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# Proximate Analysis of Food Bar Made from Pedada Fruit (*Sonneratia caseolaris*) Enhanced With Gembili Flour and Mung Bean Flour as an Alternative to Emergency Food.

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**Abstract**. Food aid in a state of disaster is still dominated by rice or instant noodles. Emergency food needed in disaster condition must be ready to eat emergency food and fulfill daily nutrients, one of them was food bar. Food Bar is a high calorie food made from a mixture of foodstuffs, enriched with nutrients, then formed into solid and compact form. It has been conducted the research formulation of food bar from gembili flour and mung bean flour. The purpose of this research is to know the influence of the formulation of gembili flour and mung beans flour and determine the best treatment of the chemical and physical properties of food bars produced. This research uses a complete random design with two factors and twice repeated, namely the formulation of the Gembili flour 30 gr, 40 gr, 50 gr and the formulation of mung bean flour 50 gr, 40 gr, 30 gr. Data obtained later in analysis using ANOVA. If there is a real interaction, then proceed with the advanced test of the Duncan multiple range test with confidence level 5%. Best treatment on the formulation of Gembili flour 50 gr and mung bean flour 50 gr which produce food bar with water content 2.39%, ash content 2.62%, protein content 12.69%, fat content 3.93%, carbohydrate content 82.14%.

**Keywords** : Food bar, Pedada fruit, Gembili Flour, Mung bean Flour

## Introduction

Food aid for the current catastrophic state is still dominated by rice or instant noodles. In the case of disaster where there is no access to other food and the victim is entirely dependent on the food aid provided, then the type of emergency food products as available today becomes less appropriate for the given, especially at the time of access To clean water and cookware is difficult to obtain while energy intake from disaster victims is indispensable. Emergency food needed in this condition is food that is ready to eat and can fulfill daily nutritional needs [1].

Types of emergency food products there are various kinds of bars, one of which is a bar that is then called Food Bar. Food Bar is a high calorie food made from a mixture of foodstuffs, enriched with nutrients, then formed into solid and compact form. Food bar can be developed due to the presence of sugar content to provide the necessary calories, durable or durable, and ready to eat because it has a similar shape to biscuits. Food Bar expected to have a calorie content of 2100 kcal which with the details of 35-45% fat, 10-15% protein and 40-50% carbohydrate [2].

Food bar in general is made of various kinds of flour mixture such as soybean flour, green bean flour, and banana. In the research of making food bar is using local raw materials are abundant and has not been utilized one of them is a pedada (Sonneratia caseolaris). Pedada fruit is one type of mangrove that grows abundantly in all coastal areas of Indonesia. Generally this fruit will fall and scattered around the tree because it has not been utilized properly. The Pedada contains about 15.95% carbohydrate, moisture content of 77.10%, fat 0.86%, ash 3.85%, and 2.24% protein [3].

The use of Pedada into flour has not gained attention among the general public, therefore the use of this type of Pedada fruit as food is still very limited and less varied. The Pedada flour has a fairly high fibre

content of 63.7% [4]. Bioactive compounds found in pedada are steroids, triterpenoids, flavonoids, saponins, and Tannins [5,6,7], in addition, pedada also contain vitamin C 56.74 mg/100 g [8]. However, it has no starch and low protein content so that in making food bar need to be added from other ingredients, such as the tubers and nuts in the form of gembili and mung beans. Based on the explanation above, needed to do research on the formulation of gembili flour and mung bean flour in making pedada food bar and analyze its chemical and physical properties.

**Methodology**

Materials used in the making of food bar is a pedada fruit obtained from Wonorejo, Surabaya, gembili tuber and mung beans obtained from local market Surabaya, , glucose syrup, lecithin, baking soda, refined sugar and margarine. Other chemicals used for analysis are sodium metabisulfite, petroleum ether, aquades, concentrated $H_2SO_4$, NaOH, Ka-Na-Tartrate solution, and Nesler solution.

The tools used for the making of food bars in this research are digital scales, mixers, baking, ovens, rolling pins, spoons and knives and the tools used for analysis are a complete set of soxhlet tools with Condenser, Soxhlet flask, water bath, filter paper, oven, kjeldhal flask, measuring flask, spectrophotometer, hot plate, desicator, burette, porcelain cup, weigh bottle, clamp and furnace.

