

## CHAPTER IV

### RESULT AND DISCUSSION

#### 4.1 Product Result

The nutritional value of vegetable candy depends on the ingredients used. Carrots and mustard greens are the main ingredients in making vegetable candy. Carrots are a type of vegetable that contains a relatively high amount of vitamin A and  $\beta$ -carotene, specifically 16.71 mg and 8.28 mg per 100 g of carrots, respectively. Despite having a sweet taste, carrots are rarely consumed raw. Raw carrots have a higher  $\beta$ -carotene content compared to cooked carrots, but cooking carrots can increase the total carotenoid content 2 to 5 times more than their actual content (Pamungkas et al., 2021). Furthermore, mustard greens are also one type of vegetable that is rich in fiber and contains nutritional values such as 1.2 g of protein, 0.3 g of fat, 4 g of carbohydrates, 0.1 mg of vitamin A, 3 mg of vitamin B, and 2 mg of vitamin C (Kurniawati dan Very, 2019). However, mustard greens are prone to damage, such as easy spoilage and wilting, which limits their shelf life to only a few days. This is attributed to the high water content in mustard greens, ranging from 86% to 95%. Therefore, processing techniques are necessary to mitigate these issues (Khamidah, 2017).

In the production of vegetable candy, stevia sugar is used as a sweetener to create a nutritious and sugar-free product. The resulting product is a candy with an aroma and flavor that resembles lychee jelly. Additionally, for the color aspect, carrot-based candy exhibits an orange color. This orange color in the candy is attributed to the presence of  $\beta$ -carotene, a natural pigment that imparts yellow, orange, or red colors to carrots (Efendi et al., 2018). For candies made with mustard greens, they exhibit a green color. The green color in candies with mustard greens is derived from the leaves of mustard greens, which serve as a natural coloring agent (Holinesti dan Janusuri, 2023). This candy has a chewy texture, and the chewy texture of the candy is influenced by the presence of a supporting ingredient called nutrijel, which gives the food its chewiness.

## 4.2 Nutrition Fact

### 4.2.1 Nutrition Table

Vegetable candy contains various nutritional components derived from each food ingredient used, particularly carrots and mustard greens.

**Table 4. 1** Nutrition Value of Carrot per 100 g

Nutrition	Total/100 g
Calorie (kcal)	42
Carbohydrate (g)	9
Fat (g)	0.2
Protein (g)	1
Fiber (g)	3.6
Calcium (mg)	33
Phosporus (mg)	35
Iron (mg)	0.66
Vitamin A (SI)	835
Vitamin B (mg)	0.6
Vitamin C (mg)	1.9
Water (g)	88.20

(Rahmayani et al., 2017)

Carrots have a high content of vitamin A. Consuming carrots can aid in maintaining eye health. Additionally, the carotenoid content in carrots plays a role in protecting DNA, proteins, and fats from oxidative damage and can help maintain the normal function of the immune system and mucous membranes(Ahmad et al., 2019). The raw carrot contains a beta-carotene content of 34.94%(Fitrianingsih et al., 2020).

**Table 4. 2** Nutrition Value of Mustard Green per 100 g

Nutrition	Total/100 g
Calorie (kcal)	27
Carbohydrate (g)	4.67
Fat (g)	0.42
Protein (g)	2.86
Fiber (g)	3.2
Calcium (mg)	115
Phosporus (mg)	58
Iron (mg)	1.64
Magnesium (mg)	32
Sodium (mg)	20
Zink (mg)	0.25
Vitamin A (IU)	3.020
Vitamin B5 (mg)	0.21
Vitamin C (mg)	70
Vitamin E (mg)	2.01
Vitamin K ( $\mu$ g)	258
Water (g)	90.7

(USDA, 2018)

Mustard greens are a type of vegetable that is rich in fiber, thus aiding in maintaining digestive health (Kurniawati & Very, 2019). In addition, mustard greens are rich in vitamins A, B, C, E, and K. The highest vitamin content in mustard greens is vitamin K and vitamin C. These vitamins play a role in the blood clotting process, which aids in wound healing. The vitamin C content in mustard greens is nearly equivalent to that of oranges. Vitamin C functions to boost the immune system, helping children stay resistant to illness (Alifah et al., 2019).

