

Banana blossom as a local resource-based emergency food innovation fusion food product

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Abstract. This research aims to explain the innovation of emergency food products based on "Fusion Food" which uses banana blossoms as the main ingredient. Banana blossoms, a local and underutilized ingredient abundant in tropical regions, are the focus. In the context of food crises and natural disasters, innovation in emergency food products becomes increasingly important. The study combines banana blossoms with various ingredients to create a nutritious, long-lasting emergency food. Researchers conducted experiments in processing banana blossoms and combining them with other ingredients with interesting flavors and textures. The results of the research on the experimental design tested three formulations in organoleptic tests on 30 semi-trained panelists to see the level of preference (hedonics) for one of the recipe formulations. The Banana Heart Samosa SJP2 received the highest preference score of 4.14. The frozen banana blossom samosas have a shelf life of over three months, with optimal consumption within three months. Half-cooked samosas last less than three days in the refrigerator, under nine hours unrefrigerated, and cooked samosas last less than two days. This research highlights the significance of innovative emergency food products that meet nutritional needs and offer diverse flavors, potentially enhancing food security during emergencies.

1 Introduction

Emergency food has a very important role in crisis situations or natural disasters, where food supplies become limited. Emergency food products (EFP) are food products designed for use in emergency situations and can be consumed directly and meet daily nutritional needs [1]. The aim of EFP is to reduce the death rate of emergency victims by providing food containing complete nutrition to meet daily nutritional needs. Emergency food should be developed from local food ingredients to help maintain a region's food security in addition to more affordable prices and abundant food availability. The ideal emergency food provided should contain sufficient nutrients, not only filling but also containing calories according to the nutritional adequacy rate (RDA), namely 2,100 KCal/day [2, 3]. One interesting innovation in this case is the use of banana blossoms as emergency food. Banana blossom is one of the locally produced and cultivated food ingredients based on the potential, culture and resources of each region. The type, quantity and quality will depend on the specific conditions of the region

[4]. Say that banana blossoms are a food ingredient whose nutritional content is minimally known [5]. This is in line with research by Salvador [6] that banana blossoms are also rarely processed, because people do not know how to process them. Banana blossoms, which are usually considered waste from banana trees, have become the focus of attention as a food product that is rich in nutrients and can help overcome hunger problems. At first glance, this idea may sound unusual, but through a fusion food approach, banana blossoms can be transformed into a delicious and nutritious dish.

In recent years, innovation in emergency food products has become increasingly relevant, especially considering the increasingly severe impacts of climate change, more frequent natural disasters and humanitarian crises. By utilizing locally available resources, such as abundant banana trees, we can create sustainable solutions and help communities deal with emergency situations. By involving creative techniques in food presentation, the concept of fusion food, banana blossoms can be an attractive alternative to maintain the availability of nutritious food in difficult conditions. As an emergency food source based on fusion food product innovation, it can be an attractive solution in overcoming the problem of hunger and food shortages, as well as exploring its potential as a sustainable step in facing future challenges.

Banana blossom is called a superfood in Singh [7] because of its high nutritional content and the therapeutic benefits it provides, such as reducing menstrual bleeding, facilitating lactation, helping to overcome diabetes, anemia and ulcers, reducing anxiety, helping in weight loss and digestive health, as well as improving mood, especially in children who easily experience anxiety and mood swings. The nutritional content in 100 grams of banana blossom is listed in the following table.

Table 1. Banana Blossom Nutritional Content

Nutritional Value	Amount	Unit
Water	90.2	g
Energy	32	kal
Proteins	1.2	g
Fat	0.3	g
Carbs	7.1	g
Fiber	3.2	g
Calcium	30	mg
Phosphor	50	mg
Iron	10	mg
Potassium	524	mg

Source: Indonesian Ministry of Health data, TKPI

The number of banana blossoms in existence is certainly connected to the amount of banana production. Bananas are one of the plants with the highest abundance in Indonesia [8]. The Central Statistics Agency stated that West Java was ranked second in the last three years in banana production. Furthermore, Subang Regency is an area that is considered high in banana production. The following graph shows the amount of banana production in Subang Regency in 2019-2020.

