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The Formulation of Red Guava (Psidium guajava L.) Instant Powder Drink using Foam Mat Drying Method

Formulasi Minuman Serbuk Instan Jambu Merah (Psidium guajava L.) yang Dikeringkan dengan Metode Foam Mat Drying

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ABSTRACT

Background: Red guava juice offers various benefit yet its shelf life is short. Processing red guava juice into powder extends the shelf life of the product. The foaming method or foam mat drying was employed in this research to produce red guava juice powder, using Maltodextrin as the filler, egg white as the foaming agent and sucrose to taste.
Objectives: This research examined the physical and chemical characteristics of the red guava instant powder drink to determine the best formulation.
Methods: The first step of research was the production guava juice powder with different maltodextrin concentrations (5%, 10%, 15%) and egg white concentrations (3%, 6%, 9%). The formulation of guava juice instant powder drink involved the addition of different sucrose concentrations (10%, 20%, 30%) and guava juice powder to water ratios (1:5, 1:10, 1:15). Physical characteristics were observed, including the bulk density, solubility, color (L, a, b), and viscosity. The chemical characteristics that included total carotene and vitamin C content were also examined. The most optimal treatment from the second step underwent the proximate analysis and sodium content test, which data were analyzed using analysis of variance (ANOVA) and Tukey/HSD test.
Results: The use of 15% maltodextrin and 3% egg white showed the most optimal result, and the use of 30% sucrose concentration and 1:5 guava juice powder to water ratio was determined as the best formulation.
Conclusions: Red guava instant powder drink is an instant powder drink product that uses natural ingredients. One packet of red guava instant powder drink contains a total of 76 kcal of energy.

INTRODUCTION

Red guava (*Psidium guajava L.*) grows subtropical and tropical areas. Red guava contains high vitamin A, C, dietary fiber[1], and also antioxidant, antimicrobial, as well as anti-inflammatory properties[2]. It contains four times more vitamin C than an orange. Red guava is usually consumed as juice or smoothies with relatively short shelf life due to high moisture. Processing red guava juice into powder form can extend its shelf life by reducing the moisture.

Fruit juice can be dried up using freeze drying and spray drying methods[3]. Unfortunately, both methods require relatively expensive equipment. The foam drying or foam mat drying offers simpler method by creating foam from liquid materials and adding foam stabilizers. After the foaming process, the next stage is the drying process using a tunnel dryer or oven[4]. The foam mat drying can be carried out at a relatively low temperature, thereby minimizing damage to vitamins[5]. The present research was performed to produce red guava juice powder and to formulate instant red guava drinks. This research also examined the physical and chemical properties of instant powdered red guava juice drinks dried using the foam mat drying method. Furthermore, information on the ideal serving size, serving suggestions, and nutritional information of the instant red guava juice powder drink per serving is also provided.

METHODS

Research Design, Time, and Place

This factorial randomized block design (RBD) research was performed through two stages from February to June 2022. The production of red guava instant powdered drinks was carried out at the Product Development Laboratory located at Muhammadiyah University Sidoarjo (UMSIDA). Physical and chemical characteristic analyses were conducted at the UMSIDA Food Analysis Laboratory. The first stage was the production of red guava juice powder with maltodextrin concentrations of 5%, 10%, and 15% and egg white

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concentrations of 3%, 6%, and 9%. In the first stage, 9 treatment combinations were replicated 3 times, resulting in 27 experimental units. The best treatment from the first stage was then used in the second stage where the formulation of red guava juice instant powder drinks was determined in different sucrose concentrations of 10%, 20%, and 30% and juice powder to water ratios of 1:5, 1:10, and 1:15. Similar to the fist stage, 9 treatment combinations with 3 replications were also performed. The juice powder to water ratio was examined to formulate the serving size of instant guava powder drinks. The best treatment was selected using the weighting method.

Research Equipment

The equipment used in the production of red guava instant drinks included spoons, basins, measuring cups, cutting boards, baking pans, plastic spatulas, stoves (Rinnai), PE plastic, steamer (Java), blenders (Philips), mixers (Philips), knives, grinders (Universal Mill), digital scales (Ohaus), 80 mesh sieves, and cabinet dryers. The equipment used for analysis included: colorimeter (FRU), oven (Memmert), UV-Vis spectrophotometer (B-One), and viscometer (NDJ-5S). The equipment used in the study can be seen in Figure 1.