#### 4.2.2 Nutrition Calculations

**Table 4. 3** Nutritional Value of Ingredients used in The Recipe for Carrot Candy

<b>Ingredients</b>	<b>Calories (kcal)</b>	<b>Carbohyd rate (g)</b>	<b>Protein (g)</b>	<b>Fat (g)</b>	<b>Sugar (g)</b>	<b>Fiber (g)</b>	<b>Sodium (mg)</b>	<b>Vit A (mcg)</b>	<b>Vit C (mg)</b>
Carrot (200g)	82	19,16	1,86	0,48	9,08	5,6	138	835	3,8
Stevia (170 g)	0	196	0	0	0	0	0	0	0
Unflavored jelly (28 g)	80	32	0	0	0	32	0	0	0
Nutrijel lychee (10 g)	27	8	0	0	2,7	2,7	0	0	0
Coconut Nutrijel (10g)	13	5,3	0	0	2,7	2,7	66,7	0	0
Water	0	0	0	0	0	0	0	0	0
<b>TOTAL</b>	<b>202</b>	<b>260,9</b>	<b>1,86</b>	<b>0,48</b>	<b>14,48</b>	<b>43</b>	<b>204,7</b>	<b>835</b>	<b>3,8</b>

1 Recipe can be about 70 pcs

1 Pack contain 5 Pcs of Carrot Candy

1 pack has 14,45 kcal.

**Table 4. 4** Nutritional Value of Ingredients used in The Recipe for Mustard Green Candy

<b>Ingredients</b>	<b>Calories (kcal)</b>	<b>Carbohyd rate (g)</b>	<b>Protein (g)</b>	<b>Fat (g)</b>	<b>Sugar (g)</b>	<b>Fiber (g)</b>	<b>Sodium (mg)</b>	<b>Vit A (mcg)</b>	<b>Vit C (mg)</b>
Mustard greens (400g)	120	22.76	9.8	1.68	1.84	14.4	80	604	280
Stevia (170 g)	0	196	0	0	0	0	0	0	0
Unflavored jelly (28 g)	80	32	0	0	0	32	0	0	0
Nutrijel lychee (10 g)	27	8	0	0	2,7	2,7	0	0	0
Coconut Nutrijel (10g)	13	5.3	0	0	2,7	2,7	66,7	0	0
Water	0	0	0	0	0	0	0	0	0
<b>TOTAL</b>	<b>240</b>	<b>264,06</b>	<b>9,8</b>	<b>1,68</b>	<b>7,24</b>	<b>51,8</b>	<b>146,7</b>	<b>604</b>	<b>280</b>

1 Recipe can be about 70 pcs

1 Pack contain 5 Pcs of Mustard green Candy

1 pack has 17 kcal.

### 4.2.3 Nutrition Label

<b>Nutrition Facts</b>		<b>Nutrition Facts</b>	
5 Servings per Container		5 Servings per Container	
Serving size	5 pcs (30g)	Serving size	5 pcs (30g)
<b>Amount Per Serving</b>		<b>Amount Per Serving</b>	
<b>Calories</b>	<b>15</b>	<b>Calories</b>	<b>17</b>
%Daily Value*		%Daily Value*	
<b>Total Fat</b> 0g	<b>0%</b>	<b>Total Fat</b> 0g	<b>0%</b>
Saturated Fat 0g	<b>0%</b>	Saturated Fat 0g	<b>0%</b>
<i>Trans</i> Fat 0g		<i>Trans</i> Fat 0g	
<b>Sodium</b> 2mg	<b>0%</b>	<b>Sodium</b> 2mg	<b>0%</b>
<b>Total Carbohydrate</b> 4g	<b>1%</b>	<b>Total Carbohydrate</b> 4g	<b>1%</b>
Dietary Fiber 1g	<b>2%</b>	Dietary Fiber 1g	<b>2%</b>
Sugar 0g		Sugar 0g	
<b>Protein</b> 0g	<b>0%</b>	<b>Protein</b> 0g	<b>0%</b>
<b>Vitamin A</b> 12 mcg	<b>2%</b>	<b>Vitamin A</b> 9mcg	<b>1%</b>
<b>Vitamin C</b> 0mg	<b>0%</b>	<b>Vitamin C</b> 4mg	<b>4%</b>
*The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet 2.150 calories a day is used for general nutrition advice		*The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet 2.150 calories a day is used for general nutrition advice	

