

## ***JELLY CANDY PRODUCTION WITH VARIATIONS OF BROCCOLI (*Brassica oleracea* var. *italica*) AND RED GINGER (*Zingiber officinale* var. *rubrum* Theilade)***

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### **ABSTRACT**

*Candy is a snack that almost everyone of all ages loves. Jelly candy is a candy made from vegetable or fruit essence, forming a gel, with a soft texture, clear color, and a certain level of elasticity. Broccoli (*Brassica oleracea* var. *italica*) contains vitamins, folate, phosphorus, magnesium, iron, potassium, and calcium. Red ginger (*Zingiber officinale* var. *rubrum* Theilade) contains gingerol compounds, flavonoids, phenols, terpenoids, and essential oils. The purpose of this study was to determine the organoleptic characteristics, water content, and reducing sugar jelly candy with variations of broccoli and red ginger. This study used a quantitative experimental method. The research procedures included preparing broccoli, preparing red ginger, making jelly candy with 3 formulas, and evaluating jelly candy. Jelly candy formula with a ratio of broccoli and red ginger, F1 (20%: 2%), F2 (30%: 3%), F3 (40%: 4%). The results showed that the organoleptic of the three jelly candy formulas had a distinctive aroma of broccoli and red ginger, brownish green color, spicy-sweet taste, and chewy texture. The water content of the jelly candy in the three formulas was 17.22% (F1), 18.33% (F2), and 18.17% (F3) respectively. Reducing sugar for jelly candy in the three successive formulas was 18.6% (F1), 16.3% (F2), and 13.9% (F3). The water content and reduced sugar of jelly candy with variations of broccoli and red ginger have met the quality requirements for soft confectionery, SNI 3547-2-2008. The results in this study, the water content and reducing sugar were below the maximum number of predetermined soft confectionery quality requirements.*

**Keywords:** *jelly candy, broccoli, red ginger*

### **INTRODUCTION**

Candy or confectionery is a snack that almost everyone of all ages loves. Candy can be classified into four types, namely hard candy, soft candy (jelly), chewing gum, and non-sugar candy (Nur *et al.*, 2023). Jelly candy has a clear, transparent appearance and has a chewy, slightly soft to slightly hard texture. Jelly candy has chewy characteristics that vary from slightly soft to slightly hard (Sriyono *et al.*, 2016). Jelly candy has advantages compared to other types of candy. Jelly candy has a higher cohesive power than its adhesive power so jelly candy is not sticky when consumed (Lampah, 2022). Jelly candy is included in semi-moist foods made from fruit or vegetable juices, gel-forming materials, transparent, and has a certain texture and elasticity (Widiati, 2019).

The increasing market demand for candy with a limited number of main ingredients has encouraged the availability of candy with basic ingredients derived from natural ingredients with abundant availability (Nur *et al.*, 2023), (Widiati, 2019). Jelly candy can be made from natural ingredients, such as broccoli and red ginger. Broccoli (*Brassica oleracea* var. *italica*) contains vitamins, folate, phosphorus, magnesium, iron, potassium, calcium, minerals, flavonoids, and carotenoids (Nurhasanah, 2022). These ingredients can reduce the risk of oxidative stress (Umama, 2019). At the same time, red ginger (*Zingiber officinale* var. *rubrum*

Theilade) contains gingerol compounds that have antioxidant, antibacterial, antifungal, anti-inflammatory, and anti-carcinogenic activities. Red ginger also contains flavonoids, phenols, terpenoids, and essential oils (Rukhyyah *et al.*, 2022). In addition, red ginger has a spicy taste which can be used as a natural flavoring agent (Kamalasari, 2018).

