p–ISSN: 2723 – 6609 e-ISSN: 2745-5254
Vol. 5, No. 12, December 2024 http://jist.publikasiindonesia.id/

The Use of Purple Eggplant as a Wheat Flour Substitution Ingredient in Making Cookies

Zana Zuflia[1*], Vany Octaviany[2]
Universitas Telkom, Indonesia
Email: zanazulfia06@gmail.com
*Correspondence

Keywords: purple eggplant; wheat flour substitution; healthy cookies.

ABSTRACT

The background of this study is based on the high nutritional content of purple eggplant, such as fiber, vitamins, and antioxidant compounds, which have the potential to increase the nutritional value of cookies while reducing the use of wheat flour. The purpose of this study is to develop a healthier cookie formulation by utilizing purple eggplant as a partial substitution ingredient for wheat flour, as well as to evaluate its organoleptic quality and nutritional content. The method used is an experimental method with a complete random design (RAL). The manufacturing process includes processing purple eggplant into flour, formulation of ingredient mixtures, and organoleptic testing with trained panelists. Organoleptic testing involves assessing the taste, aroma, texture, and color of cookies. The results showed that the substitution of wheat flour with purple eggplant flour of up to 30% produced cookies with a crispy texture, sweet-medium taste, and a distinctive aroma that was liked by the panelists. The fiber and protein content of cookies is also significantly increased compared to cookies without substitution. In conclusion, the use of purple eggplant as a substitute for wheat flour in making cookies provides better nutritional benefits without reducing product acceptability. This innovation offers a potential healthy food alternative to be further developed in the snack food industry.

Introduction

Purple eggplant (Solanum melongena L) is one of the most widely consumed horticultural plants in Indonesia. Purple eggplant is rich in various important nutrients such as vitamins, minerals, fiber, and antioxidant compounds (Demir & Kılınç, 2017). Bioactive compounds such as anthocyanins and phenols in purple eggplant are known to provide many health benefits (Break Even Point Analysis on Making Cookies by Mixing Wheat Flour with Red Bean Flour. Every 100 grams of eggplant contains 24 calories, water (94 grams), protein (1.1 grams), fat (0.2 grams), carbohydrates (5.7 grams), and other minerals and vitamins. Eggplant is also used as a medicine such as itching on the skin, abdominal pain, stomach washing, and high blood pressure (Eprints UMK, 2024).

The potential of purple eggplant in the manufacture of processed food products is still not widely explored. Although purple eggplant has many benefits, currently the processing is only fried and boiled. Its use in society is still limited. The public is not fully aware of the health and culinary potential of purple eggplant. In addition, the variety of recipes that use purple eggplant is still lacking, so far usually purple eggplant is only processed such as balado eggplant and crispy fried eggplant, so there needs to be innovation in the processing and serving of purple eggplant to increase its use (Soares et al., 2022). Eggplant (Solanum melongena) is an annual vegetable that is widely found growing wild in Indonesian forests. Eggplant is widely grown in various parts of the world and has many varieties, ranging from local eggplant to imported eggplants such as Japanese eggplant (Eprints UTDI, 2024), (Papagianni et al., 2021) This study shows that the use of eggplant flour can substitute wheat by up to 30% in the manufacture of pastries such as cookies, is a product that is favored by many people because it has a good taste, a practical size, and easy to carry around (Worang, Pelleng, & Tarore, 2018).

Cookies are one of the snack food products based on wheat flour derived from wheat. In the manufacture of cookies, wheat flour is the main ingredient used. However, Wheat flour often contains added sugar, which can increase blood sugar levels and contribute to diseases such as diabetes. Excessive use of wheat flour in food can increase the risk of obesity and blood sugar-related diseases (American Heart Association, 2020), Some wheat flour products may contain additives or preservatives that can be harmful to health. (Sari, Fajrin, & Fudholi, 2020). Consumption of wheat flour in sensitive people can cause indigestion and allergic reactions. Therefore, there needs to be an effort to utilize local food ingredients such as purple eggplant as a substitute for wheat flour in making cookies. (China, Amadi, & Ujong, 2022). The use of purple eggplant as a wheat flour substitution ingredient in making cookies can provide better nutritional value, attractive appearance, and unique texture and taste for consumers. This innovation also supports efforts to explore local food ingredients that have the potential to be used in the food industry. Several studies have examined the use of other local ingredients as wheat flour substitutions in the manufacture of cookies, such as chempedak seed flour. (Ho & Wong, 2020) and cassava leaf flour (Anugrah et al., 2024).

