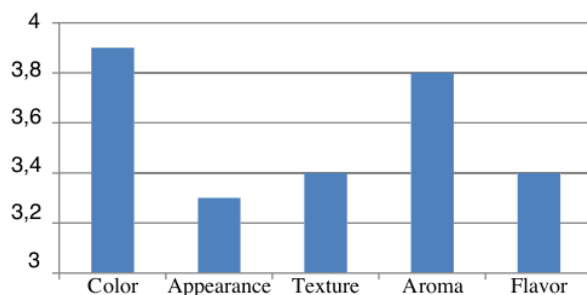


Figure 4. Questionnaire Result from Organoleptic Test of Avocado Seeds Brownies Cake

According to the Figure 4, the highest acceptance level came from color and aroma as parameters with 3.9 and 3.8 in scores, respectively. The parameter that needs to be improved, which scored 3.3, was the brownies cake's appearance. The brownies' flavor gave a low score, which was 3.4, due to the bitter aftertaste, which comes from the lime leaves. The addition of lime leaves was to enhance the aroma and the expiration date. However, the addition actually gave flavor that respondents did not like. The problem solution is by changing the addition of lime leaves with the extract of lime leaves. The extract was obtained from the addition of lime leaves to the steaming of margarine and compound chocolates. After the mix of those ingredients melt, the lime leaves were then separated and wasted so that there would be no bitter aftertaste in the product. After improving the avocado seeds brownies production, we conducted the organoleptic test again to 55 respondents in Gelar Produk.

Based on the questionnaire results, the color became the parameter with the highest score. Meanwhile, the lowest was the flavor. The appearance and texture parameters were better than the previous results. The three variants of formulations, the formulation with the highest acceptance from respondents was the Formulation 3 (F3).

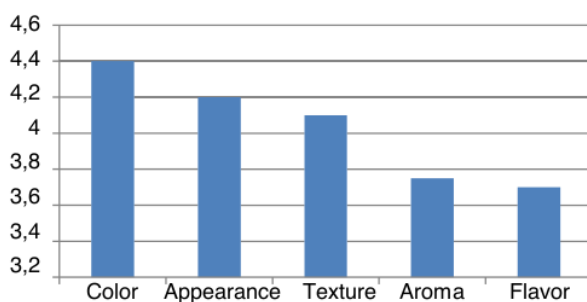


Figure 5. Organoleptic Test Questionnaire Result

Table 1. Sensory Evaluation of Chocolate Steamed Brownies at Various Proportion of Avocado Seed

Formula	Overall Appearance	Taste	Color	Texture	Aroma
F1	3.0	3.6	4.0	2.5	3.0
F2	3.3	3.4	3.9	3.4	3.8
F3	4.2	3.7	4.4	4.1	3.75

4. CONCLUSIONS

The study concluded that that avocado seeds as a side waste of production have the potential as a steamed brownie ingredient with a quality level of acceptance of color parameter as 4.4, appearance as 4.2, texture as 4.1, aroma as 3.75, and flavor as 3.7.

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