Figure 1. Research Equipment

Research Materials

The primary material used in this study was red guava obtained from a traditional market in Sidoarjo, Indonesia. Maltodextrin (Lansida), egg whites (Kejapanan Market, Indonesia), and sugar (PTPN) were also utilized. For chemical and physical analyses, the materials included distilled water (Brataco), iodine (ROFA), acetone (SMART-LAB), anthrone (Merck), $CaCO_3$ (Merck), sodium oxalate (EMSURE), and lead acetate (Merck). The materials employed in the research are presented in Figure 2.

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(a) Red Guava (b) Maltodextrin (c) Egg White (d) Sugar (e) Distilled Water (f) Iodine

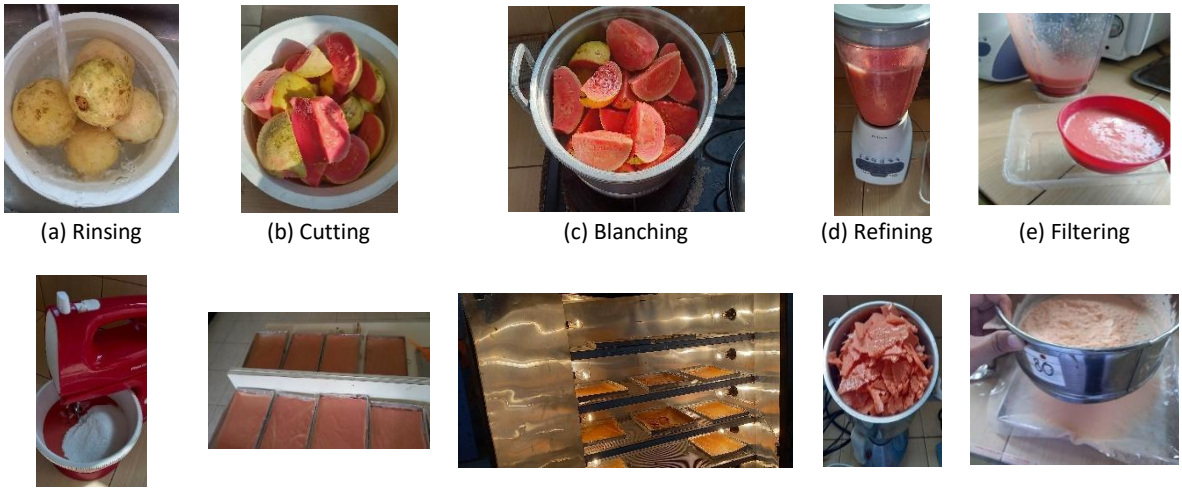
(g) Acetone (h) Anthrone (i) $CaCO_3$ (j) Sodium Oxalate (k) Pb Acetate

Figure 2. Research Materials

Research Procedure

In stage 1, the red guava juice powder was produced. Red guavas were washed in running water to remove dirt, cut into pieces of approximately ±6 cm size and blanched at a temperature of ±80°C for 5 minutes. The red guavas were then mixed with water in a 1:1 (w/v) ratio and blended using a high-speed blender for 2 minutes. The blend was filtered to separate the seeds before the guava pulp was added and mixed with maltodextrin (5%, 10%, 15%), and egg whites (3%, 6%, 9%) using a high-speed mixer for 10 minutes until foam formed. The mixture was poured into a baking pan and dried in a cabinet dryer at 50°C for 7 hours. The dried juice formed sheets which were then grounded using a grinder and sieved through an 80 mesh sieve. The red guava juice powder production is presented in Figure 3.

Stage 2 was the formulation of red guava instant drink. The best guava juice powder from stage 1 were added with sucrose (10%, 20%, and 30%) and water (powder to water ratio of 1:5, 1:10, 1:15) and stirred until evenly mixed.