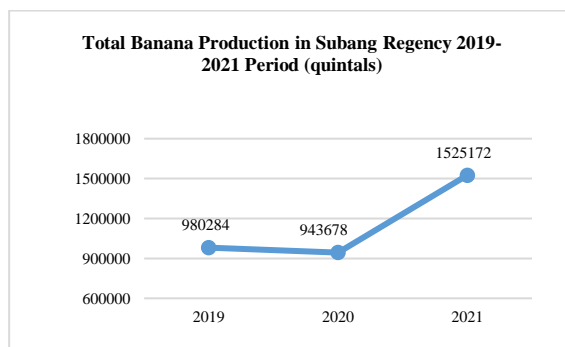


Fig. 1. Total Banana Production in Subang Regency for the 2019-2021 Period

Source: Subang Regency Central Statistics Agency, 2022

Based on Figure 1, there was an increase in banana production in Subang Regency from 2019 to 2021. Referring to information obtained by researchers from vegetable traders from Subang Regency, Aris said that in a week the number of banana blossoms reached 100. If calculated every month it can reach 400 pieces.

Variations in the use of banana blossoms in Indonesia are minimal. Banana blossoms in Indonesia are processed into curry, stir-fries, clear vegetables, chili sauce, pecel, and salad (quoted from Rakyatempatlawang.disway.id, accessed on Sunday 6 August 2023) [9]. The lack of use of banana blossoms, especially as a snack, means that a healthy alternative food is needed so that the existence of banana blossoms increases, including making samosa snacks. Samosa is a triangular-shaped savory dish with a spice filling that is widely consumed by the public [10]. In the 11th century, samosas were described as snacks filled with minced meat, nuts, and dried fruit and then fried until crispy. However, from the 16th century until now, samosas are generally filled with potatoes and green chilies. In this study, researchers will add banana blossoms to the filling because the strong spice flavor of the samosa can balance the taste of the banana blossoms [11]. The presence of banana blossom samosas will become fusion food and add to the variety of dishes in Indonesia. To increase the nutritional content of banana blossom samosas, potatoes will be added as a typical samosa filling, and oyster mushrooms to increase the protein content. This is confirmed by the opinion of Widyastuti and Tjokrokusumo [12] that the protein content of mushrooms is of the best quality among other animal and vegetable sources because it contains all the essential amino acids.

The banana blossom samosas produced in this research were a pilot project in the form of frozen food. The nutritional value has a total energy per serving of 117 calories. According to Santoso [13] say that the process of freezing food makes serving the food easier. Furthermore, in the research of Sasongko [14] the freezing process can extend its shelf life. The shelf life of frozen banana blossom samosas is more than three months with the best consumption being under three months. The aim of this research is to determine the recipe formulation for banana blossom samosas and to determine the shelf life of banana blossom samosa products.

2 Research methods

The research method that will be used in this research is an experimental method with a quantitative approach. Quantitative research is the process of finding data in the form of numbers as a tool for finding goals within the scope of knowledge. In the process, quantitative research will prove a hypothesis or conjecture for research results. The method used is an

experimental method. The experimental method is a research method to find out what will happen in the field [15].

The kitchen project will be carried out as an experiment in making three banana blossom samosa recipe formulations. Then, carry out a hedonic test on semi-trained panelists to test three recipe formulations and find the most preferred standard recipe. Next, the product was tested for the shelf life of the banana blossom samosa product.

The research object was chosen as the main objective being researched. The object of research is something about what or who will be researched [16]. Meanwhile, the subject is the source of data that will be obtained in a study [17]. So, the object of this research is banana blossom samosas and the subjects are semi-trained panelists.

