Organoleptic characteristics and nutritive value estimation of baked food products from Manonjaya variety salacca flour

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Abstract. Manonjaya salacca (snake fruit) is one of the original varieties of Indonesia which is currently declining due to the quality of taste less favoured than the snake fruit on the market. This variety in the future is feared to be lost, so it is necessary to revitalize the utilization of this snake fruit by diversifying processed products, one of them is baked food products from Manonjaya salacca flour. The purpose of this research was to know the acceptance level of baked food products from Manonjaya salacca flour organoleptically and the nutritional value estimation. This research method was observational with a descriptive explanation. Panellists in this study were consumers with a total of 61 people. Organoleptically, respondents tend to value cake, muffin, cookies, and flakes in every color, flavor, taste, and texture parameters. Nutritional value per 100 g of baked food products from Salacca flour (cake, muffin, cookies, flakes) were energy 287.5-479.0 kcal, water 0.8-3.8 g, protein 6.0-6.7 g, fat 0.8-31.0 g, carbohydrates 45.0-98.8 g, and fiber 1.1-4.6 g. Panellists were accepted the organoleptic characteristics and the estimated nutritional values on baked food products from Manonjaya variety salacca flour were varied.

Keywords: Manonjaya, salacca, baked, organoleptic, nutritive

1. Introduction
Manonjaya has long been known as a producer of snake fruit that grows naturally both in the garden and in the yard of the population. But at this time, the pamor is decreasing. Even according to data from the Tasikmalaya District Department of Agriculture Food Crops in 2016 decline in a production rate of Manonjaya salacca up to 64% in 2013-2015 [1]. Based on interviews with some residents of Manonjaya obtained information that at this time many farmers who change the allotment of land for planting salacca replaced to plant trees due to the price of it is declining to lose compete with another one, such as Pondoh salacca. Manonjaya salacca is only valued at IDR 300,-/ kg at the farm level far below the price of Pondok and Bali salacca, so it is not able to encourage farmers to plant it. This is very worrying about the loss of these varieties in the future. Even the latest research efforts by looking at the diversity of genes of several varieties of fruits in Indonesia as one of the basic food diversification has not included Manonjaya salacca in it [2]. Whereas Manonjaya salacca has...
larger pulp quality and distinctive taste. Therefore, it is necessary to revitalize Manonjaya salacca to keep it sustainable and even increase its prestige.

One of the weaknesses owned by Manonjaya salacca is that it is not as sweet as the salacca which is commonly circulating in the market today such as Pondoh salacca. For that reason, one effort that needs to be done to increase public consumption of Manonjaya salacca is innovation into processed products. Research on farming analysis and a prospect of Manonjaya salacca development has been done [3]. Based on the result of the research [3] give a suggestion for the development of quality of Manonjaya salacca for example by processing into the processed product and the existence of processing plant around the development area. However, based on a preliminary survey conducted by current researchers, processed products from Manonjaya salacca were still very limited. Manonjaya salacca only processed into sweets, dodol, and chips. Currently, the product was only made by 1 group of craftsmen and experienced equipment constraints.

Some efforts in diversity products with raw materials Manonjaya salacca need to be done to increase the level of public acceptance of the product. Food products are developed based on the type of food that is currently widely consumed by the community and considered the benefits of nutrients contained in it.

Generally, salacca has nutritional content and health benefits. Nutrient Adequacy Score (NAS) analyses on all fruits consumed by Indonesians based on Susenas 2008 data and Food Composition List has been studied, the result shows that fruit was the fruit with the highest NAS among other fruits for the content Fe (30.8%) and Vitamin A (31.2%) [4]. Salacca contains several nutrients such as per 100 grams of salacca has the composition of energy, protein, and carbohydrates consecutive 77 calories, 0.4 grams, 20.9 grams. Mineral content of calcium, phosphorus, and iron respectively 28 mg, 18 mg, and 4.2 mg per 100 grams [5]. In addition to the content of these nutrients, the consumption of salacca fruit also proved beneficial for health, salacca has high antioxidant activity compared with other tropical fruit species [6]. This is reinforced by the results of research in Malaysia which shows that the fruits have a high phytochemical and antioxidant properties and potentially have properties that are beneficial to health [7]. A healthy diet using salacca prevents the increase in total liver cholesterol, inhibits elevated plasma lipids, inhibits decreased antioxidant status in mice fed a diet containing cholesterol [8].

The Salacca flour has been prepared and analyzed its nutritional content [9]. For further development, the researcher was interested to make some processed snack products from flour, such as cake, muffins, flakes, and cookies. The products were then tested organoleptically and calculated the estimated nutritional value.

2. Materials and Methods

2.1. Materials
Manonjaya salacca used in this study was a variety that has been certified by Center for Plant Variety Protection, Ministry of Agriculture RI No. 62 / PVL / 2008 [10]. Before making the baked food product, Manonjaya salak first made into flour. The stages and yields of the flour were obtained from previous studies [9]. The main basic ingredients used for all products were Manonjaya salacca, added with other ingredients such as wheat flour (substance to be substituted), tapioca, chicken egg, salt, water, butter, and skim milk. The equipment used in the manufacture of such products was with household appliances, such as stoves, pots, pans, and other kitchen utensils.

