

Substitution Experiment of Wheat Flour Using Green Broccoli Flour in Tartlet Skin

¹Putri Febiyola, ²Sahlit Sugesti, and ³Enny Karmin

¹Sekolah Tinggi Pariwisata AMPTA, Yogyakarta, Indonesia

²Sekolah Tinggi Pariwisata AMPTA, Yogyakarta, Indonesia

³Sekolah Tinggi Pariwisata AMPTA, Yogyakarta, Indonesia

(Putri.febiyola@icloud.com)

Abstract. The trend of modern society's consumption patterns is currently shifting. Food consumption is no longer just to fill the stomach but must also support body health. Currently, many people are starting to reduce rice consumption because of the sugar content in it. Instead, consumption of vegetables, fruits, and meat is increasing. However, the use of broccoli is still relatively limited and less in demand when consumed directly. This study uses a descriptive experimental method, which is a study that aims to determine the value of the independent variable without comparing or connecting it with other variables. The data collection technique was carried out through interviews with three expert experts. The results of the study showed that the optimal formulation was obtained in the experiment using 80% green broccoli flour and 20% wheat flour, as well as the addition of powdered milk and vanilla. This formulation produces tartlet skin that meets the standards of taste, texture, aroma, color, and appearance that are in accordance with the researcher's expectations and can be accepted by experts in the fields of pastry and bakery.

Keywords: Broccoli Flour, Experiment, Organoleptic Test

RESEARCH BACKGROUND

The development of the culinary world in Indonesia, especially in the pastry sector, has shown rapid progress. This is indicated by the increasing media exposure to culinary and the growth of the food and beverage industry. Pastry is a field that requires high creativity because it combines taste with aesthetics. One popular pastry product is the tartlet, which is a mini-sized pie that is usually served as a dessert. Tartlets have sweet or savory fillings and are usually made with pie crusts from short pastry dough. Innovation in pastry processing continues to develop, including the use of new ingredients such as green broccoli in the form of flour for tartlet crusts.

Table 1: Tartlet Skin Recipe Using 80% Green Broccoli Flour and 20% Wheat Flour:

No	Inggredient	Quantity
1	Green Broccoli Flour	30 g
2	Wheat Flour	20 g
3	Powdered Milk	10 g
4	Butter	25 g
5	Vanilla Essence	1 tsp
6	Salt	1 tsp
7	Sugar	1 tsp
8	Egg Yolk	25 g

[Source: Wayne Gisslen, 2013]

Changes in the consumption patterns of modern society that are now more concerned with health have become an opportunity to introduce nutritious foods such as broccoli. Unfortunately, vegetable and fruit consumption in Indonesia is still relatively low. Broccoli, although rich in fiber, vitamins, and antioxidants that are beneficial for body metabolism and disease prevention, is less popular if consumed directly and has a short shelf life. Therefore, broccoli needs to be further processed so that it can be utilized optimally, one of which is by making it into flour that is more durable and flexible in food processing.

Broccoli processing into flour aims to extend shelf life and maintain its nutritional content. Broccoli flour has a smooth texture and green-brown color due to the drying process, and can be used as an alternative ingredient to replace wheat flour. The use of broccoli as a substitute for flour not only increases the nutritional value of food, but also reduces the consumption of wheat flour which is high in gluten and glycemic index. This study aims to develop tartlet skins made from green broccoli flour, as a healthier food innovation and in accordance with current community consumption trends.

REVIEW OF RELATED LITERATURE

General knowledge about green broccoli flour

Broccoli flour is a processed product of broccoli that is dried and ground into a fine powder, with the aim of extending shelf life, facilitating distribution, and expanding its use in the culinary world and food industry. Broccoli has a high nutritional content such as water, protein, fiber, vitamins, minerals, beta-carotene, and glutathione, as well as active compounds such as cyanohydroxybutene which are beneficial for health. The process of making broccoli flour involves the stages of cutting green broccoli 1 cm long, washing, boiling using salt for 3 minutes, drying at a temperature of 70 ° C for 6 hours, then grinding and sieving to become flour.