(a) Rinsing (b) Cutting (c) Blanching (d) Refining (e) Filtering

f) Mixing with Maltodextrin and Egg Whites (g) Pouring into Trays (h) Drying (i) Grinding (j) Sifting

Figure 3. Red Guava Juice Powder Production

Physical and Chemical Analysis

The physical and chemical characteristics of red guava juice powder were examined. The physical characteristics consisted of density[7], solubility[7], lightness (L)[8], redness (a)[8], yellowness (b)[8], and viscosity[9], while the chemical characteristics included total carotene[10] and vitamin C content[11]. The proximate analysis of the best treatment in stage 2 was analyzed[12].

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RESULTS AND DISCUSSIONS

Research Stage 1

Physical Characteristics

Bulk Density and Solubility

The outcomes of bulk density and guava juice powder solubility are shown in Table 1. The ANOVA test showed that the interaction between maltodextrin and egg white did not significantly affect bulk powder density value. However, each factor had a significant effect on the density value of red guava juice powder. In the maltodextrin concentration treatment, the highest density was found in the 10% maltodextrin concentration treatment (0.69 g/mL). Higher maltodextrin concentration is followed by lower the density value. Meanwhile, in this reseach, the 10% maltodextrin concentration resulted in a density value of 0.69 g/mL, while the 15% maltodextrin concentration resulted in 0.60 g/mL. This condition might occur due to the moisture of the guava juice powder that decreased as maltodextrin was added. The low moisture causes the mass of red guava juice powder to decrease even within the same volume, eventually lowering the density value. Similar finding was also observed in Mahendran's research[13], where the density of red guava added with 50% maltodextrin was greater (0.57 g/cm^3) than 60% maltodextrin addition (0.54 g/cm^3).

In general, greater egg white concentrations decreases the density of some substance, such as goat milk. In this research, the treatment using 3% egg white concentration resulted in higher density (0.68 g/mL) than the 6% egg white concentration treatment (0.59 g/mL). Similarly, Kandasamy *et al.* [14] found a decrease in the density of papaya powder in greater egg white concentration.

Table 1. Average Density, Solubility, Lightness (L), and Yellowness (b) Values of Red Guava Juice Powder

Treatment	Density (g/mL)	Solubility (%)	Lightness (L)	Yellowness (b)
M1	0.59 a	39.23 a	80.96 a	18.02 b
M2	0.69 b	41.71 ab	84.56 b	14.82 ab
M3	0.60 a	42.12 b	84.96 b	14.39 a
Tukey Test 5%	0.05	2.66	2.57	1.85
P1	0.68 b	40.93	80.94 a	16.94 b
P2	0.59 a	41.52	85.46 b	14.90 a
P3	0.61 ab	40.61	84.08 bc	15.40 ab
Tukey Test 5%	0.05	ns	2.57	1.85

M1=Maltodextrin 5%, M2=Maltodextrin 10%, M3=Maltodextrin 15%
P1=Egg White 3%, P2=Egg White 6%, P3=Egg White 9%
Ns=not significant
Numbers followed by the same letter in one column indicate no significant difference based on the 5% Tukey test.

Table 1 presents the average solubility values of red guava juice powder with different treatments. The results of analysis of variance (ANOVA) showed that the interaction between maltodextrin concentration and egg white concentration had no significant effect on the density of red guava juice powder. Whereas, maltodextrin concentration had a significant effect on the density values of red guava juice powder.

The addition of maltodextrin at 15% concentration yielded in higher solubility (42.12%) than the 5% maltodextrin concentration (39.23%) (Table 1). Maltodextrin is a carbohydrate (oligosaccharide) that is soluble in water and it also binds water-soluble (hydrophilic) substances[13].

Color (L, a, and b)

The average lightness (L) and yellowness (b) values of red guava juice powder are shown in Table 1, while the average redness (a) values are shown in Table 2. The ANOVA test showed an interaction between maltodextrin concentration and egg white concentration on the redness (a) brightness (L) and yellowness (b) values of the red guava juice powder.

15% maltodextrin and 3% egg white concentrations produced the highest redness value (a) (13.01). Maltodextrin forms thin layers that accelerate the drying process. The presence of a thin layer between the dried materials minimizes the degradation of active components from the heat during the drying process. Greater maltodextrin concentration minimizes the degradation of carotene in red guava juice, resulting in greater redness of the red guava juice powder (a) of 13.01.