Figure 4. 1 Nutrition Fact of carrot Candy and green mustard candy

## 4.3 Food Safety and Packaging

### 4.3.1 Processing and Storage Temperature

Candy is processed through several sequential steps in a manufacturing procedure. The candy production flow must adhere to the manufacturing procedure, which includes ingredient peeling and cutting, mixing, filtering, cooking, molding, and drying. Each step in the production flow serves the purpose of preparing the candy for the next step. Each step must align with the manufacturing procedure to ensure the final product meets the desired specifications (Sari and Holinesti, 2022).

Peeling and cutting the ingredients is the first step in candy production, aiming to remove damaged or unusable parts of the ingredients. Next is the mixing step, where the peeled and cut ingredients are mixed with water and blended. Subsequently, the mixture is filtered to extract the syrup. The next stage involves cooking by adding stevia and jelly powder. The addition of jelly powder is done to maintain any reduced acidity during the cooking process and aid in gel formation. This is because jelly powder contains carrageenan and citric acid. The subsequent step is molding, where the mixture is poured into available molds. The mixture is then left to solidify (Khamidah, 2017). After solidification, the candy is cut and neatly arranged in a tray lined with baking paper. The lining with baking paper prevents sticking during baking. Next, the candy is placed in an oven to dry for 6-8 hours at a temperature of 60°C, depending on the size of the candy (Fajarini et al., 2018).

The temperature and duration of drying during baking significantly affect the vitamin content of candies, especially vitamin C. Vitamin C is a water-soluble vitamin that is sensitive to heat and can degrade. Therefore, as the drying temperature increases, the vitamin C content decreases. The vitamin C level decreases with higher temperatures and longer drying durations. According to the study, the highest vitamin C content was observed at a drying temperature of 60°C for 5 hours. Moreover, the texture of the candy is also influenced by the drying duration. Longer drying times result in harder or chewier candies. This is due to the loss of moisture through evaporation, resulting in lower water content (Miranti, 2020). Therefore, the temperature and drying duration used for vegetable candies are suitable and do not significantly decrease the vitamin content.

#### **4.3.2 Self Life**

Vegetable candy is categorized as a jelly candy, which is one type of sugar confectionery with a soft texture processed by adding hydrocolloids such as agar, gums, pectin, starch, carrageenan, gelatin, and others, resulting in a chewy product texture. The candy needs to be molded and undergo an aging process before being packaged (SNI 3547.2-2008). In the study conducted by Rismandari et al (2017) the water activity ( $a_w$ ) values of jelly candy ranged from 0.84 to 0.89. These values are considerably high for product storage, as bacteria and molds generally thrive in products with an  $a_w$  value of 0.7. The elevated  $a_w$  value is attributed to the higher water content in the candy product, exceeding the standard set by SNI (2008). The longer the shelf life of a product, the lower its  $a_w$  value, as bacteria or molds can only survive under specific  $a_w$  conditions.

Vegetable candy falls under the category of semi-moist food products and remains sufficiently durable and stable when stored at room temperature. In another study, it was found that jelly candy made with cherry leaf extract had a shelf life of only 3 days, while jelly candy with added starfruit extract had a longer shelf life of approximately 5 days. This is due to the flavonoid content in starfruit extract, which inhibits microbial activity (Setiawati and Sari, 2020). In the market, jelly candy typically has a shelf life of approximately 2 months. The extended shelf life can be influenced by environmental factors, product storage methods, and appropriate packaging of the product (Aprilinda Soi, 2017).

#### **4.3.3 Product Packaging**

Packaging is the outer layer that wraps a product with the purpose of protecting it from weather conditions, shocks, and collisions with other objects. Food packaging functions to maintain the appearance and quality of the food. Additionally, food packaging can enhance the product's value and serve as a promotional medium. Another function of food



packaging is to protect the product from sunlight, moisture, and improper handling, thereby minimizing damage to the product. In developing countries, food loss and waste account for approximately 40%-50% of the total production. However, if a product is properly packaged, the loss and waste can be reduced to around 10% (Sucipta et al., 2017). The selection of packaging materials should consider several factors, such as the ability to protect and contain the product, the ability to sell the product, and the reasonable cost of the packaging material (Amalia et al., 2022).