General knowledge about Tartlet

Pie is a type of pastry that is popular in America and originated in England, originally filled with closed meat dishes, but has developed into various fillings with a crispy and soft taste, usually served as a dessert. Tartlet itself is a mini version of pie, also known as flan in France, and is a type of dessert that looks attractive and tastes special. (Nurwana, 2021)

Pie dough is divided into two types, namely Flaky Pie Dough and Mealy Pie Dough. This study used Flaky Pie Dough, which is a dough made by mixing fat and flour unevenly until margarine granules form which create a layered and crispy crust texture. When water is added and ground, the flat fat granules create layers of flakes on the dough. Meanwhile, Mealy Pie Dough is made by mixing fat more tightly into the flour until it resembles coarse flour, producing a softer dough, does not absorb liquid, and is suitable for use as a base for fruit pies or soft pies because of its low gluten and water content (Wayne Gisslen, 2013)

Tartlet Quality Criteria

A good tartlet has several quality criteria that can be seen from the texture, taste, and aroma. The crust should be soft and tender but still united and not brittle, the top should not be hard or flaky, and the bottom should be perfectly cooked without being soft. In addition, the crust should not shrink or come off the mold, and the filling should be cooked well so that the whole tartlet feels harmonious and delicious. (Wayne Gisslen, 2013).

Food Quality Criteria

Food quality is the level of excellence of a food that includes taste, appearance, and nutritional content, which plays an important role in attracting consumers and winning the culinary business competition. Adding that food quality consists of several main dimensions, namely texture, aroma, taste, and color. Texture includes the nature of food such as smooth, hard, soft, or liquid; aroma is the first impression that influences appetite; taste involves a combination of basic tastes such as sweet, salty, sour, and bitter; and color that must be combined harmoniously so that the appearance of food is attractive and appetizing. (West, Wood and Harger, 2012)

RESEARCH METHOD

This research is a descriptive experiment that aims to test the manufacture of tartlet skin from green broccoli flour. Data were collected through interviews with three experts as research subjects, namely sources who provide relevant information. Meanwhile, the object of research is tartlet skin made from green broccoli flour which is the focus of the experiment and analysis in this study. This research was conducted at STP AMPTA Yogyakarta located at Laksada Adisucipto KM 6, Caturtunggal, 55281 Yogyakarta, because the place has a representative kitchen with complete equipment, a special room for observation, and adequate lighting. The research implementation is scheduled from January 10, 2025 to February 10, 2025 in order to maximize the research process and data collection. The data collection methods in this study include observation of the ingredients and process of making green broccoli flour to determine deficiencies in making tartlet skins, interviews with experts to obtain information and suggestions regarding the experiments conducted, documentation in the form of collecting and storing data and images as supporting evidence for the study, and utilizing the internet to search for references and additional information from various sources such as articles and theses. Organoleptic testing is a testing method that uses the senses of touch, sight, smell, and taste to assess the quality of food products in terms of texture, color, aroma, and taste. This study was conducted to evaluate the quality of broccoli flour tartlet skins based on these four factors.

RESULTS AND DISCUSSION

This study involved three stages of experiments with variations in the composition of green broccoli flour, namely 100%, 90%, and 80%, where the experiment with the 80% composition produced the best product and has been submitted to experts for further assessment and consideration with the successful recipe composition. The third experiment in this study focused on refining the formulation of green broccoli flour-based tartlet skin, by changing the composition to 80% green broccoli flour and 20% wheat flour. The addition of powdered milk was maintained to strengthen the taste, and vanilla essence was added according to expert advice to reduce the distinctive aroma of broccoli. The results of the experiment showed a significant improvement in terms of color, texture, and aroma compared to the previous experiment, where the color of the tartlet looked brighter, the texture was crispier and lighter, and the aroma of broccoli was successfully minimized.