3 Research Result

The results of the research on the experimental design tested three formulations in an organoleptic test on 30 semi-trained panelists to see the level of preference (hedonic) for one of the recipe formulations. The hedonic test is a test in organoleptic sensory analysis which is used to determine the magnitude of the difference in quality between several similar products by providing an assessment or score on certain properties of a product and to determine the level of liking of a product [20]. Testing the suitability of banana blossom samosas is carried out through several stages. Banana flower samosas were tested on semi-trained panelists and consumer panelists. Organoleptic tests were carried out on 30 semi-trained panelists consisting of chefs, academics, culinary entrepreneurs and students who had undergone on-the-job training in kitchens, both bakery or pastry and cuisine or catering. There are three recipe formulations that are tested through organoleptic tests to determine and determine one recipe. The difference in the three recipe formulations is the ratio of ingredients in the samosa filling. Testing the suitability of banana blossom samosas is carried out through several stages. Banana flower samosas were tested on semi-trained panelists and consumer panelists. Organoleptic tests were carried out on 30 semi-trained panelists consisting of chefs, academics, culinary entrepreneurs and students who had undergone on-the-job training in kitchens, both bakery or pastry and cuisine or catering. There are three recipe formulations that are tested through organoleptic tests to determine and determine one recipe. The difference in the three recipe formulations is the ratio of ingredients in the samosa filling.

The main ingredients in banana blossom samosa filling are banana blossoms, potatoes and oyster mushrooms. Then, one recipe selected from the organoleptic test will be tested for the shelf life of banana blossom samosas.

3.1 Banana Blossom Samosa Recipe Formulation

a. SJP1 (Banana Blossom Samosa 1)

The recipe formulation with code SJP 1 has a filling ratio of 1:1 for banana blossoms with potatoes and oyster mushrooms.



Fig. 2. Banana

Blossom Samosa 1

Source: Research results, 2023

b. SJP2 (Banana Blossom Samosa 2)

The recipe formulation with code SJP 2 has a filling ratio of 2:1 for banana blossoms with potatoes and oyster mushrooms.



Fig. 3. Banana

Blossom Samosa 2

Source: Research results, 2023

c. SJP3 (Banana Blossom Samosa 3)

The recipe formulation with code SJP 3 has a filling ratio of 3:1 to banana blossoms with potatoes and oyster mushrooms.



Fig. 4. Banana

Blossom Samosa 3

Source: Research results, 2023

3.2 Organoleptic (Hedonic) Test Results

The organoleptic test via hedonic/liking test was tested on 30 semi-trained panelists with three different samples with details of semi-trained panelists, namely, five academics, five chefs, five culinary entrepreneurs, and students with pastry/bakery educational backgrounds. cuisine as many as 15 people. In this test, product assessment results were obtained based on objective responses from semi-trained panelists.

Organoleptic tests are carried out by sensory analysis of the taste, shape, texture, appearance, and aroma of the product for each formulation sample. The type of non-parametric statistical test used is the Kruskal-Wallis test. The purpose of the Kruskal-Wallis test is to see significant differences between three or more unrelated samples. The Kruskal Wallis test can be used if it meets the requirements, namely that the research data as a whole is not normally distributed.

The results of the Kruskal Wallis test based on organoleptic test data on the taste, shape, texture, appearance, and aroma characteristics of each banana blossom samosa formulation showed that there were no significant differences. Next, the selected banana blossom samosa formulation was obtained from the highest average results of the characteristics of taste, shape, texture, appearance, and aroma. The average results of the SJP1, SJP2, and SJP3 formulations are:

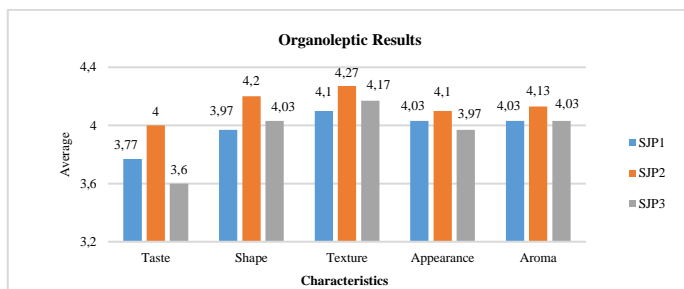


Fig. 5. Organoleptic Results

Source: Data processed by researchers, 2023

The graph above is the result of an organoleptic test using descriptive statistics based on the average or mean value of the three formulation samples. The taste characteristics of SJP2 received an average value of 4.00, the shape characteristics received an average value of 4.20, the texture characteristics received an average value of 4.27, the appearance characteristics received an average value of 4.10, and the aroma characteristics received an average value of 4.13. SJP2 has a total score of 4.14 which is included in the liking scale. So, overall SJP2 is most preferred by semi-trained panelists. Next, the SJP2 formulation goes through a consumer acceptability test stage to determine the product's acceptance in society.

