Fortification of Health Food Supplement as Functional Food in Sago Analogue

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Abstract. Health food supplement is a health support food that can help meet important nutrients for the body’s needs to function properly. Therefore, supplements are not full substitutes for medicines and food, meaning that health food supplements are intended to supplement or increase food intakes. This research is designed to create an economic multiplier effect through the development of sago analog rice as Riau’s flagship product. The purpose of this study is to process fortified sago analog rice fortified with health food supplements made from functional food ingredients (gabus fish concentrate, catfish oil and chlorella sp. concentrate). The research method used is an experimental method with experiments on processing sago analog rice fortified with health food supplements made from functional components of food (amino acid albuminl, crude fiber and omega-9 fatty acids). The treatments given are formulations of analog rice with four levels, namely: sago analog rice (F1), corn analog rice (F2), red rice analog rice (F3), and analog combination sago rice, red rice and corn (F4). The results show that, based on organoleptic preference tests, F4 analog rice was most preferred by panelists, namely analog rice combined with different sources of starch (sago, red rice and corn).

1. Introduction
Health food supplement is a health support food that can help meet important nutrients for the body’s needs to function properly. Therefore, supplements are not full substitutes for medicines and food, meaning that health food supplements are intended to supplement or increase food intake.

Found a formula of health food supplements rich in chlorella-based ingredients, cork fish protein concentrate and catfish oil which are functional food components rich in nutrients, especially amino acid albumin, omega-9 and fiber. Therefore, this follow-up research is designed to create an economic multiplier effect through the development of the manufacture of sago analogue rice fortified with health food supplements to be used as a superior product [1].

Currently, Sago analog rice is rich in carbohydrates and poor in other nutrients (protein and crude fiber) needed by the human body, so these products need to be fortified with other health food supplements that contain functional components of food. Potential functional food components of fish are omega-3, omega-6 and omega 9 fatty acids; while chlorella microalgae are rich in crude fiber.
From the aforementioned background, it is necessary to conduct further research to utilize health food supplement formulations from previous studies to be fortified in sago analog rice. Thus, the results of this fortification are expected to produce high nutritional food products as a substitute for rice, especially for diabetic patients, so as to improve the health of the people who consume it. Besides, it is also expected that the best products produced can be accepted by consumers and used as Riau’s superior products.

2. Methodology

2.1. Materials and Methods

The main raw materials used in this study are health food supplements from previous studies and sago starch. This research was carried out using an experimental method to make sago analogue rice fortified with a health food supplement containing functional components of food namely omega 9 fatty acids, amino acid albumin and crude fiber. The test parameters can be seen in Table 1.

| Research stages                          | Activity                                                                 | Targets to be achieved                                                                 |
|------------------------------------------|--------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| Sago analog rice production made from    | Determination of sago analog rice formulations fortified with health food| Obtained health products are identified; 1. Organoleptic (taste, texture, aromatic, and color), 2. Proximate sago analog rice products fortified with health food supplements. |
| health food supplement (chlorella, catfish oil and gabus Fish Concentrate). | health food supplements                                                   |                                                                                         |
|                                          | Determination of the characteristics of chemical and organoleptic of analog rice products with the best treatment |                                                                                         |

| Table 2. Composition of analog rice formulations fortified with health food supplements |
|-----------------------------------|-----------------------------------|---|---|---|---|
| Material                          | Formulation (%)                  | F1 | F2 | F3 | F4 |
| Sago flour                        | -                                | -  | -  | 100 | -  | -  | 60 |
| Red rice flour                    | -                                | -  | 100| -  | 20 |
| Corn flour                        | -                                | 100| -  | -  | 20 |
| Gabus fish concentrate            | 10                               | 101| 10 | -  | -  | 10 |
| Oil catfish                       | 3                                | 3  | 3  | 3  | 3  |
| Chlorella flour                   | 2                                | 2  | 2  | 2  | 2  |

2.2. Measurement Parameter of Quality Product

The product quality parameters analyzed include organoleptic testing and proximate composition. To find out the level of panelists’ acceptance of analog rice, a preference test is carried out on analog rice products using a scale of 2 (= dislike), 3 (= neutral/like), 4 (= prefer) and 5 (= really like).

This organoleptic test involves 25 semi-trained panelists. The parameters assessed in this test include preference for taste, flavour, color, and texture of analog rice. The parameters assessed for analog rice products with four formulation are analyzed for its chemical composition, namely: proximate [2].