The process of making foodbar includes weighing materials, among others: pedada flour(20 gr), gembili flour (30 gr, 40 gr, 50 gr), mung bean flour (50 gr, 40 gr, 30 gr), margarine 30 grams, refined sugar 30 grams, 20 gram glucose syrup, 0.5 gram baking soda, and lecithin 0.5 Grams. The ingredients was mixered for 5 minutes, and after well blended are flattened with roller then formed. Baking is done with a baking pan that has been spread margarine. Baking is carried out at a temperature of 150°C for 30 minutes. Analysis conducted include moisture content, ash content, fat content, protein content and carbohydrate levels by difference [9].

**Results and Discussion**

**Water Content**

The average value of water content of pedada fruit bar with gembili and mung bean flour formulations can be seen in Figure 1.

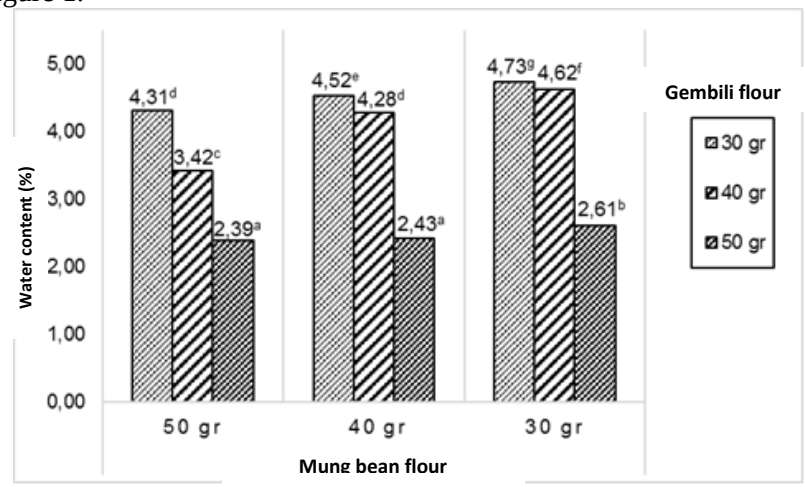


**Figure 1**. Water content of pedada fruit bar with gembili and mung bean flour formulations

Figure 1 shows that the average water content bar is between 2.39%-4.73%. The formulation of Gembili flour 30 gr and mung bean flour 30 gr produces the highest water content value of 4.73%. Whereas in the formulation of Gembili flour 50 gr and mung bean flour 50 gr produce the lowest water content value of 2.39%.

The higher the Gembili flour and mung beans are added the food bar water content is decreasing. This is because the raw materials used in the making of food bars are gembili flour and mung bean flour. The Gembili starch content of starch is quite high and mung bean flour protein content is also high. The nature of water contained in starch is a weak bound water, so along with the addition of gembili flour can decrease the water content of food bar. Weak-bound water is easily eliminated by evaporation or drying [10]. Protein is water binding (hydrophilic), so that water bound to the ingredients is getting less along with more and more of the addition of mung bean flour in the food bar. According to [11], proteins have polar clusters such as carbonyl, hydroxyl, amino, carboxyl which are able to absorb water so as to increase hydration value in the ingredients.

**Ash content**

Statistical analysis results showed that there was no real interaction ($p > 0.05$) between the formulation of gembili flour and mung bean flour against the ash content of food bars, but the formulation of gembili flour and mung bean flour each gave effect Real. Average value of food bar ash content with the formulation of gembili flour and mung bean flour can be seen in table 1 and table 2.

**Table 1.** Average value of food bar ash content on the Gembili flour formulation

| Gembili Flour (g) | Ash content (%) | DMRT 5% |
|---|---|---|
| **30** | 2,44±0,03$^{a}$ | - |
| **40** | 2,48±0,05$^{ab}$ | 0,01 |
| **50** | 2,56±0,02$^{b}$ | 0,11 |

Average values followed by different letters mean significant ($p \leq 0,05$)

Table 1 indicates there is a noticeable difference between the gembili flour formulation of ash content, it can be known that the higher the formulation of gembili flour then the rate of ash food bar is increasing. This is due to ash content in gembili flour of 0.98% so it can increase the level of ash food bar. The mineral content in the Gembili according to [12], said that Gembili contains calcium of 56 mg/100 gr and phosphorus amounted to 0.6 mg/100 gr.