It is known that higher maltodextrin concentration is followed by higher brightness (L) since maltodextrin is white in color. On the other hand, lower maltodextrin concentration results in higher yellowness (b) value due to non-enzymatic browning during the drying process. Lower maltodextrin concentration forms thinner layers, where the protection of the ingredients is less adequate. Mahendran[13] observed that during the freeze-drying process, non-enzymatic browning occurred, resulting in a yellow color in the product. The visual of the red guava juice powder product in this research is shown in Figure 4.

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Table 2. Average Redness Value (a) of Red Guava Juice Powder Products

Treatment	Average Redness Value (a)
M1P1	11.53 b
M1P2	10.41 ab
M1P3	10.54 b
M2P1	9.18 a
M2P2	9.29 a
M2P3	11.31 b
M3P1	13.01 c
M3P2	9.94 ab
M3P3	9.13 a
Tukey Test 5%	1.39

M1P1=Maltodextrin 5%, Egg White 3%; M1P2=Maltodextrin 5%, Egg White 6%; M1P3=Maltodextrin 5%, Egg White 9%; M2P1=Maltodextrin 10%, Egg White 3%; M2P2=Maltodextrin 10%, Egg White 6%; M2P3=Maltodextrin 10%, Egg White 9%; M3P1=Maltodextrin 15%, Egg White 3%; M3P2=Maltodextrin 15%, Egg White 6%; M3P3=Maltodextrin 15%, Egg White 9%
Numbers followed by the same letter in one column indicate no significant difference based on the 5% Tukey test.

Figure 4. Red Guava Juice Powder

Best Treatment in Research Stage 1

The most optimal treatment was determined using the weighting method[6]. In the first phase of research, the use of 15% maltodextrin and 3% egg white concentration of 3% showed the most optimal characteristics: density of 0.67 g/ml, solubility of 40.52%, lightness value (L) of 81.06, redness value (a) of 13.01, and yellowness value (b) of 16.74.

Research Stage 2

Physical Characteristics

Solubility

The average solubility values of instant red guava juice powder are presented in Table 3. ANOVA results show that sucrose concentration had no significant effect on solubility, whereas the powder-to-water ratio significantly influenced it. Higher water addition increased solubility, as water is a polar compound[15] in which greater proportion of water provides more polar molecules, thereby enhancing powder solubility.

Table 3. Average Solubility, Brightness (L), Redness (a), Total Carotene, and Vitamin C Content of Instant Red Guava Juice Powder Drink

Treatment	Solubility (%)	Lightness (L)	Redness (a)	Carotene Total (µg/mL)	Vitamin C Content (%)
S1	91.756	63.11	9.36 b	0.30	0.153 b
S2	91.744	63.37	8.84 ab	0.31	0.105 a

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Treatment	Solubility (%)	Lightness (L)	Redness (a)	Carotene Total (µg/mL)	Vitamin C Content (%)
S3	91.267	65.67	7.75 a	0.36	0.138 ab
Tukey Test 5%	ns	ns	1.17	ns	0.036
A1	86.707 a	63.99	11.21 c	0.43 b	0.153 b
A2	92.990 a	62.85	8.11 b	0.25 a	0.150 b
A3	95.070 b	65.31	6.63 a	0.29 ab	0.093 a
Tukey Test 5%	2.029	ns	1.17	0.085	0.036

S1=Sucrose 10%. S2=Sucrose 20%. S3=Sucrose 30%
A1=Red Guava Juice Powder to Water =1:5. A2=Red Guava Juice Powder to Water=1:10. A3=Red Guava Juice Powder to Water=1:15
ns = not significant
Numbers followed by the same letter in one column indicate no significant difference based on the 5% BNJ test.

Viscosity

The average viscosity values of instant red guava juice powder are presented in Table 4. ANOVA results indicate a significant interaction between sucrose concentration and the powder-to-water ratio. The highest viscosity (54.17 mPa·s) occurred at 30% sucrose with a 1:5 powder-to-water ratio. This result is attributed to the high sucrose content. which increases total dissolved solids and thus viscosity. Conversely. higher water proportions reduce viscosity by diluting the solution[16].