The use of purple eggplant as a substitute for wheat flour in making cookies is an interesting novelty. In addition to providing better nutritional value, the use of purple eggplant flour can also be a product differentiation in the snack food industry. This innovation also opens up opportunities to explore other local food ingredients as substitution materials in the manufacture of bakery products in the future. Examining the use of purple eggplant as a substitute for wheat flour in the manufacture of cookies. The results of the study show that the use of purple eggplant can increase the fiber and nutrient content in cookies, as well as provide a unique taste. This study emphasizes the importance of innovation in the use of local ingredients to create healthier food products (Vedanta, 2022) The use of purple eggplant as a substitute for wheat flour in making cookies offers significant attraction. Purple eggplant has a high nutritional content, including carbohydrates 33.5%, protein 9.58%, fat 19.8%, moisture content 19.6%, ash

content 1.37%, and fiber 14.7%. This study shows that the substitution of wheat flour with purple eggplant can increase fiber content and reduce carbohydrate content in cookies, and does not affect aroma. The results of the nutritional content analysis showed that cookies with purple eggplant substitution had a carbohydrate content of 33.5%, protein of 9.58%, fat of 19.8%, and fiber of 14.7%, which is by USDA standards (Nusantara, 2015).

Method

This study uses an experimental method. The experimental method is a scientific approach used to test hypotheses and answer research questions. In experiments, researchers manipulate certain variables to see their impact on other variables (Zyra, 2023). The experimental method involves dividing the subjects or objects of research into control groups and treatment groups, where the treatment group is subjected to certain treatments while the control group is not. This research aims to develop a product The use of purple eggplant as a substitute for wheat flour in making cookies that are healthier and beneficial to the community. The research method used includes the use of purple eggplant as a substitute for wheat flour in making cookies starting from cleaning, processing, drying, and mashing into flour. The research method in the research "Utilization of Purple Eggplant as a Wheat Flour Substitute in Making Cookies" uses experimental and organoleptic methods. This study uses an experimental design with a variation of the addition of purple eggplant as a substitute for wheat flour in the manufacture of cookies. (Żyra, Skoczypiec, & Bogucki, 2023). This variation was carried out to determine the effect of the addition of purple eggplant on the quality of cookies. The design of this study uses a Complete Random Design (RAL) with 4 different cookie formulations, namely by adding purple eggplant to a certain percentage. Each formulation is repeated 2 times to reinforce the results. Data collection was carried out through organoleptic tests. Testing was conducted using trained panelists to assess the quality of cookies based on organoleptic properties such as color, texture, taste, and aroma. Panelists gave an assessment using a hedonic scale to determine the level of preference for each cookie sample. The organoleptic test results were analyzed using Variance Analysis (ANOVA) to find out if there was a noticeable difference between the mean ratings of each cookie group. Thus, this research method uses a combination of experimental and organoleptic to evaluate the quality of cookies made using purple eggplant as a substitute for wheat flour.

Figure 1

Figure 2

Prepare all the necessary ingredients ranging from eggplant flour, wheat flour, sugar, brown sugar butter, eggs, cornstarch, and also vanilla.	Mix sugar, brown sugar, and butter, and stir until evenly distributed After it is evenly distributed, add the eggs and vanilla extract, then stir until evenly distributed, In another container mix eggplant flour, wheat flour, cornstarch, baking powder, and baking soda stir.s

Figure 3

Cookies are ready for packing, you can also be creative to be platting (optional)

