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Content of dietary fiber and vitamin A in slice jam of Tamarillo (*Solanum betaceum* Cav.) and watermelon albedo as complementary foods for school-age children

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Abstract. The health of school children is a top priority because school-age children are prone to malnutrition and infectious diseases. Picky eater and avoiding of food and avoiding fruits and vegetables makes it less sufficient for fiber and vitamins. This study aimed to determine the proportion between tamarillo and albedo of watermelon with several percentages of added sugar on the content of vitamin A and fiber produced from the slice jam. This study used a Randomized Block Design. The treatments given were: 1). proportions of dutch-eggplant: albedo of watermelon (100%: 0%; 75%; 25%; 50%: 50%); 2). The additions of sugar (10, 20, and 30%) with 3 replicates. The results of the research data were analyzed by ANOVA. If the results were significantly different, then it was continued with 5% DMRT test. The results show that the proportion of tamarillo and albedo of watermelon and the addition of sugar have a significant effect on vitamin A and fiber contents. Selected slice jam products have food fiber content of 6.025% and vitamin A 2102.0.

1. Introduction

The health of school children is a priority at the mean time. From the results of the 2013 population census it was found that the age group of school children in Indonesia amounted to around 28% of the total population of Indonesia. School-age children are an age group that is prone to malnutrition and infection diseases [1]. One of the aspects that need to be considered at this time is the picky eater of children at school and at home as they begin to be able to choose and buy their own food menu [2]. This resulted the school-age children face imbalanced nutritional intake such as fiber and vitamin needs. Fiber and vitamin needs can be fulfilled with consumption patterns that are in line with nutritional needs. Food ingredients that can meet fiber and vitamin needs are fruits and vegetables, where school-age children often avoid these foods. One of the fruits that can be used as a potential source of fiber and vitamins is tamarillo.

Tamarillo is a potential commodity where in 100 grams of this fruit contains 82.7 - 87.8% water, 1.5 grams protein, 0.06-1.28 grams fat, 10.3 grams carbohydrate, 1.4 fiber -4.29 grams, ash 0.66-0.94 mg, carotene 0.371 - 0.653 mg, vitamin A 540 IU and vitamin C 23.3 - 44.9 mg [3]. Along with the times, food products are demanded to be practically carried and practical when consumed. The tamarillo fruit can be used as a product in the form of sheets, so that it is practical in its use (a kind of slice cheese).



The widely produced jams on the market are made from chocolate, peanuts and some fruits. In making the glue jam, it requires pectin to form a good texture. Watermelon albedo is a good source of pectin because it contains pectin of 21.03% [4]. This study aimed to look at the content of vitamin A and fiber content of food in each formula of slice jam of tamarillo.

2. Materials and methods

2.1. Place and rime

The research had been conducted in the Food Service Laboratory of Nutrition Science Study Program, Faculty of Health Sciences, Jenderal Soedirman University. The research time was held for 6 months, namely March 2018 to August 2018.

2.2. Materials

The materials used in this study were tamarillo fruit and watermelon obtained from Dieng, sugar, agar, and water. The materials used for analysis were distilled water, buffer solution, alcohol 95%, K₂SO₄ 10%, NaOH 0.3 N and H₂SO₄ 0.25.

2.3. Research methods

This research was conducted experimentally using Randomized Block Design consisted of nine treatments with three replications, namely: B1G1 (Dutch-eggplant 75%, albedo of watermelon 25%, sugar 25%); B1G2 (Dutch-eggplant 75%, albedo of watermelon 25%, sugar 35%); B1G3 (Dutch-eggplant 75%, albedo of watermelon 25%, sugar 45%); B2G1 (Dutch-eggplant 50%, albedo of watermelon 50%, sugar 25%); B2G2 (Dutch-eggplant 50%, albedo of watermelon 50%, sugar 35%); B2G3 (Dutch-eggplant 50%, albedo of watermelon 50%, sugar 45%); B3G1 (Dutch-eggplant 25%, albedo of watermelon 75%, sugar 25%); B3G2 (Dutch-eggplant 25%, albedo of watermelon 75%, sugar 35%); B3G3 (Dutch-eggplant 25%, albedo of watermelon 75%, sugar 45%).

2.4. Observation

The observed variables in this study were the levels of dietary fiber and the content of vitamin A in the jam sheets.

2.5. Data analysis

Data obtained from observations were analyzed statistically using analysis of variance. If F statistic > F table, then it would be proceeded with Multiple Range Test (DMRT) Test at level 5%.

3. Results and discussion

The acidity (pH), moisture content, vitamin A levels, total dissolved solids and fiber can be seen in Table 1.

3.1. Vitamin A

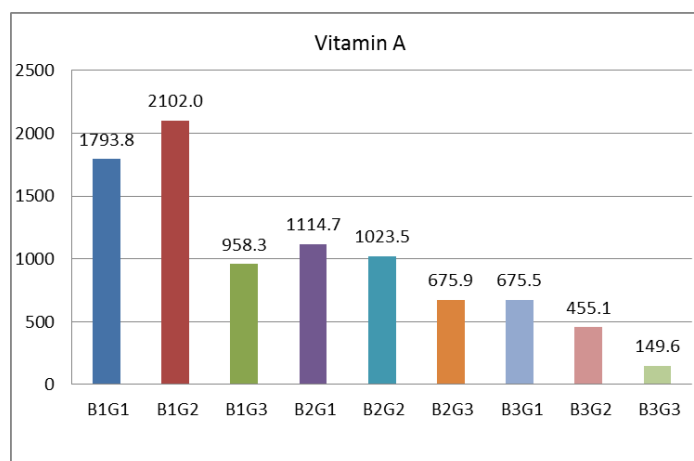
Based on Table 1, it can be seen that the average value of total vitamin A in tamarillo slice jam ranged from 149.6 to 1793.8 UI. It can be seen the tendency of increasing the value of vitamin A along with the increase in the number of tamarillo used in production the slice jam. This was possible because the level of vitamin A of tamarillo was greater than the level of vitamin A in watermelon albedo. Vitamin A content on tamarillo slice jam can be seen in Figure 1.