It can be concluded that the banana blossom samosa product selected from the hedonic test is SJP2 which has the highest total value, namely 4.14. The nutritional content of SJP has a total energy of 117 calories. If you want to meet the emergency food calorie intake, you need to add other ingredients such as beef or chicken. Beef is the best choice for consumption because it contains all the essential amino acids, vitamins, fats and cholesterol needed [18]. Chicken meat has a good nutritional composition, including 74.86% water content, 23.20% protein, 1.65% fat, 0.98% minerals, and 114 kcal calories [19].

3.3 Shelf Life of Banana Blossom Samosas

Shelf life is the time period for storing a product in the best condition of the product. The product form of banana flower samosa is frozen food. So, there are conditions that are considered to see the quality of the product. The conditions of the banana flower samosas studied were banana flower samosas during freezing, banana flower samosas which were stored in the refrigerator or refrigerator and at room temperature, and after being fried.

a) Banana flower samosas that have been half-fried and cooled, then packaged and stored in the freezer to become frozen food. The storage temperature in the freezer is -18°C , at this temperature the freezing and preservation process occurs. Banana flower samosas that have been stored for two months in the freezer and fried before being ready for consumption experience no change in product quality. The quality of the product is maintained just like freshly made banana blossom samosas.

b) Next, the condition of the banana flower samosas studied was half-cooked banana flower samosas which were stored in the refrigerator at a temperature below 4°C . The shelf life conditions studied to see the suitability for consumption were banana blossom samosas which were stored on the third and fourth days.

c) Next, frozen banana blossom samosas are stored for nine hours in an open room at a temperature of 25°C – 28°C . After being left for nine hours, the product quality of the banana blossom samosas did not change. So, banana blossom samosas can be consumed after being fried from open storage for less than nine hours.

d) Then, the condition of the banana blossom samosas studied was that the banana blossom samosas had been cooked for three days. The banana blossom samosas on the third day were stale. So, ripe banana blossom samosas can be consumed for a maximum of two days.

It can be concluded that the shelf life of frozen banana blossom samosas is more than three months with the best consumption being under three months, the shelf life of half cooked banana blossom samosas in the refrigerator is less than three days, the shelf life of half cooked banana blossom samosas in the open is less than nine hours, and the shelf life of cooked banana blossom samosas is less than two days.

References

1. E. Syamsir and P.D.L.Sitanggang, Pengembangan Dodol Sebagai Produk Pangan Darurat, *Jurnal Ilmu dan Teknologi Pangan*, **vol. 9**, no 1: 65 – 76 (2011).
2. IOM (Institute Of Medicine), Dietary Reference Intake For Energy, Carbohydrate, Fiber, Fatty, And Water. A Report Of The Panel On Macronutrients Subcommites On Upper Reference Levels Of Nutrients And Interpretation And Uses Of Dietary reference Intakes And Standing Committee On The Scientific Evaluation Of Dietary Reference Intakes, (National Academic Press. Washington, DC, (1995).
3. F. Mona, G. Mulus, Dewi, Maryanti, Judiono, *Jurnal Riset Kesehatan Poltekkes Depkes Bandung*, **vol. 1**, no 1, (2022).
4. P. Utami and S. Budiningsih, Potensi dan Ketersediaan Bahan Pangan Lokal Sumber Karbohidrat Non Beras di Kabupaten Banyumas, *Jur Nal Dinamika Ekonomi & Bisnis*, 150–158, (2015).
5. A. Astija and D. Djaswintari, Analisis Kandungan Lemak pada Abon yang Dibuak dari Jantung Pisang (*Musa Paradisiaca*) dan Ikan Sidat (*Anguilla marmorata*), *Journal of Nutrition College*, **vol. 9**, no 4, 241–246, (2020), doi: doi.org/10.14710/jnc.v9i4.27789
6. I. Salvador, Consumer acceptability of banana blossom sisig, *ICAM, Jember, Indonesia*, 321–335, (2012).