**Table 2**. Average value of food bar ash content on the mung bean flour formulation

| Mung bean flour (g) | Ash content (%) | DMRT 5% |
|---|---|---|
| **50** | 2,58±0,01$^{b}$ | 0,11 |
| **40** | 2,51±0,03$^{ab}$ | 0,10 |
| **30** | 2,38±0,05$^{a}$ | - |

Average values followed by different letters mean significant ($p \leq 0,05$)

Based on table 2 there is a noticeable difference between the mung bean flour formulation to ash content, it can be known that the higher the mung bean flour formulation Then the rate of ash food bar is increasing. This is due to the ash content of mung beans by 3.51% so as to increase the rate of ash food bar. Mineral content contained in mung beans according to [13], stating that mung beans contain minerals sodium (Na), potassium (K), calcium (Ca), phosphorus (P), Magnesium (Mg), iron (Fe), and manganese (Mn).

**Protein Content**

Food bar protein levels range from 8.29% - 12.69%. The formulation of Gembili flour 50 gr and mung bean flour 50 g produces the highest protein levels of 12.69%, while in the formulation of Gembili flour 30 gr and 30 gr mung bean flour produces the lowest protein rate of 8.29%. Average value of food bar protein levels with the formulation of gembili flour and mung bean flour can be seen in Figure 2.

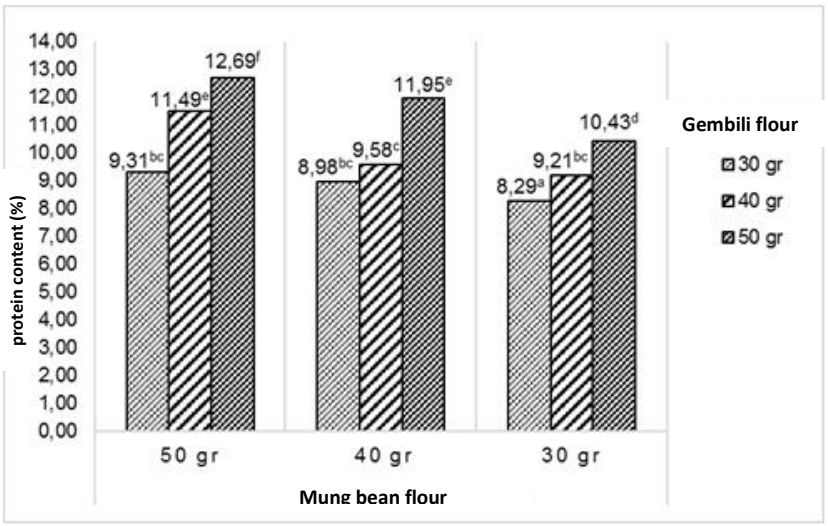


**Figure 2**. Protein content of pedada fruit bar with gembili and mung bean flour formulations

Figure 2 shows that the higher the formulation of gembili flour and mung bean flour can increase the protein levels of food bar. This is because the protein content contained in the food bar is influenced by the increasing number of gembili flour and mung bean flour, where the protein content in the gembili flour of 5.1% and mung bean flour amounted to 20.94%. According to [14], the protein content of gembili flour amounted to 6.11%, while in mung bean flour has a protein content of 23.25%. The addition of mung bean flour aims to add protein in the food bar that can not be fulfilled by gembili flour. It is supported also by research conducted [15], expressed legume flour is a source of raw materials supplying protein needs in food bar products.

**Fat Content**

Food bar fat content range between 2.52 – 3.93%. The formulation of Gembili flour 50 gr and mung bean flour 50 gr showed the highest fat content of 3.93%, while in the formulation of Gembili flour 30 gr and mung bean flour 30 gr showed the lowest fat content of 2.52%. The average value of the fat content of the food bar on the gembili and mung bean flour formulations can be seen in Figure 3.