Tamarillo fruit contains compounds such as β carotene and fiber. Antioxidant compounds that are contained in carotene β which has a very important role because most know about free radical attack in Tamarillo there are 50 mg in 100 grams of material, this compound is called provitamin A in the body so it is often called Vitamin A [3], whereas Tamarillo contains 0.6 mg in 100 grams of ingredients. Beta carotene is an antioxidant that is easily oxidized in the presence of maltodextrin will reduce the interaction with light and air which can reduce levels of beta carotene.

Table 1. Chemical content analysis result of Dutch-eggplant jam sheets.

Data	Vitamin A	Dietary Fiber
F hit B	32.45 **	28.05 **
F tab 5%	4.46	4.46
B1	1618.020 ^a	5.233 ^a
B2	938.040 ^b	4.398 ^a
B3	426.752 ^c	2.277 ^b
F hit G	10.88 **	9.09 **
F tab 5%	4.46	4.46
G1	1194.665 ^a	4.405 ^a
G2	1193.542 ^a	4.533 ^a
G3	594.605 ^b	2.970 ^b
F hit BXG	1.73	4.17 *
F tab 5%	3.84	3.84
B1G1	1793.795	5.820 ^a
B1G2	2102.000	6.025 ^a
B1G3	958.265	3.855 ^b
B2G1	1114.685	3.840 ^b
B2G2	1023.510	5.875 ^a
B2G3	675.925	3.480 ^b
B3G1	675.515	3.555 ^b
B3G2	455.115	1.700 ^c
B3G3	149.625	1.575 ^c

The content of every 100 grams of tamarillo part contains 48 cal calories, 1.5 g protein, 0.3 g fat, 11.30 g carbohydrates, 0.28-0.38 mg potassium, 0.3-0 iron, 9 mg, vitamin A 5600 SI, vitamin B 0.3-0.14 mg, vitamin B1 0.04 mg, vitamin C 15-42 g, vitamin E 2 g, water 85 g, fiber 1.4-4.7 g [5]. Vitamin A is one of the essential nutrients that cannot be produced by the human body. To get it, it must be taken from sources outside the body, especially from natural sources, such as cereals, tubers, fruits, fruits, animals, and others. The need for vitamin A is recommended for toddlers 250 micrograms of retinol (vitamin A) or 750 micrograms of beta carotene per day.

**Figure 1.** Vitamin A content in each treatment.

3.2. Food fiber content

The levels of dietary fiber in tamarillo slice jam are ranged from 1.58 to 6, 025 mg in 100 grams of material. The fiber content of tamarillo slice jam was influenced by pectin content, originated from albedo of watermelon and tamarillo. The use of high pectin produced high fiber content because pectin is a constituent component of fiber from the polysaccharide group. The use of sugar did not affect the fiber content of tamarillo slice jam. For more details, the fiber content of food can be seen in Figure 2.

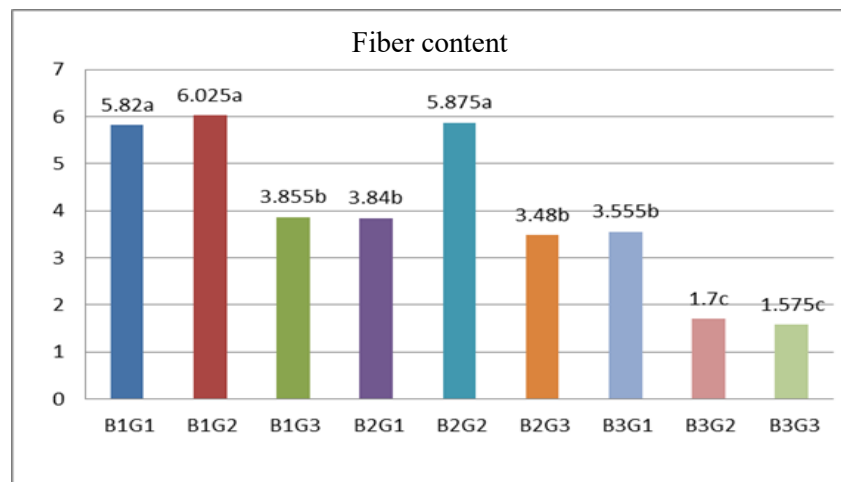


Figure 2. Dietary fiber content in each treatment.

The production of dutch-eggplant jam sheet jam with 55% sugar concentration and 0.75% pectin produced dutch-eggplant jam sheet with 1.787% fiber content [6]. Strawberry jam sheet contained 50% sugar concentration, 1% pectin, and 0.1% citric acid obtain strawberry jam sheet jam with 1.366% fiber content [7]. Jackfruit jam sheet using 0.2% citric acid and 0.4% pectin produces jackfruit jam sheet contained 0.030% fiber content [8].

4. Conclusion

Much more of tamarillo fruit used in making slice jam, the higher vitamin A and fiber content in the product. Tamarillo can be used as a potential raw material as a source of vitamin A and dietary fiber.

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