Results and Discussion

Purple Cookies Formulation

This study uses an experimental method. The experimental method is a scientific approach used to test hypotheses and answer research questions. In experiments, researchers manipulate certain variables to see their impact on other variables. (Selvarajan, Venkataramanan, Nair, & Choudhury, 2023). The experimental method involves dividing the subjects or objects of research into control groups and treatment groups, where the treatment group is subjected to certain treatments while the control group is not. This research aims to develop a product The use of purple eggplant as a substitute for wheat flour in making cookies that are healthier and beneficial to the community. The research method used includes the use of purple eggplant as a substitute for wheat flour in the manufacture of cookies starting from being cleaned, processed, dried, and mashed into flour. The organoleptic test was carried out by involving 30 panelists from 5 lecturers, 3 entrepreneurs, 10 students 12 students, and the general public**.** The use of purple eggplant as a substitute for wheat flour in making cookies can be a healthier and more environmentally friendly alternative. However, further research is needed to determine the long-term effects and optimization of the process of making cookies that use purple eggplant as a substitute for wheat flour. Has relatively good sensory taste qualities (Papagianni et al., 2021). It is considered to have a relatively high score by the general public panelists involved in organoleptic tests. The sweet taste provides a pleasant delicacy, The use of purple eggplant as a substitute for wheat flour in the manufacture of cookies has succeeded in creating a satisfying and interesting dining experience with an optimal combination of taste and texture. The benefits of eggplant in cookies can be divided into several main aspects. First, eggplant is rich in fiber and various vitamins such as vitamin A, vitamin C, vitamin B-6, and vitamin K. Fiber in eggplant helps maintain digestive health and control blood sugar levels, while other vitamins and minerals such as potassium, calcium, and magnesium help maintain heart and bone health. Second, eggplant contains antioxidants such as anthocyanins, nasunin, lutein, and zeaxanthin that help the body fight free radicals and prevent various diseases. These antioxidants also help reduce the risk of heart disease. Third, eggplant can be used as a substitute for wheat flour in the manufacture of cookies, offering a healthier variety of flavors and textures. The use of eggplant in cookies also helps control blood sugar levels by slowing down the rate of digestion and absorption of sugar in the body, so it can prevent diabetes. Thus, the utilization of eggplant in cookies not only provides a unique flavor and texture but also offers significant health benefits.

Purple Cookies Acceptability

The acceptability of the organoleptic test of purple eggplant cookies can be seen from several aspects. These cookies have a distinctive and unique taste, due to the nutritional content of purple eggplants such as vitamin K, minerals, calcium, and bioflavonoids. This taste can increase consumer pleasure. In addition, the aroma of purple eggplant cookies is also unique and interesting, which is caused by the natural aroma content of purple eggplant. This aroma can increase the impression of consumer pleasure.

The texture of purple eggplant cookies is also interesting, with a combination of water and fiber content in purple eggplant. This soft and crispy texture can increase consumer pleasure. The appearance of purple eggplant cookies is also attractive, with a distinctive purple color and an elongated rounded shape. This appearance can increase consumer pleasure. In addition, purple eggplant cookies have a high nutritional content, including vitamin K, (ÇİLESİZ, 2023) minerals, calcium, and bioflavonoids. This nutritional content can increase consumer pleasure due to the health benefits provided. Thus, purple eggplant cookies can offer significant appeal with their unique and enhanced taste, aroma, texture, appearance, and nutritional content. Taste Organoleptic assessment shows that cookies with purple eggplant substitution have a unique flavor and soft texture. Despite the difference in flavor, most panelists liked cookies that used purple eggplant as an additional ingredient. Consumer Acceptance: Survey results show that consumers are open to product innovations that use local ingredients such as purple eggplant, and many have expressed interest in buying such products in the market.