Vegetable candy is a type of confectionery made from vegetables and sugar, with a chewy and soft texture, typically ready to eat. This candy belongs to the snack food category and is marketed in various places both offline and online. However, the increasing number of competitors has led to intense competition that is no longer limited, resulting in many candies remaining unsold and becoming stale and wasted. Therefore, vegetable candy requires packaging that can attract consumers, support product quality to maintain its freshness and quality during delivery to customers.



**Figure 4. 2** Plastic 20X30



**Figure 4. 3** Plastic 7X10

Plastic has been chosen as the packaging material for vegetable candy. The selection of plastic is due to its flexible nature, allowing it to conform to the shape of the packaged food, lightweight, non-fragile, transparent, easily labeled, cost-effective, and available in various types of plastic (Yuliati and Hadiyati, 2018). The commonly used types of plastic are Polyethylene (PE) and Polypropylene (PP). Both plastics have high density, withstand temperature and humidity, and have lower water absorption, thus providing protection to the product (Q et al., 2016). Polyethylene plastic can be used for freezing storage at temperatures as low as  $-50^{\circ}\text{C}$  but is not suitable for fatty foods. On the other hand, polypropylene plastic has greater durability than PE, is more rigid, and less prone to tearing. It also withstands high temperatures up to  $150^{\circ}\text{C}$ , making it suitable for use in sterilizing food ingredients (Nugraheni, 2018).

To maintain the quality of vegetable candy, appropriate packaging is required to protect the product. Polypropylene (PP) plastic has been chosen as the packaging material for the candy due to its relatively low cost, high flexibility, durability, and ease of recycling (Deglas, 2023). Furthermore, PP plastic is safe for food or edible products, has good permeability to water vapor and gases, and possesses favorable physical

properties and transparency levels (Soeka and Jumiono, 2019). Therefore, this plastic is suitable for preserving the candy's quality

Food packaging not only serves to protect the product, but it should also provide information, brand image, and act as a promotional medium that is easily seen, understood, and remembered. The inclusion of labels and branding on a food product is crucial for differentiation from competitors (Widiati, 2020).

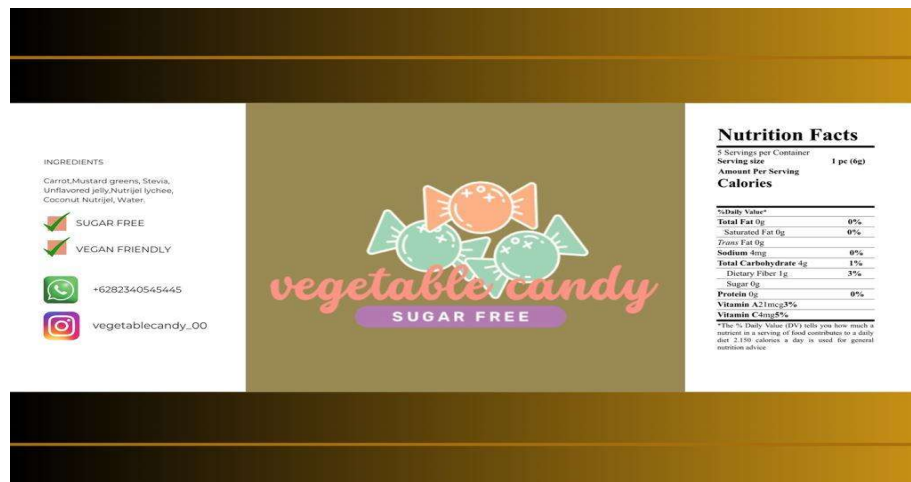


Figure 4. 4 Logo

## 4.4 Financial Aspects

### 4.4.1. Product Cost (Variable Cost, Overhead Cost, Fixed Cost)

The product cost is calculated based on the total of all monthly expenses. These expenses include labor costs, raw material costs, packaging costs, and equipment costs. Labor costs are calculated based on the daily working hours of the staff per month, which is 20 days per month. The raw material costs are calculated based on the quantity of raw materials needed for 3 recipes per day or 60 recipes per month, with 40 servings per day or a total of 800 servings per month.