7. S. Singh, Banana Blossom-an Understated Food with High Functional Benefits, *International Journal of Current Research*, **vol. 9**, no 1, 44516–44519, (2017).
8. T. Aileen and G. Currie, Plant-Based New Food Product Development: From Conception to Implementation of “Banana Blossom Jerky.” *Jurnal Hospitality Dan Manajemen Jasa*, 1–15, (2019).
9. Andika, Berbagai Rekomendasi Olahan dari Jantung Pisang. *Rakyat Tempat Lawang*. (2023), <https://rakyatempatlawang.disway.id/read/645162/berbagai-rekomendasi-olahan-dari-jantung-pisang/15>
10. A. Shalini, Preservation of Ready-To-Prepare (RTP) Samosa Sheets, *Pakistan Journal of Food Sciences*, **vol. 22**, no 4, 197–205, (2012).
11. J. Rowlatt, The Story of India as Told by a Humble Street Snack, BBC, (2016). <https://www.bbc.com/news/magazine-36548445>
12. N. Widyastuti and D. Tjokrokusumo, Manfaat Jamur Konsumsi (Edible Mushroom) Dilihat Dari Kandungan Nutrisi Serta Perannya Dalam Kesehatan, *Jurnal Teknologi Pangan Dan Kesehatan (The Journal of Food Technology and Health)*, **vol. 3**, no 2, 92–100, (2022). doi: 10.36441/jtepakes.v3i2.562
13. I. Santoso, S. Mustaniroh, D. Pranowo, Keakraban Produk dan Minat Beli Frozen Food: Peran Pengetahuan Produk, Kemasan, dan Lingkungan Sosial, *Jurnal Ilmu Keluarga Dan Konsumen*, **vol. 11**, no 2, 133–144, (2018). doi: [10.24156/jikk.2018.11.2.133](https://doi.org/10.24156/jikk.2018.11.2.133)
14. P. Sasongko, S. Yuniningsih, E. M. Yasak, Aplikasi Frozen Food Technology Untuk Menurunkan Tingkat Kerugian Produk, *JAPI (Jurnal Akses Pengabdian Indonesia)*, **vol. 1**, no 1, 8–17, (2017).
15. D. Darmawan, *Metode Penelitian Kuantitatif*, Rosdakarya, (2013).
16. H. Umar, *Metode Penelitian Untuk Skripsi dan Tesis*, Rajawali, (2013).
17. R. Abubakar, Pengantar Metodologi Penelitian, In SUKA-Press, UIN Sunan Kalijaga. (2021). [https://idr.uin-antasari.ac.id/10670/1/PENGANTAR METODOLOGI PENELITIAN.pdf](https://idr.uin-antasari.ac.id/10670/1/PENGANTAR_METODOLOGI_PENELITIAN.pdf)
18. S. Maiyena, R. E. Mawarnis, Kajian Analisis Konsumsi Daging Sapi dan Daging Babi Ditinjau dari Kesehatan, *Jurnal Pendidikan Tambusai*, **vol. 6**, no 1, 3131-3136, (2022). ISSN: 2614-3097
19. D. Rosyidi, A. Susilo, R. Muhibianto, Pengaruh Penambahan Limbah Udang Terfermentasi *Aspergillus niger* Pada Pakan Terhadap Kualitas Fisik Daging Ayam Broiler, *Jurnal Ilmu Dan Teknologi Hasil Ternak*, **Vol. 4**, no 1: 1-10, (2009).
20. N. Qamariah, Uji Hedonik Dan Daya Simpan Sediaan Salep Ekstrak Etanol Umbi Hati Tanah, *Jurnal Surya Medika*, **vol. 7**, no 2, 124-131, (2022). e-ISSN: 2655-2051.