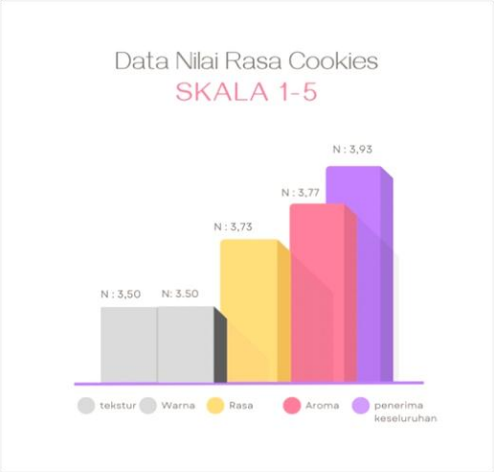

Figure 4 Cookies Average Value Chart

Based on the graph data above that has been accumulated from 30 members of the general public who have filled out questionnaires, the results of the study based on the taste of the scale of 1-5 panelists gave a score of 3.73, the panelists assessed that purple eggplant can provide a delicious and strong taste, not much different from cookies in general while for the aroma scale of 1-5 panelists gave a score of 3.73, The panelists assessed that the aroma of eggplant in the cookies made the aroma much stronger and stronger, and for the texture from a scale of 1-5 the panelists gave a score of 3.50, the panelists assessed that the texture was quite liked by the public The conclusion of the overall acceptance of the scale of 1-5 panelists gave a score of 3.93, the panelists assessed that for the overall taste of these cookies were very tasty and quite optimal, Consumer preferences are greatly influenced by texture, taste, and aroma. Thus, the use of purple eggplant as a substitute for wheat flour in making cookies can provide better nutritional benefits and increase consumer preferences. Wheat flour has a significant influence on the quality of cookiesCookie Quality Test Results: Taste: 20 panelists (90%) stated that

cookies have a good and balanced taste. Aroma: 25 panelists (96%) stated that cookies have an attractive aroma and are not pungent. Texture: 24 panelists (94%) stated that cookies have a crispy texture and are not mushy. Appearance: 28 panelists (98%), Duncan Multiple Range Test (DMRT): The results of the DMRT test show that the use of a certain proportion of 30% eggplant flour and 70% wheat flour provides the best quality cookies. Sensory Taste Quality (Taste, Aroma, and Texture) Cookies made from purple eggplant flour substitution provide optimal taste in terms of taste, aroma, and texture.

Nutritional Content of Purple Eggplant Cookies

Nutritional Content Cookies produced with purple eggplant substitution show an increase in fiber and vitamin content. Purple eggplant is rich in vitamin K, minerals, and bioflavonoids, which provide additional health benefits. (Soares et al., 2022). Purple eggplant has a high nutritional content, including water content of 9.766%, protein of 22.901%, fat of 14.647%, and carbohydrates of 45.319% per 100 grams. This study also shows that this nutritional content is by the Indonesian National Standard on jerky (Widya, 2015). Product innovations that use purple eggplant as a substitute for wheat flour in making cookies have several significant nutritional benefits. Here are some of the nutritional contents that can be obtained from this innovation. Purple eggplant is rich in vitamin C, which is an important antioxidant for maintaining a healthy body. Vitamin C also plays a role in maintaining the immune system and improving the skin. Purple eggplant is also high in dietary fiber, which can help maintain digestive health and reduce the risk of heart disease. Dietary fiber can also help control blood sugar levels and body weight. Purple eggplant has a high antioxidant capacity, which can protect the body from free radical damage. These antioxidants can also help maintain healthy skin and prevent premature aging eggplant contains the compound solasodin, which has antioxidant and anti-cancer properties. These compounds can help protect the body from damage caused by free radicals and prevent the development of cancer. Thus, product innovations that use purple eggplant as a substitute for wheat flour in making cookies can provide better nutritional benefits compared to traditional cookies that use wheat flour.

Conclusion

The conclusion of the research and organoleptic test of the use of purple eggplant as a substitute for wheat flour in making cookies shows that the use of purple eggplant can provide a variety of unique flavors and textures.