Table 4. Average Viscosity and Yellowness Value of Instant Red Guava Juice Products

Treatment	Viscosity (mPa.s)	Yellowness (b)
S1A1	35.83 d	21.70 f
S1A2	6.90 c	15.40 d
S1A3	2.40 ab	12.98 b
S2A1	43.97 e	20.43 e
S2A2	5.97 c	14.91 d
S2A3	1.77 a	10.65 a
S3A1	54.17 f	23.73 g
S3A2	5.00 c	13.57 bc
S3A3	2.07 ab	10.99 ab
Tukey Test	2.178	0.961

S1A1=10% sucrose concentration. red guava juice powder to water ratio=1:5
S1A2=10% sucrose concentration. red guava juice powder to water ratio=1:10
S1A3=10% sucrose concentration. red guava juice powder to water ratio=1:15
S2A1=20% sucrose concentration. red guava juice powder to water ratio=1:5
S2A2=20% sucrose concentration. red guava juice powder to water ratio=1:10
S2A3=20% sucrose concentration. red guava juice powder to water ratio=1:15
S3A1=sucrose concentration 30%. red guava juice powder to water ratio = 1:5
S3A2=sucrose concentration 30%. red guava juice powder to water ratio = 1:10
S3A3=sucrose concentration 30%. red guava juice powder to water ratio = 1:15
Numbers followed by the same letter in one column indicate no significant difference based on the 5% Tukey test.

Color

The average brightness (L*) and redness (a*) values are shown in Table 3. while the yellowness (b*) values are shown in Table 4. As found in ANOVA test. sucrose concentration and the proportion of red guava juice powder to water amout did not significantly affect the brightness (L) value. yet they had significant effect on the redness (a) value of the red guava instant drinks. The appearance of red guava instant drink powder after being dissolved in water can be seen in Figure 2.

The highest redness value (a*) was found in the 10% sucrose treatment (9.36) and guava juice powder to water ratio of 1:5 (11.21). Lower sucrose concentration and lower the proportion of water result in higher the redness value. Red guava seeds contain lycopene red pigment[17]. Hence. lower sucrose and greater water ratio

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produce higher the lycopene pigment concentration in the guava juice powder.

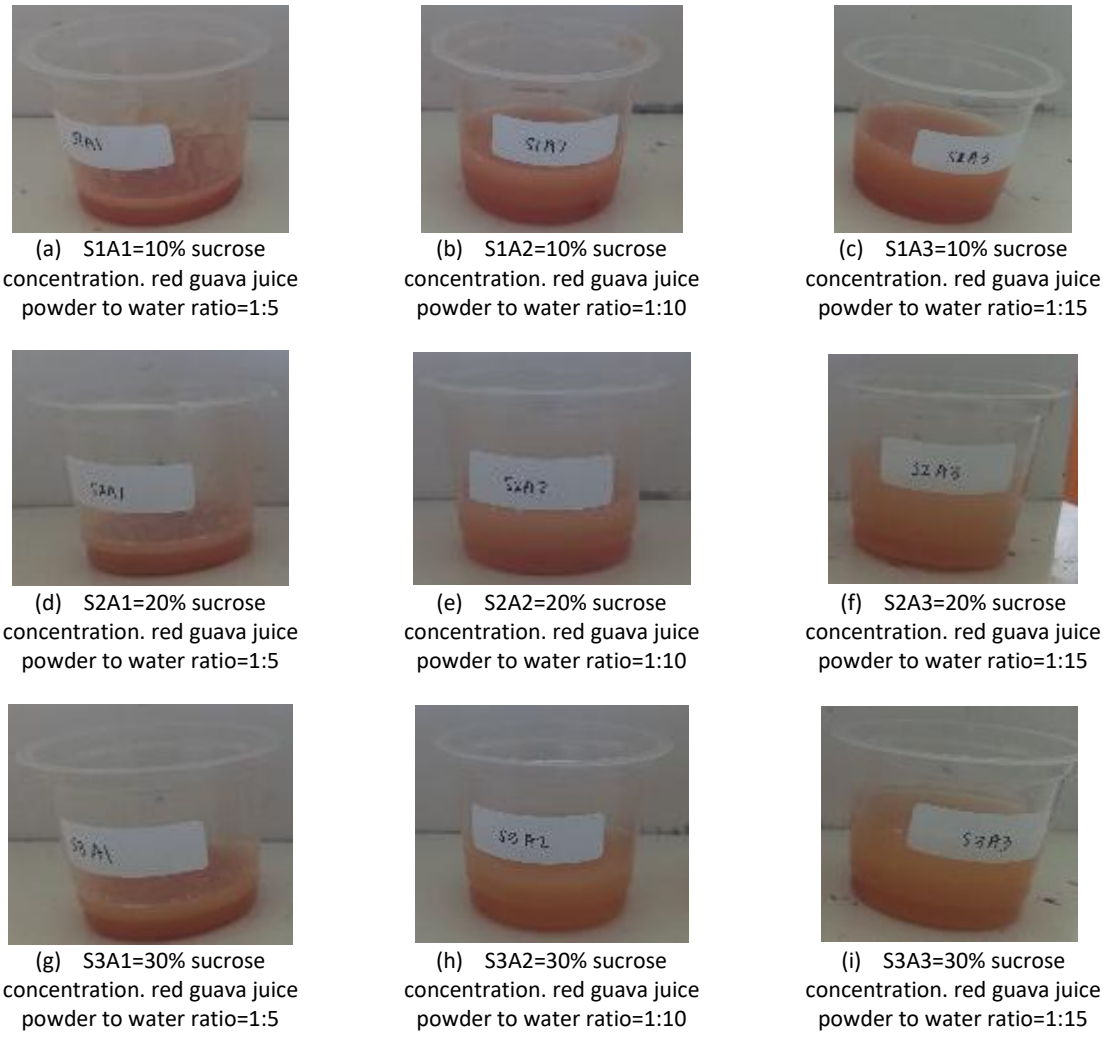
The highest yellowness value (b*) was found in the treatment with a sucrose concentration of 30%. with a ratio of red guava juice powder to water of 1:5 (23.73). In addition to containing lycopene pigment. red guava also contains other types of carotenoid pigments such as β-carotene and β-cryptoxanthin that produce orange color in the fruit[17]. In this research. a yellowish-white crystal sugar sucrose was used.

