Formulation of Emergency Food Bars Made from Cassava Flour and Red Bean Flour

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ABSTRACT

The aim of the study was to find the best formulation of emergency food bars based on cassava and red bean flour. This study was an experimental study with a completely randomized design with 2 replications. According to the organoleptic test of 43 panelists, F3 (42:58) was the best formulation in terms of color, taste, and aroma preferences. The nutrient content analysis showed that the energy of the food bars was about 232.46 kcal per 50 g, which is close to the minimum standard for emergency food. The nutrient content of the emergency food bars per 100 g were carbohydrate 62.84 g, protein 9.81 g, total fat 19.37 g, energy from fat 174.33 kcal, total energy 464.93 kcal, water content 5.46 g, and ash content 2.52 g.

Keywords: cassava flour, emergency food, food bars, red bean flour

INTRODUCTION

The problem that arises due to the disaster is the lack of available food supply (buffer stock) that is acceptable according to the consumption habits of the victims (Sumarto & Tajrifani 2020). Emergency food is an alternative food that can be given to disaster refugees, so it should be easy to consume and high in calories. The development of emergency food based on local commodities has been widely studied. Several local commodities have the potential to become raw materials for emergency food, such as bananas, sweet potatoes, and cassava, which are sources of carbohydrates, and soybeans, red beans, and mung beans, which are sources of protein (Ekafitri & Faradilla 2011). In this study, an emergency food bar was developed using raw materials from cassava flour and red bean flour and egg as a binding agent. The aim of the study was to find the most nutritionally adequate, organoleptically acceptable, and quality compliant formulation.

METHODS

This study is an experimental study with a completely randomized design with 2 replications. The raw materials used to prepare the emergency food bars were locally sourced from West Java Province, Indonesia. The materials used were cassava and red bean flour, skim milk powder, margarine, sugar, and water. Variations were made in formulating the ratios between cassava flour and red bean flour, namely F1 (33:67), F2 (37:63), F3 (42:58), F4 (47:53), and F5 (51:49).

The variables measured in this study were organoleptic properties and nutrient content. The organoleptic test used was the hedonic test to determine which product was most preferred among the same products (Ayustaningwarno *et al.* 2021). Meanwhile, proximate analysis was performed to analyze food contents, including carbohydrates, proteins, fats, water, and crude fiber. Proximate analysis can be used as an assessment of the quality of food contents (Wijayanti 2022).

Data analysis

Data were analyzed using Kruskal-Wallis non-parametric test. When the result was significantly different ($p < 0.05$), it was processed using Mann-Whitney test ($\alpha = 5\%$).

RESULTS AND DISCUSSION

Cassava is one of the local foods that is a source of carbohydrates with functional benefits. It does not contain gluten and has a high energy

content. Morerver, in the form of cassava flour, it can also act as a texturizing agent. On the other hand, red beans are a source of protein with soluble components that can lower cholesterol and metabolize carbohydrates, it has low glycemic index, and it is are rich in vitamins (B1, B6), minerals (Ca, Fe, Mn, P) and folic acid (Sumarto *et al.* 2018).

As shown in Table 1, all treatments were favored by the panelists for all parameters (color, aroma, taste, and texture), with the lowest average score of 4.5 and the highest score of 5.7 on a scale of 1–7. The panelists gave ratings above "indifferent" to "moderately disliked" for all parameters and treatments. The color and taste of treatment F3 (42:58) was the most preferred by the panelists compared to the other treatments. Based on panelist preference for aroma, all treatments were almost equally preferred, while the texture that the panelists liked the most was that of F2 (37:63).

The results of the Kruskal-Wallis statistical test on the color aspect obtained a value of p=0.023, which means that there was a significant difference in color among the five formulation treatment groups, while there were no significant differences in the aspects of aroma, taste, and texture. The color aspect was then further analyzed using the Mann-Whitney test. It was found that, Formula 3 was significantly different from F4 and F5, but not from F1 and F3.

The nutritional values of F3 emergency food bars per 100 g were carbohydrate 62.84 g, protein 9.81 g, total fat 19.37 g, energy from fat 174.33 kcal, total energy 464.93 kcal, water content 5.46 g, and ash content 2.52 g. If it is made per 50 g, the total energy content is 232.46 kcal, fat is 9.68 g, protein is 4.90 g, and carbohydrate is 31.42 g. This is in accordance with the requirements for the nutritional content of emergency food, which is 35–45 percent fat (9.1–11.9 g) of total energy, and the minimum-maximum required nutrient density of 233–250 kcal. However, it does not meet the requirements for protein and carbohydrate content, which are 10–15% protein (7.9–8.9 g) and 40–50% carbohydrate (100–125 g) of total energy (Zoumas *et al.* 2002).

Table 1. Average score of the organoleptic evaluation on the basis of the hedonic test

Formula	Organoleptic properties			
	Color	Taste	Aroma	Texture
F1 (33:67)	5.1	5.1	5.1	5.1
F2 (37:63)	5.5	5.2	5.5	5.1
F3 (42:58)	5.7	5.2	5.5	4.8
F4 (47:53)	5.1	5.1	5.4	4.5
F5 (51:49)	5.0	5.5	5.5	5.0
p	0.023*	0.608	0.955	0.393

*Kruskall-Wallis Test, $p<0.05$; Seven-point hedonic scale: 1) Strongly disliked; 2) Moderately disliked; 3) Slightly disliked; 4) Indifferent; 5) Slightly liked; 6) Moderately liked; 7) Strongly liked

CONCLUSION

The emergency food bar with cassava flour and red bean flour (42:58) was the best formula for color preference in the organoleptic test. The nutritional content of the emergency food bars per 100 g was 62.84 g carbohydrate, 9.81 g protein, 19.37 g total fat, 174.33 kcal energy from fat, 464.93 kcal total energy, 5.46 g water, and 2.52 g ash.

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DECLARATION OF CONFLICT OF INTERESTS

All authors declare that they have no conflict of interest in the preparation of the manuscript.

REFERENCES

Ayustaningwarno F, Rustanti N, Afifah DN, Anjani G. 2021. Teori dan Aplikasi Teknologi Pangan. Semarang (ID): Fakultas Kedokteran, Universitas Diponegoro.

Ekafitri R, Faradilla FR. 2011. Pemanfaatan komoditas lokal sebagai bahan baku pangan darurat. Jurnal Pangan 20(2):153–161. https://doi.org/10.33964/jp.v20i2.34

Sumarto, Listianasari Y, Radiati A, Nugraha A. 2018. Panduan Teknis Penyelenggaraan Makanan dalam Kondisi Darurat Bencana dengan Pemanfaatan Sumber Daya Lokal (Studi Kasus di Kabupaten Tasikmalaya). Tasikmalaya (ID): Poltekkes Kemenkes Tasikmalaya dan BPBD Tasikmalaya.

Sumarto, Tajrifani AS. 2020. Pengembangan produk pangan dari bahan baku lokal untuk buffer stock darurat bencana di Kabupaten Tasikmalaya, Jawa Barat. Jurnal Dialog Penanggulangan Bencana 11(2):179–185.

Wijayanti T. 2022. Teknik dan Metode Analisis Biokimia. Malang (ID): MNC Publishing.

Zoumas B, Armstrong L, Backstrand J, Chenoweth W, Chinachoti P, Klein B, Lane HW, Marsh KS, Tolvanen M. 2002. High Energy, Nutrient-Dense Emergency Relief Food Product. Washington (US): National Academy Press.