The results of the organoleptic test showed that purple eggplant cookies have a dark brown color, fragrant aroma, crispy texture, and sweet-medium taste, which is included in the category of favorites. The nutritional content of purple eggplant cookies also shows that the ash and protein content meet the quality requirements of cookies, but the moisture content does not meet the quality requirements of the moisture content of cookies for diabetic diets. The fat and carbohydrate content was lower compared to the development of cookies in other studies, as well as the high content of dietary fiber and anthocyanins. The best formula based on the results of the hedonic test and nutritional content analysis

is cookies with 100% purple eggplant flour. These cookies have the characteristics of dark brown color, fragrant aroma, crispy texture, and sweet taste. This shows that the use of 30% purple eggplant flour can provide optimal results in making cookies. Wheat flour substitutions offer several significant nutritional advantages. Purple eggplant is rich in carbohydrates that can be used as a source of energy, as well as containing protein that helps meet protein needs in the diet. Although the fat content is relatively low, it can add nutritional value from wheat flour substitution. In addition, purple eggplant is also rich in vitamin A, calcium, phosphorus, and iron which are very beneficial for health. Its high antioxidant activity, especially phenolics and flavonoids, can provide antioxidant benefits and protect against cell damage. Thus, purple eggplant can be a healthy and nutritious substitute for wheat flour, due to its complete nutritional content and significant health benefits.

Bibliography

Anugrah, Naufal Permata, Sukma, Rahayu, Niza, Nadhifatun, Christiana, Mareta Ester, Vionita, Vionita, & Rismaya, Rina. (2024). The effect of adding suji leaf flour on the physical characteristics of gluten-free cookies. *Proceeding International Seminar of Science and Technology*, *3*, 95–100.

China, M. A. H., Amadi, G. A., & Ujong, A. E. (2022). Functional and pasting properties of wheat and cooking banana flour blends and their utilization in cookies production. *Research Journal of Food Science and Nutrition*, *7*(2), 59–67.

ÇİLESİZ, Ass st Prof Dr Yeter. (2023). *ispec 16th international conference on engineering & natural sciences*.

Demir, M. K., & Kılınç, M. (2017). Utilization of quinoa flour in cookie production. *International Food Research Journal*, *24*(6), 2394–2401.

Ho, Lee Hoon, & Wong, Shi Yun. (2020). Resistant starch from exotic fruit and its functional properties: a review of recent research. *Chemical Properties of Starch*, 101.

Papagianni, Olga, Moulas, Iraklis, Loukas, Thomas, Magkoutis, Athanasios, Skalkos, Dimitrios, Kafetzopoulos, Dimitrios, Dimou, Charalampia, Karantonis, Haralabos C., & Koutelidakis, Antonios E. (2021). Trends in food innovation: An interventional study on the benefits of consuming novel functional cookies enriched with olive paste. *Sustainability*, *13*(20), 11472.

Sari, Nasmi Herlina, Fajrin, Jauhar, & Fudholi, Ahmad. (2020). Characterization of swellability and compressive and impact strength properties of corn husk fiber composites. *Composites Communications*, *18*, 49–54.

Selvarajan, L., Venkataramanan, K., Nair, Anish, & Choudhury, Bishub. (2023). Si3N4-TiN rotary EDM optimization by Mo-Jaya algorithm with Pareto optimal solution, analysis of micro-structural and geometrical tolerances. *Journal of the Mechanical Behavior of Biomedical Materials*, *145*, 105995.

Soares, Jaqueline Machado, Teixeira, Flávia, Oliveira, Mayra Lopes de, Amaral, Luane Aparecida do, Almeida, Tainá da Silva Fleming de, Souza, Gabriel Henrique Oliveira de, Hokama, Lais Maluf, Menegassi, Bruna, Santos, Elisvânia Freitas dos, & Novello, Daiana. (2022). Eggplant flour addition in cookie: nutritional enrichment alternative for children. *Foods*, *11*(12), 1667.

Worang, Cintia G. M., Pelling, Frendy A. O., & Tarore, Henny S. (2018). Analisis Break Even Point Terhadap Produksi Ayam Petelur Pada UD. Kakaskasen Indah. *JURNAL ADMINISTRASI BISNIS (JAB)*, *7*(001), 58–65.

Żyra, Agnieszka, Skoczypiec, Sebastian, & Bogucki, Rafał. (2023). Influence of material

properties on near dry-EDM process: The discussion of research for titanium grade 2 and Inconel 625 alloy. *Materials Research Proceedings, 28*.