Chemical Characteristics

Total Carotene and Vitamin C Content

The average total carotene and vitamin C content of instant red guava juice powder drinks are shown in Table 8. The red guava juice powder to water ratio significant affected the total carotene content of instant red guava juice drinks. The 1:5 ratio resulted in the highest total carotene content (0.43 µg/mL) since lesser water kept the total carotene content of the red guava juice powder drink high. Red guava juice powder contains the pigments β-carotene. ϒ-carotene. and lycopene. which belong to the carotenoid group[18].

The sucrose concentration factor and the ratio of red guava juice powder to water have a significant effect on the vitamin C content of instant red guava juice drinks. Red guava is a food source of ascorbic acid (vitamin C)[19]. The highest vitamin C content (0.153%) was observed at 10% sucrose concentration and a low powder-to-water ratio. Lower sucrose concentrations and reduced water proportions increased vitamin C content in the instant guava drink.



(a) S1A1=10% sucrose concentration. red guava juice powder to water ratio=1:5
(b) S1A2=10% sucrose concentration. red guava juice powder to water ratio=1:10
(c) S1A3=10% sucrose concentration. red guava juice powder to water ratio=1:15
(d) S2A1=20% sucrose concentration. red guava juice powder to water ratio=1:5
(e) S2A2=20% sucrose concentration. red guava juice powder to water ratio=1:10
(f) S2A3=20% sucrose concentration. red guava juice powder to water ratio=1:15
(g) S3A1=30% sucrose concentration. red guava juice powder to water ratio=1:5
(h) S3A2=30% sucrose concentration. red guava juice powder to water ratio=1:10
(i) S3A3=30% sucrose concentration. red guava juice powder to water ratio=1:15

Figure 5. Appearance of Red Guava Instant Drink Powder After Dissolving in Water

Best Treatment for Research Stage 2

Using the weighting method. the optimal treatment in the second research phase was instant red guava juice powder with 30% sucrose concentration and a 1:5 powder-to-water ratio. This formulation showed 86.83% solubility. 34.17% viscosity. brightness (L) of 64.80. redness (a) of 10.66. yellowness (b) of 23.73. total carotene content of 0.36 µg/mL. and vitamin C content of 0.14%. A 1:5 powder-to-water ratio may be recommended on product labeling as a serving suggestion. equivalent to 20 g of powder dissolved in 100 mL of water. Nutritional information for this formulation is presented in Figure 6.