Broccoli has high benefits, but in everyday life, it is less popular, especially for children, so it needs to be processed into products that are more popular, including jelly candy. Previously, there was no formulation for jelly candy combining broccoli and red ginger. Adding red ginger to jelly candy, besides its high beneficial content, adds flavor. Based on the above description, Jelly Candy with Broccoli (*Brassica oleracea* var. *italica*) and Red Ginger (*Zingiber officinale* var. *rubrum* Theilade) variations are made. This research aims to determine the quality of jelly candy which includes organoleptic to decide on the characteristics of the product in terms of color, smell, taste, and water content to determine the quality and reduce sugar which is an important macronutrient as an energy source.

## METHOD

This research was conducted with a quantitative experimental design. The tools used include draining jelly candy, analytical balance (Ohaus), stove (Rinnai), pan, stirrer, bowl, juicer Philips), filter paper, knife, Erlenmeyer (Pyrex), mold, burette, beaker glass (Pyrex), cup, oven (Binder), desiccator, volumetric flask (Pyrex), pipette, and electric heater (Thermo). The materials used include broccoli and red ginger from the traditional market in Klaten, sugar, water, citric acid, agar powder, (NH<sub>4</sub>) HPO<sub>4</sub>, Pb acetate, H<sub>2</sub>SO<sub>4</sub>, distilled water, starch indicator, 0.1 N sodium thiosulfate, and 20% KI solution.

The research procedure included several stages, namely the preparation of broccoli, the preparation of red ginger, manufacture, and evaluation of jelly candy.

1. Broccoli preparation referred to research (Kamalasari, 2018). Starting with collecting broccoli, then cleaning from various impurities, and weighing it according to the formulation, the broccoli was crushed using a juicer by adding 200 ml of water, and then filtering it to get broccoli juice.
2. The preparation of red ginger referred to research (Setyaningsih & Laxiana, 2021). Beginning with the collection of red ginger, washing, chopping the ginger, then weighing it according to the formulation. Furthermore, red ginger was rushed using a juicer with the addition of 20 ml of water, then filtered to get the red ginger juice.
3. The jelly candy formulation refers to previous research (Sriyono *et al.*, 2016). There are three formulations, namely F1 = Jelly candy formula with a ratio of broccoli and red ginger of 20% and 2%; F2 = Jelly candy formula with a ratio of broccoli and red ginger of 30% and 3%; F3 = Jelly candy formula with a ratio of broccoli and red ginger of 40% and 4%

**Table 1. Formulation for Making Jelly Candy with Variation of Broccoli (*Brassica oleracea* var. *italica*) and Red Ginger (*Zingiber officinale* var. *rubrum* Theilade)**

Material	F1 (g)	F2 (g)	F3 (g)
Broccoli	100	150	200
Red ginger	10	15	20
Jelly	7	7	7
Sugar	250	250	250
Citric acid	0,2	0,2	0,2
Aquadest (ml)	Ad 500	Ad 500	Ad 500

4. Evaluation of jelly candy included organoleptic testing, water content, and reducing sugar.
  - a). Organoleptic testing was carried out using the human senses as the main tool to see the quality of products that have undergone processing.
  - b). Testing the water content used the oven method.
  - c). Testing for reducing sugars used the Luff school method. (BSN, 2008).

## RESULTS AND DISCUSSION

**Table 2. Characteristics of Jelly Candy with Variation of Broccoli (*Brassica oleracea* var. *italica*) and Red Ginger (*Zingiber officinale* var. *rubrum* Theilade)**

Formulas	Organoleptic Test	Water content (%)	Reducing Sugar (%)
F1	Brownish green color, distinctive smell of broccoli and red ginger, sweet and spicy taste, chewy texture	17,22	18,6
F2	Brownish green color, distinctive smell of broccoli and red ginger, sweet and spicy taste, chewy texture	18,33	16,3
F3	Brownish green color, distinctive smell of broccoli and red ginger, sweet and spicy taste, chewy texture	18,17	13,9

Note: F1 = Jelly candy formula with a ratio of 20% and 2% broccoli and red ginger; F2 = Jelly candy formula with a ratio of broccoli and red ginger of 30% and 3%; F3 = Jelly candy formula with a ratio of broccoli and red ginger of 40% and 4%.