2.2. Methods
This research has obtained the ethical approval of Health Research Ethics Commission of Balitbangkes RI No. LB.02.01 / 5.2 / KE.301 / 2016. This research was an observational research with a descriptive explanation. Type of processed food was based on baking process technology to minimize the loss of nutrients, especially minerals. Manonjaya salacca first made into flour for
substitution with main ingredients such as wheat flour can be done with an equivalent amount [9]. Processed products made from Manonjaya salacca flour were cakes, muffins, cookies, and flakes.

The processed products of Manonjaya salacca were tested through an organoleptic test with consumer panel consisting of teachers, canteens managers, student’s parents, and community of Manonjaya salacca center with the number of 61 people [11]. The products were evaluated for taste, aroma, texture, and color. The ratings were on a 5-point hedonic scale ranking from 5 (like extremely) to 1 (dislike extremely) [12]. Mineral water at room temperature was provided to rinse the mouth during evaluations.

Moreover, the nutrients of salacca products were measured so that the nutritional composition contained in it. Nutritional substances of Manonjaya salacca processed products calculated were macro nutrients (energy, carbohydrate, fat, protein, and water) and fiber. The nutritional values of Manonjaya salacca products were calculated based on the nutritional value of each raw material according to the List of Food Composition - DKBM [5] and the result of the research of Manonjaya salacca flour which has been done [9].

This research was conducted in Food Technology Laboratory of Nutrition Department of Tasikmalaya Health Polytechnic, Ministry of Health RI and in State Junior High School 1 Manonjaya which is work area of Manonjaya Health Center of Tasikmalaya Regency. The study was conducted in May to August 2016 (4 months). The data were processed using MS Excel software. For data processing of nutrient estimation used Nutrisurvey software. Then the data were analyzed descriptively.

3. Results and Discussion

3.1. Acceptance through organoleptic test of Manonjaya Salacca Product

The processed products that produced from Manonjaya salacca flour can be seen in the following figures. Figure 1. Products made based on baking principle ie cakes, muffins, cookies, and flakes.

Figure 1. (A). Cake Salak Manonjaya (Cak Salman), (B). Muffin Salak Manonjaya (Muf-on), (C). Cookies Salak Manonjaya (Cokiman), (D). Flakes Salak Manonjaya (Flas-on)
The results of an organoleptic test on Manonjaya salacca processed products can be divided into 2 types of data, they were the ordinal and interval scale. If the assumption of data type was ordinal scale, the result can be seen in Figure 2, while the interval data type can be seen in Figure 3.

**Figure 2.** Result of Organoleptic Test on Manonjaya Salacca Processed Products (Ordinal Data)

**Figure 3.** Result of Organoleptic Test on Manonjaya Salacca Processed Products (Interval Data)

Organoleptic testing is a test to assess the quality and safety of a food and drink [11]. Organoleptically, on a scale of 1-5 the panellists/respondents tend to value cake, muffin, cookies, and flakes in every color, flavor, taste, and texture parameter. When viewed on an ordinal scale, most of the panellists/respondents like the Manonjaya salacca processed products whether Cake, Muffin, Cookies, or Flakes in any color, flavor, taste, and texture parameters (Figure 2). Whereas, when
viewed on an interval scale, overall panellists/ respondents favored Manonjaya salacca processed products on any color, aroma, taste, and texture parameters with average values between 3.33-4.51 on a scale of 1-5 (Figure 3). Among the four processed products of Manonjaya salacca, based on each parameter tested organoleptically, muffin products were the most preferable one. Whereas the other products that was low incomes compared to the other three processed products is Flakes in each parameter tested, especially texture. This was because it has not been brewed by milk as the way of presentation in general, so the texture of the product was still considered hard.

Cookies products made with Manonjaya salacca substitution of 50% have been received by consumer panelists. The results of this study were also in line with the research conducted by [13] which resulted in a substitution of spinach flour substitution of up to 60% still acceptable by panelists. Sponge cake from Manonjaya salacca flour can still be received by panelists with 50% substitution. While other studies using mango pulp and mango peel flour were most preferable one in the substitution treatment of 10% [14].