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Nutrition Facts		
Serving Size		20 g
1 Serving per Package		
Amount per Serving		
Total Energy		76 kkal
		% RDA*
Total Fat	0.4 g	0.6%
Protein	0.03 g	0.05%
Total Carbohydrates	18 g	6%
Dietary Fiber	3 g	10%
Total Sugar	0.1 g	
Sodium	6 mg	0.4%

Percentage of Recommended Dietary Allowances (RDA) based on energy requirements of 2150 kcal. An individual's energy requirements may be higher or lower.

Figure 6. Nutrition Facts for Red Guava Instant Powder Drink

Strength and Limitation of Research

The advantage of this research is that it is made from natural ingredients, namely red guava, which has health benefits for humans. The product of this research is easy to store and does not spoil easily because it is in powder form. The disadvantage of this research is that after being mixed with water, some of the powder settles easily. An evaluation is needed to reduce the rate of sedimentation when dissolved in water.

CONCLUSIONS

The research performed to produce a natural-based beverage product in the form of red guava powder drink with optimal formulation. The most optimal product had sucrose concentration of 30% and a powder-to-water ratio of 1:5. Every serving of the product contains 76 kcal of energy. total fat (0.6%). protein (0.05%). carbohydrates (6%). dietary fiber (10%). and sodium (0.4%) in reference tot he Recommended Daily Allowance (RDA).

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CONFLICT OF INTEREST AND FUNDING DISCLOSURE

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AUTHOR CONTRIBUTIONS

SRN: concept. supervision. methodology. revision writing. editing; RA: data analysis. original draft writing; AEP: methodology; resources; KSK: data analysis. original draft writing; SW: original draft writing. editing.

REFERENCES

1. Hadi. A. S. Potensi Buah Jambu Biji Merah (Psidium guajava L.) dalam Meningkatkan Kadar Hemoglobin. *Proceeding Biol. Educ. Conf.* **20**. 1–6 (2023).
2. Amaliya. A.. Risdiana. A. S. & Van der Velden. U. Effect of Guava and Vitamin C Supplementation on Experimental Gingivitis: A Randomized Clinical Trial. *J. Clin. Periodontol.* **45**. 959–967 (2018). DOI: 10.1111/jcpe.12922.
3. Tumbas Šaponjac. V. T. *et al.* Optimisation of Beetroot Juice Encapsulation by Freeze-Drying. *Polish J. Food Nutr. Sci.* **70**. 25–34 (2020). DOI: 10.31883/pjfns/115153
4. Kurniasari. F.. Hartati. I. & Kurniasari. L. Aplikasi Metode Foam Mat Drying Pada Pembuatan Bubuk Jahe (Zingiber officinale). *J. Inov. Tek. Kim.* **4**. 7–10 (2019). DOI: 10.31942/inteka.v4i1.2679
5. Putri. W. D. R.. Nurbaya. S. R. & Murtini. E. S. Microencapsulation of Betacyanin Extract from Red Dragon Fruit Peel. *Curr. Res. Nutr. Food Sci.* **9**. 953–960 (2021). DOI: 10.12944/CRNFSJ.9.3.22
6. Rahmani. R. Pemanfaatan Alang-Alang (Imperata Clyndrica) Sebagai Pangan Fungsional Jelly Drink (Kajian: Jenis dan Konsentrasi Gelling Agent). *J.*

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Kesehat. Tambusai **3**. 200–207 (2022). DOI: 10.31004/jkt.v3i2.4699