To evaluate the quality of the product, researchers involved three experts in an organoleptic test conducted on January 22, 2025. The assessment focused on the aspects of color, texture, taste, and aroma. As a result, the product was considered to be more similar to a tartlet made from wheat flour, both in terms of visual appearance and taste. The experts stated that the aroma of broccoli was no longer disturbing and the taste of the tartlet was savorier and more balanced, making this formulation more worthy of consideration as a healthy alternative to tartlet skin. By considering all aspects of the assessment, it can be concluded that the third formulation is the most optimal. The composition of 80% green broccoli flour and 20% wheat flour with the addition of powdered milk and vanilla essence has met the expected standards of taste, texture, aroma, and appearance. This formula is recommended as a standard formula in the development of healthy tartlet skins based on green broccoli, while opening up opportunities for innovation in local pastry products with high nutritional value.

Excerpt 1

"Using 100% broccoli flour produces a texture that is not yet crispy, the skin is too thick, and the broccoli aroma is still strong. To overcome this, it is recommended to mix broccoli flour with wheat flour, thin the skin, and add vanilla so that the aroma is more delicious and the color is closer to the original appearance. In the third experiment, the product with a mixture of wheat flour was considered to have a more attractive color and a good taste". (Interview with Chef Sulastyo as a lecturer in the pastry and bakery course at STP AMPTA Yogyakarta, January 22, 2025).

By considering all aspects of the assessment, it can be concluded that the third formulation is the most optimal. The composition of 80% green broccoli flour and 20% wheat flour with the addition of powdered milk and vanilla essence has met the expected standards of taste, texture, aroma, and appearance. This formula is recommended as a standard formula in the development of healthy tartlet skins based on green broccoli, while also opening up opportunities for innovation in local pastry products with high nutritional value.

Excerpt 2

"The first experiment, the product left a bitter taste and an unpleasant odor from broccoli flour, so it was suggested to add powdered milk to reduce it. In the second experiment, although it tasted good, the broccoli aroma was still there and it was suggested to add wheat flour so that the color was more like the original tartlet skin. The third experiment was considered the closest because it tasted good and savory, and the skin color was more like the original tartlet as in the second experiment". (Interview with Chef Sri Khusnul Ainiya as a lecturer in the pastry and bakery course at STP AMPTA Yogyakarta, January 22, 2025).

In the second experiment, the researcher modified the tartlet skin dough with 90% broccoli flour, 10% wheat flour, and powdered milk, which produced a crispier texture, lighter color, and a broccoli aroma that began to decrease. Based on expert evaluation on January 20, 2025, improvements were still needed in the thickness, color, and aroma. For the next experiment, the researcher will increase the wheat flour to 20% and add vanilla to improve the color, aroma, and produce a thinner, crispier, and standard tartlet skin.

Excerpt 3

"In the first experiment, the product had a dark color and a bitter taste, so it was suggested to add wheat flour so that the broccoli flavor was not too strong. The second experiment received input to make the skin thinner when molded because it was still hard, and the brown color did not match the appearance of the wheat flour tartlet skin. Meanwhile, the third experiment was considered the most preferred because the skin was thinner and the appearance was more similar to the tartlet using wheat flour". (Interview with Chef Agus Supriyanto as a lecturer in the pastry and bakery course at STP AMPTA Yogyakarta, January 22, 2025).

In the third experiment, the researcher used 80% green broccoli flour, 20% wheat flour, and added powdered milk and vanilla essence to improve the color, texture, aroma, and taste of the tartlet skin. The results showed significant improvements: brighter color, thinner and crispier texture, drastically reduced broccoli aroma, and more balanced taste. The expert assessment on January 22, 2025 stated that this product was close to the wheat flour tartlet standard and was worthy of being a healthy alternative. This formula is considered the most optimal and is recommended as a reference for developing green broccoli tartlet skin.