3.2. Estimated nutritional value of processed products of Manonjaya Salacca

The nutritional value of Manonjaya salacca processed products was obtained based on the calculation of the nutritional value of the constituent raw material based on secondary data from the nutritional value of Manonjaya salacca flour [9] and the nutritional value of other ingredients contained in the list of food ingredients composition (DKBM) [5]. Estimation of nutritional value in Manonjaya salacca processed products such as cake, muffin, cookies, and flakes can be seen in Table 1.

| Nutrient          | Cake (per 100 g) | Muffin (per 100 g) | Cookies (per 100 g) | Flakes (per 100 g) |
|-------------------|------------------|--------------------|--------------------|-------------------|
| Energy (Kcal)     | 381.6            | 356.2              | 479.0              | 287.5             |
| Water (g)         | 0.8              | 0.8                | 3.0                | 3.0               |
| Protein (g)       | 6.5              | 6.1                | 6.0                | 6.7               |
| Fat (g)           | 22.4             | 21.0               | 31.0               | 8.0               |
| Carbohydrate (g)  | 48.2             | 45.0               | 66.0               | 98.8              |
| Fiber (g)         | 1.2              | 1.1                | 3.0                | 4.6               |
| Number of Servings Per Recipes | 40.0 | 40.0 | 66.0 | 4.0 |
| Weight Per Portion | 24.5 (1 piece)   | 26.3 (1 big cup)   | 10.0 (1 chip)      | 24.0 (160 chip)   |

Source: The data were based on laboratory test results of Manonjaya Salacca Flour [9] and Nutrisurvey (2007).

Estimated nutritional value of Manonjaya salacca processed products made (cake, muffin, cookies, and flakes) has been calculated based on data from laboratory analysis of Manonjaya salacca flour [9] and data from the 2007 Nutrisurvey Program (Table 1). The nutritional value of Manonjaya salacca products varies for each product. Energy per portion donated from Manonjaya salacca processed products varies from 47.9 to 94.5 kcal. One serving of cake and muffins can almost meet the standard snack of 100 kcal per serving. The fiber content per serving of Manonjaya salacca products varies.
from 0.3 to 1.11 g. Based on the requirement of fiber per day 25 gram, then per portion of Manonjaya salacca processed product can donate 1.2-4.4% from fiber requirement per day.

In Malaysia, we have developed sponge cake product from a raw material of mango porridge and mango skin flour [14]. The research claims that the products produces high fiber. Based on the research, the content of crude fiber in wheat flour, mango porridge flour, and mango leaf powder were 0.63%, 8.07%, and 12.61% (dry basis), respectively. If calculated based on dry weight, Manonjaya salacca flour has a crude fiber content of 6.42%. The content of ash (total minerals) of Manonjaya salacca flour is also greater than that of wheat flour, mango pulp, and mango leaf powder of the research results [14] ie 1.42%, 1.29%, and 2.50% (respectively based on dry weight). If calculated based on dry weight, Manonjaya salacca flour has the ash content of 2.68%, higher than mango porridge meal and mango leather flour of the research results [9,14]. Thus, the processed products produced from Manonjaya salacca flour have higher fiber and ash content estimation than similar products in the market with wheat flour.

The addition of certain nutrient-rich ingredients to baking-based products is potential to be developed as a source of micronutrient and macronutrients, such as the addition of pomegranate powder to cookies made by researchers from Pakistan [15]. Cookies with pomegranate flour supplementation have an effect on the increase of fiber content, total phenol, and inorganic residue on the resulting product. Although in this research the product of cookies developed from Manonjaya salacca raw material has not been analyzed on fiber content, total phenol, and inorganic residues in a laboratory, the possibility will be the same with cookies product with pomegranate flour supplementation.

In addition, research on bioactive components (total phenolic and vitamin C) correlates to antioxidant capacity in other variety of salacca (Pondoh, Nglumut, and Bali) has been done [16]. The results show that the three salacca cultivars have a capacity as the antioxidants and have a correlation with the total phenolic content and vitamin C contained therein. This is also an indication of the potential of Manonjaya salacca as the same species with all three salacca that have the antioxidant capacity and bioactive components, especially the total phenolic and vitamin C.

In addition to the potential for functional food development from Manonjaya salacca because of the content of the compounds as described above, Manonjaya salacca can also be used as a source of prebiotic and probiotics. A characteristic study of probiotic microcapsules of *Lactobacillus plantarum* in Pondoh salacca has been done [17]. The results indicate that the jam of Pondoh salacca potentially becomes a growth medium of microencapsulated probiotics. The results of this study also become a potential in the development of processed products Manonjaya salacca as a medium for growth of probiotics, especially the fiber content of Manonjaya salacca flour is quite high. In brief, Manonjaya salacca flour and its processed products are expected to become prebiotic which is a food for probiotics, beneficial bacteria.

### 4. Conclusion and Recommendation

Organoleptic test results show that cake, muffin, cookies, and flakes products from Manonjaya salacca flour can be received by panelists in every color, flavor, taste, and texture parameters. The estimated nutritional values on baked food products from Manonjaya variety salacca flour (cake, muffins, cookies, flakes) were varied. Nutritional values per 100 g of baked food product from Manonjaya salacca flour were energy 287.5-479.0 kcal, water 0.8-3.8 g, protein 6.0-6.7 g, fat 0.8-31.0 g, carbohydrates 45.0-98.8 g, and fiber 1.1-4.6 g. The recommendation of this research is needed nutrition analysis in the laboratory to obtain a more accurate value. Processed products from Manonjaya salacca flour can be developed as a functional food.
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