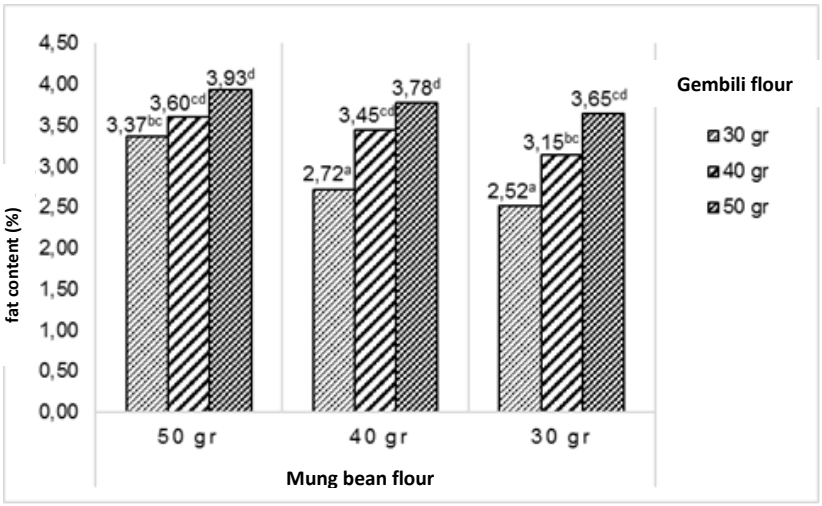


**Figure 3**. Fat content of pedada fruit bar with gembili and mung bean flour formulations

Figure 3 shows that the higher the formulation of gembili flour and mung beans hence the higher fat content. Increased fat content in the food bar caused from the raw materials used, the more gembili flour and mung beans that added fat content will be increased. Mung bean flour has a high fat content in comparison with gembili flour is 1.28%, while gembili flour has a fat content of 0.30%. Gembili flour has a fat content of 0.89% [14]. According to [15], mung bean flour has a fat content of 2.61%.

**Carbohydrate content (*by difference*)**

Statistical analysis results showed that there was no real interaction ($p > 0.05$) between the formulation of gembili flour and mung bean flour against the carbohydrate content of food bar, but the formulation of gembili flour and mung bean flour respectively gave Real influence. The average value of carbohydrate food bar in the Gembili flour formulation and mung bean flour can be seen in table 3 and table 4.

**Table 3**. Average value of food bar carbohydrate content on the gembili flour formulation

| Gembili flour (g) | Carbohydrate content(%) | DMRT 5% |
|---|---|---|
| **30** | 79,50±0,37$^{a}$ | - |
| **40** | 79,93±0,17$^{a}$ | 0,76 |
| **50** | 81,44±0,37$^{b}$ | 0,79 |

Average values followed by different letters mean significant ($p \leq 0,05$)

Table 3 shows the real difference between the gembili flour formulation of carbohydrate content, it can be known that the higher the addition of gembili flour then the food bar carbohydrate levels are increasing. This is due to carbohydrates in gembili flour by 88.99%, so the higher the addition of gembili flour then the resulting carbohydrate level is also higher. Gembili flour is more important role in increasing carbohydrate levels of food bar. Addition of Gembili flour aims to add carbohydrates in the food bar. It is also supported by [16] stating that tubers are a source of carbohydrate that is important as a source of energy.

**Table 4**. Average value of food bar carbohydrate content on the mung bean flour formulation

| Mung bean flour (g) | Carbohydrate content (%) | DMRT 5% |
|---|---|---|
| **50** | 81,22±0,26$^{c}$ | 0,79 |
| **40** | 80,26±0,26$^{b}$ | 0,76 |
| **30** | 79,38±0,38$^{a}$ | - |

Average values followed by different letters mean significant ($p \leq 0,05$)

Table 4 shows a noticeable difference between the mung bean flour formulation against carbohydrate levels, it can be noted that the higher the mung bean flour formulation then the food bar carbohydrate levels are increasing. This is due to carbohydrates in mung bean flour of 65.08%, so the higher the formulation of mung bean flour then the resulting carbohydrate levels are also increasingly higher. According to [15], carbohydrate content in mung bean flour amounted to 62.11%.

## Conclusion

The addition of gembili flour and mung bean flour gives a real influence on moisture content, ash content, protein levels, fat levels and carbohydrate levels of pedada fruit food bar. Food Bar with a formulation of gembili flour 50 gr and mung bean flour 50 gr is the best treatment with water content value of 2.39%, ash content of 2.62%, protein content of 12.69%, fat content of 3.93% and carbohydrate content of 82.14%.

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