2.3. Observation Analysis

The data obtained will be processed if the data are tabulated and graphed. Afterwards, the processed data will be analyzed descriptively and statistically simple.
### Results and Discussion

#### 3.1. Main Raw Material

The main raw materials used to make analog rice are sago flour, brown rice and corn. The raw materials in this study were used for 4 (four) formulations, namely Formulation 1 (F1) using raw material for sago flour (100%), F2 using red flour powder (100%), F3 using corn flour (100%), and F4 using the combination of sago flour, red rice and corn by comparison of 60%: 20%: 20%. The raw material of flour used was analyzed proximate composition to determine the chemical composition of the raw materials used. The results of the analysis of the chemical composition are presented in Table 3.

| Pximate Composition | Sago flour | Red rice flour | Corn Flour | Gabus fish concentrate |
|---------------------|------------|----------------|------------|------------------------|
| Water content       | 10.52      | 4.75           | 11.62      | 9.78                   |
| Protein             | 0.07       | 9.50           | 7.82       | 68.24                  |
| Fat                 | 0.68       | 2.64           | 0.18       | 6.56                   |
| Ash                 | 0.30       | 0.41           | 0.58       | 3.26                   |
| Carbohydrate        | 87.87      | 82.05          | 75.12      | 10.74                  |
| Fibre               | 0.56       | 0.65           | 4.68       | 1.42                   |

Table 3 shows that the water content of sago flour, brown rice, corn and cork fish meets SNI standards (maximum 13% for sago flour, red rice, corn and 10% for fish meal).

#### 3.2. Organoleptic Value

Organoleptic assessment is a way to determine the level of acceptance or preference of panelists (consumers) of analog rice products. In this study, the assessment of analog rice and analog rice after cooking was analyzed. The assessment results show that panelists can accept and everyone likes all rice and analog rice formulations, but the F4 formulation is preferred by consumers.

Consumer acceptance was greatly influenced by the physical appearance of rice and analog rice such as appearance, color, texture and taste; meaning that the main raw material and the processing process greatly determine the physical properties of rice and analog rice, resulting in different levels of acceptance. The results of panelist (consumer) organoleptic assessment can be seen in Table 4.

| Formula Analog Rice | Taste | Aroma | Color | texture |
|---------------------|-------|-------|-------|---------|
| F1                  | 3.58  | 3.60  | 5.0   | 3.56    |
| F2                  | 3.54  | 3.57  | 5.21  | 3.53    |
| F3                  | 3.57  | 3.87  | 5.28  | 3.81    |
| F4                  | 4.40  | 3.67  | 5.60  | 3.66    |

Table 4 shows that the level of consumer acceptance of the color of analog rice was around 5.0 - 5.60 (rather like to like). This was because the color of analog rice from various raw materials had a distinctive color of each raw material color, namely white, red, yellow and beige. Therefore, panelist acceptance of color parameters varied for each analog rice formulation, depending on the color produced. This is consistent with the statement [3] stating that the level of panelist acceptance of analog rice color varies. In this study, the color of analog rice favored by panelists was F4 analog rice with a value of 5.6 (likes); others like it a little. The same thing also happened to the taste of rice from each analog rice, meaning that in general the panelists’ judgment was like and preferred to analog rice on all formulations.
3.3. Proximate Composition Analog Rice

The results of the analysis of analog rice proximate composition with various formulations can be seen in Table 5.

Table 5 shows that the water content of F1 (sago flour), F2 (brown rice) and F3 (corn flour) and F4 (combination of sago, red rice and corn) ranged from 10.22 to 12.82 below the SNI standard, namely a maximum of 13%; while the analog rice protein content of different combinations of starch (F4) had the highest value compared to the others.

| Prximate Composition | Formulation F1 | Formulation F2 | Formulation F3 | Formulation F4 |
|-----------------------|----------------|----------------|----------------|----------------|
| Water content         | 12.82          | 12.38          | 10.22          | 10.24          |
| Fat                   | 0.20           | 0.39           | 0.02           | 0.35           |
| Protein               | 8.52           | 12.71          | 12.25          | 12.75          |
| Ash                   | 0.99           | 1.03           | 0.02           | 1.17           |
| Fibre                 | 5.32           | 3.79           | 4.13           | 4.08           |
| Carbohydrate          | 72.15          | 69.70          | 73.36          | 71.41          |

4. Conclusion

Based on the results of this study, it can be concluded that all basic rice formulations analogous to different sources of starch (sago, red rice and corn) could be favored or accepted by panelists (consumers). However, sago analog rice was made from 60% sago, 20% corn flour and 2% red rice flour or formula F4 fortified with health food supplements as the best formula organoleptically and proximate composition. Therefore, it is suggested that further research is needed to determine the storability of analogue sago rice with the formula F4 above.

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