Figure 1 Tartlet Skin Broccoli, 2025

CONCLUSION

Based on the results of three experiments with a composition of 100%, 90% and 80% green broccoli flour, it was found that the composition of tartlet skin with a ratio of tartlet skin with a composition of 80% green broccoli flour and 20% wheat flour got the best results based on expert income and organoleptic tests by experts. The results can be concluded that green broccoli flour tartlet skin can be used as a raw material based on aspects of taste, color, texture and aroma.

REFERENCES

- Andani, Putri (2016). *Penambahan Tepung Brokoli Dalam Pembuatan Mie Basah Sumber Serat*. Universitas Muhammadiyah Prof. Dr. Hamka Jakarta.
- Anis, Masrukhah (2019). *Penambahan Tepung Brokoli Terhadap Kadar Kalsium, Vitamin C, Warna Dan Tekstur Pada Nugget Daging Kelinci*. Universitas Brawijaya.
- Fkm.unair.ac.id 2024. Penduduk Indonesia Kurang Konsumsi Sayur, Buah dan Pangan Hewani – Departmen Gizi FKM unair (<https://fkm.unair.ac.id/penduduk-indonesia-kurang-konsumsi-sayur-buah-dan-pangan-hewani/>) Diakses, 24 Mei 2024 jam 13.13 WIB
- Gisslen, Wayne (2013). *Professional Baking*
- Hamidi (2010). *Metode Penelitian Kualitatif : Pendekatan Praktis Penulisan Proposal Dan Laporan Penelitian*. Jakarta: Kramat Raya Margonda
- Maya Azeliya, Renny (2013). *Pembuatan Bolu Brokoli (Brassica Oleracea L) Dilihat Dari Kadar Beta Karoten Dan Kadar Vitamin C Serta Daya Terima*. Universitas Muhammadiyah Surakarta.
- Momchips-Official.com 2021. *Snack Sehat Buah Sayur* (<https://momchips-official.business>) Diakses, 24 Mei 2024 jam 09.56 WIB
- Nurwana, 2021. *“Pembuatan Pie Substitusi Terong Belanda (Tamarillo) Untuk Meningkatkan Pangan Lokal”* Universitas Negeri Semarang.
- Reski, Andi,. (2012), Studi kualitas Minyak Makanan gorengan Pada Penggunaan Minyak Goreng Berulang, Skripsi Jurusan Teknologi Pertanian, Fakultas Pertanian, Univ. Hasanuddin, Makassar.
- Rri.co.id 2022. Sejarah Kuliner Capcay yang Populer di Indonesia. (<https://rri.co.id/samarinda/sosbud/kuliner-daerah/1318472/sejarah-kuliner-capcay-yang->) Diakses, 23 Mei 2024 jam 14.20 WIB.
- Sekar Ayu, Meidya (2021). *Pengaruh Substitusi Bubuk Brokoli Sifat Organoleptik Kue Lidah Kucing*. Jurusan S1 Pendidikan Tataboga Universitas Negeri Surabaya. Jurnal Vol 10 No. 2 (2021).
- Sillick, 1. J., &Schutte, N. S. (2006). Emotional intelligence and self-esteem mediate between perceived early parental love and adult happiness. *E-Journal of Applied Psychology*, 2(2), 38-48. Retrieved from <http://ojs.lib.swin.edu.au/index.php/ejap>
- Simdos.unud.ac.id 2017. Teknologi Telur. (<https://simdos.unud.ac.id/u/file>) Diakses, 4 Juni 2024 jam 20.45 WIB
- Style.tribunnews.com 2017. Resep Es Krim Brokoli. (<https://style.tribunnews.com/amp/2017/05/14/resep-es-krim-brokoli>)
- Sudarminto, (2020). *Peluang Usaha Tani Brokoli Prospek, Khasiat Dan Panduan Budidaya*. Yogyakarta: Pustaka Batu Press.



Sugiyono. (2018). *Metode Penelitian Kuantitatif Kualitatif Dan R&D*. Bandung: Alfabeta.

Suhardjito, Y.B. 2006. *Pastry and Perhotelan*. Yogyakarta: Andi.