7. Lai. S.. Cui. Q.. Sun. Y.. Liu. R. & Niu. Y. Effects of Particle Size Distribution on the Physicochemical. Functional. and Structural Properties of Alfalfa Leaf Powder. *Agric.* **14**. 1–16 (2024). DOI: 10.3390/agriculture14040634
8. Nurbaya. S. R.. Yuwono. S. S.. Putri. W. D. R. & Lastriyanto. A. Ohmic Heating Process for the Extraction of Betacyanin Pigment from Red Dragon Fruit Peel as a Natural Food Colorant Ingredient. *Int. J. Heat Technol.* **42**. 1065–1072 (2024). DOI: https://doi.org/10.18280/ijht.420333
9. Agusman. Suryanti. Nurhayati. Murdinah & Wahyuni. T. Measurement of Fish Gelatin using Rotational Viscometer: An Alternative to Conventional Pipette Method. *IOP Conf. Ser. Earth Environ. Sci.* **715**. 0–9 (2021). DOI: 10.1088/1755-1315/715/1/012056
10. Jiang. M. & Nakano. S. ichi. New insights into the stoichiometric regulation of carotenoid production in Chlorella vulgaris. *Bioresour. Technol. Reports* **20**. 101227 (2022). DOI: 10.1088/1755-1315/715/1/012056
11. Nurbaya. S. R.. Azara. R.. Prihatiningrum. A. E. & Hudi. L. Physicochemical Characteristics of Cucumber Sherbet on Various Pandan Wangi Juice Concentrations and Sweetener Types. **5**. 132–141 (2024). DOI: http://dx.doi.org/10.20961/agrihealth.v5i2.92815
12. Cahyaningrum. P. L. Analisis Proksimat Serbuk Instan Kombinasi Rimpang Temulawak (Curcuma xanthorrhiza Roxb.) dan Daun Anting-Anting (Acalypha indica L.). *Widya Kesehat.* **2**. 1–10 (2020). DOI: 10.32795/widyakesehatan.v2i1.600
13. Mahendran. T. Physico-Chemical Properties and Sensory Characteristics of Dehydrated Guava Concentrate: Effect of Drying Method and Maltodextrin Concentration. *Trop. Agric. Res. Ext.* **13**. 48 (2011). DOI: http://dx.doi.org/10.4038/tare.v13i2.3138
14. Kandasamy. P.. Varadharaju. N.. Kalemullah. S. & Moitra. R. Preparation of Papaya Powder under Foam-Mat Drying Technique using Egg Albumin as Foaming Agent. *Int. J. Bio-resource Stress Manag.* **2012**. 324–331 (2012). DOI: 10.4038/tare.v13i2.3138
15. Qiao. B.. Jiménez-Ángeles. F.. Nguyen. T. D. & De La Cruz. M. O. Water follows polar and nonpolar protein surface domains. *Proc. Natl. Acad. Sci. U. S. A.* **116**. 19274–19281 (2019). 10.1073/pnas.1910225116
16. Wijaya. W. P. & Gozali. T. Penambahan Kolagen Sisik dan Tulang Ikan Gurami (Osphronemus Goramy) Pada Minuman Jus Jambu Biji (Psidium guajava). *Pas. Food Technol. J.* **8**. 12–19 (2021). DOI: 10.23969/pftj.v8i1.3899
17. Pasupuleti. V. & Kulkarni. S. G. Lycopene fortification on the quality characteristics of beverage formulations developed from pink flesh guava (Psidium guajava L.). *J. Food Sci. Technol.* **51**. 4126–4131 (2014). DOI: 10.1007/s13197-013-

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18. Koop. B.L. *et al.* Flavonoids. Anthocyanins. Betalains. Curcumin. and Carotenoids: Sources. Classification and Enhanced Stabilization by Encapsulation And Adsorption. *Food Res. Int.* **153**. (2022). DOI: 10.1016/j.foodres.2021.110929

19. Youssef. M. & Ibrahim. R. Molecular Markers Associated With High Vitamin-C Content in Guava. *J. Agric. Chem. Biotechnol.* **7**. 49–55 (2016). DOI: 10.21608/jacb.2016.40744

How to cite: *Nurbaya, S. R., Azara, R., Prihatiningrum, A. E., Kinanti, K. S., & Widayanti, S. (2025) The Formulation of Red Guava (Psidium guajava L.) Instant Powder Drink using Foam Mat Drying Method: Formulasi Minuman Serbuk Instan Jambu Merah (Psidium guajava L.) yang Dikeringkan dengan Metode Foam Mat Drying. Amerta Nutrition, 9(4), 679–688.*