#### 1. Start-Up Capital

**Table 4. 5** Start-Up Capital

Tools and Equipment	Quantity	Price (/unit)	Sub Total
Peeler	1	Rp 20,000	Rp 20,000
Blender	1	Rp 280,000	Rp 280,000
Knife	2	Rp 25,000	Rp 50,000
Mould	2	Rp 25,000	Rp 50,000
Filter	2	Rp 14,000	Rp 28,000
Oven	1	Rp 200,000	Rp 200,000
Measuring cup	1	Rp 20,000	Rp 20,000
Cutting board	2	Rp 25,000	Rp 50,000
Stock pot	1	Rp 350,000	Rp 350,000
<b>TOTAL</b>			<b>Rp 1,048,000</b>

#### 2. Labour Cost

**Table 4. 6** Labour Cost

Occupation	Personnel	Salary (/month)	Sub Total
Chef	1	Rp 4,080,000	Rp 4,080,000
Cook Helper	1	Rp 3,400,000	Rp 3,400,000
Administration officer	1	Rp 2,720,000	Rp 2,720,000
Cleaning service officer	1	Rp 2,040,000	Rp 2,040,000
<b>TOTAL</b>			<b>Rp 12,240,000</b>

### 3. Packaging Cost

**Table 4. 7** Packaging Cost

Packaging	Quantity	Price (/unit)	Sub Total
Plastic Nougat	250	Rp 7,500 (/50pcs)	Rp 37,500
Plastik bag	50 pcs	Rp 10,000 (/50pcs)	Rp 10,000
<b>TOTAL (/day)</b>			<b>Rp 47,500</b>
<b>TOTAL (/month)</b>			<b>Rp 950,000</b>

### 4. Utility Cost

**Table 4. 8** Utility Cost

Facility	Quantity	Price (/unit)	Sub Total
Water	500 L	Rp 2,800 (/m3)	Rp 1,400
Electricity	20 kWh	Rp 1,700 (kWh)	Rp 34,000
<b>TOTAL (/day)</b>			<b>Rp 35,400</b>
<b>TOTAL (/month)</b>			<b>Rp 708,000</b>

### 5. Raw Material Cost

**Table 4. 9** Raw Material Cost

Raw Materials	Quantity	Price (/unit)	Sub Total
Carrot	600 g	Rp 8,000 (/kg)	Rp 4,800
Mustard green	6 bunches	Rp 2,500 (/bunches)	Rp 15,000
Stevia	510 g	Rp 69,000 (130 g)	Rp 271,000
Swallow plain jelly	12 packs	Rp 5,800 (/pack)	Rp 69,600
Nutrijel Lychee	3 pack	Rp 2,000 (/pack)	Rp 6,000
Coconut nutrijel	3 pack	Rp 2,000 (/pack)	Rp 6,000
Gas	3 kg	Rp 20,000 (/3kg)	Rp 20,000
<b>TOTAL (/day)</b>			<b>Rp 392,400</b>
<b>TOTAL (/month)</b>			<b>Rp 7,848,000</b>

## 6. Rent Cost

**Table 4. 10** Rent Cost

Facility	Size	Price	Sub Total
Land	10 m x 5 m	Rp 2,000,000	Rp 2,000,000
Building	6 m x 5 m	(/month)	
<b>TOTAL (/month)</b>			<b>Rp 2,000,000</b>

## 7. Total Cost

Fixed Cost = Labour Cost and Rent Cost

Variable Cost = Labour + Raw Material + Packaging + Utility + Rent Cost

Total Cost (/month) = Rp 12,240,000 + Rp 7,848,000 + Rp 950,000 + Rp 708,000 + Rp 2,000,000  
**= Rp 23,746,000**

### 4.4.2. Selling Price

Product Price =  $\frac{\text{Total cost(/month)}}{\text{Total product units(month)}}$   
 =  $\frac{23,746,000}{800 \text{ portions}}$   
**= Rp 29,683 / portion**

Product Selling Price = Product Price + (Product Price x Profit Percentage)  
 = Rp 29,683 + (Rp 29,683 x 50%)  
 = Rp 29,683 + Rp 14,842  
 = Rp 44,525 ≈ Rp 44.500