Organoleptic tests were carried out to determine the physical appearance of jelly candy with variations of broccoli and red ginger. Organoleptic tests were carried out using the five human senses to observe the aroma/smell, color, taste, and texture of jelly candy. Aroma or smell will characterize each food from what ingredients the food product is made of. In terms of aroma, it uses more of the five senses of smell, namely the nose. The smell is produced by the interaction of volatile substances (Kadir, 2020). In the aroma/smell test, the three formulations smelled typical of broccoli and ginger. Color is one of the basic criteria for determining food quality. Color can determine the quality of food ingredients used as an indicator of the freshness of food ingredients, whether or not the method of mixing or processing (Septianti & Sari, 2021). Of the three formulations, jelly candy was brownish-green in color. The color is produced from broccoli and sugar when cooked. Taste is a physical parameter that is often used to assess consumer acceptance of a food product. This parameter relies on the tongue to judge it. The sense of taste is divided into four, namely: salty, sour, bitter, and sweet (Kusumawati & Basmal, 2015). In the taste test, all three formulations had a sweet and spicy taste. The difference in taste occurred because of the ratio of red ginger juice used. The addition of red ginger extract affects the taste of jelly candy, which is because red ginger contains gingerol compounds that give it a distinctive spicy taste (Srikandi *et al.*, 2020). Texture is a characteristic of a material as a result of a combination of several physical properties which include size, shape, quantity, and elements of the material formation that can be felt by the senses of touch and taste, including the senses of the mouth and sight (Tarwendah, 2017). In testing the texture of the three formulations had a chewy texture.

Testing the water content is one of the factors that influence the acceptance of food ingredients, where water content plays a role in determining quality in terms of product freshness, the shelf life of a food product, and changes that occur in food products (Blongkod *et al.*, 2016). The water content of jelly candy in this study was 17.22% (F1), 18.33% (F2), and 18.17% (F3). The results of this study were by the SNI quality standard for soft confectionery (BSN, 2008), with a maximum moisture content of 20%.

A reducing sugar test is carried out to determine the content of inversion sugar contained in food ingredients. Reduction of sugar is a process of changing carbohydrate compounds into simple sugar groups (Lubis *et al.*, 2022). Jelly candy-reducing sugar in this study was 18.6% (F1), 16.3% (F2), and 13.9% (F3). The results of this study were by the SNI quality standard for soft confectionery, with a maximum reducing sugar of 25% (BSN, 2008). From the results of this research, it is known that the difference in composition only affects the difference in results for reducing sugar, and each still meets the quality requirements for jelly candy. The reducing sugar content is related to the inversion process of sucrose into

inverted sugar (glucose and fructose). The inversion process can be influenced by reactions from acid, heat, and mineral content. Especially for acid and heat, overall they are the same, but not for minerals. The results of this research are in line with previous research, beetroot jelly candy and soursop extract (Meilianti, 2018), clubs juice, and gelatin jelly candy (Sari et al., 2022), and pineapple heart jelly candy (Giyarto et al., 2020), each of which meets SNI standards. The results obtained in the research have met the standards, but there are still several quality parameters that have not been analyzed. So it is recommended for further analysis in subsequent research, such as ash content, acidity degree (pH), and hedonic tests

## CONCLUSION

The organoleptic of the three jelly candy formulas had a distinctive aroma of broccoli and red ginger, brownish green color, spicy-sweet taste, and chewy texture. The water content of the jelly candy in the three formulas was 17.22% (F1), 18.33% (F2), and 18.17% (F3) respectively. Reducing sugar for jelly candy in the three successive formulas was 18.6% (F1), 16.3% (F2), and 13.9% (F3). Organoleptic characteristics, water content, and reducing sugar jelly candy with variations of broccoli (*Brassica oleracea* var. *italica*) and red ginger extract (*Zingiber officinale* var. *rubrum* Theilade) have met the quality requirements of soft candy.

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