



**FORMULATION AND ORGANOLEPTIC TEST OF HERBAL  
RED GINGER SYRUP (ZINGIBER OFFICINALE VARIETAS  
RUBRUM) AS A HEALTH DRINK**

**Authors:**

**Sri Iriyanti<sup>1\*</sup>, Dian Irianti<sup>2</sup>, Masrif Masrif<sup>3</sup>, Endah Sri Rahayu<sup>4</sup>, Budi Kristanto<sup>5</sup>**

<sup>1\*,2,3,4,5</sup> *Jurusan Gizi, Poltekkes Kemenkes Jayapura, Jayapura, Papua*

*Corresponding Author Email: dorci8277@gmail.com*

**About the Author**

1. 1<sup>st</sup> Author : Sri Iriyanti  
Affiliation : Department of Nutrition, Polytechnic Ministry of Health, Jayapura, Papua, Indonesia  
Mailing address : Padang Bulan, Jalan Masuk Poltekkes Padangbulan No.2, RW.2, Hedam, Kec. Heram, Kota Jayapura, Papua 99351  
Email of author : iriyantisri@yahoo.com  
Orcid ID : <https://orcid.org/0000-0002-5928-7339>  
Google Scholar URL: <https://scholar.google.com/citations?user=m5DvG94AAAAJ&hl=id&oi=sra>
2. 2<sup>nd</sup> Author : Dian Irianti  
Affiliation : Department of Nutrition, Polytechnic Ministry of Health, Jayapura, Papua, Indonesia  
Mailing address : Padang Bulan, Jalan Masuk Poltekkes Padangbulan No.2, RW.2, Hedam, Kec. Heram, Kota Jayapura, Papua 99351  
Email of author : afdal.blues90@gmail.com  
Orcid ID : -  
Google Scholar URL: -
3. 3<sup>rd</sup> Author : Masrif Masrif  
Affiliation : Department of Nutrition, Polytechnic Ministry of Health, Jayapura, Papua, Indonesia  
Mailing address : Padang Bulan, Jalan Masuk Poltekkes Padangbulan No.2, RW.2, Hedam, Kec. Heram, Kota Jayapura, Papua 99351  
Email of author : masrif@gmail.com  
Orcid ID : <https://orcid.org/0009-0002-4813-3374>  
Google Scholar URL: -
4. 4<sup>th</sup> Author : Endah Sri Rahayu  
Affiliation : Department of Nutrition, Polytechnic Ministry of Health, Jayapura, Papua,

Indonesia  
Mailing address : Padang Bulan, Jalan Masuk Poltekes Padangbulan No.2, RW.2, Hedam, Kec.  
Heram, Kota Jayapura, Papua 99351  
Email of author : endahsrihayu@gmail.com  
Orcid ID : <https://orcid.org/0000-0001-8243-917X>  
Google Scholar URL: <https://scholar.google.co.id/citations?user=PtdUo5IAAAAJ&hl=id>

5. 5<sup>th</sup> Author : Budi Kristanto  
Affiliation : Department of Nutrition, Polytechnic Ministry of Health, Jayapura, Papua,  
Indonesia  
Mailing address : Padang Bulan, Jalan Masuk Poltekes Padangbulan No.2, RW.2, Hedam, Kec.  
Heram, Kota Jayapura, Papua 99351  
Email of author : budi@gmail.com  
Orcid ID : <https://orcid.org/0000-0002-9676-2258>  
Google Scholar URL: <https://sinta.kemdikbud.go.id/authors/profile/6734302/?view=googlescholar>

### **ABSTRACT**

*Red ginger syrup tastes sweet, spicy and contains antioxidants that are good for health. A heating technique has been developed in the process of making red ginger syrup. This research aims to determine the manufacture of red ginger syrup, the organoleptic properties of the color, aroma, taste and viscosity of red ginger syrup as well as the hedonic test of the label on the ginger syrup container. The type of research used was an experimental method with a one-shot case study design using 3 different formulas with variations in the amount of red ginger and granulated sugar. The research involved 18 trained panelists to carry out organoleptic tests using a hedonic scale. The study found that 61.11% of red ginger syrup panelists preferred formula 3, 50% preferred formula 2, and 44.44% preferred formula 1. The majority preferred Formula 2, with 55.55% preferring it. Plastic bottles were preferred 50% of the time. The results of the preference test for containers showed that panelists preferred plastic bottle containers with 50% of panelists choosing to like them. The conclusion of this research is that there is no difference in the level of preference of panelists regarding the organoleptic properties of red ginger syrup.*

*Keywords: Organoleptic Test, Red Ginger, Health Drinks, Syrup*

### **ABSTRAK**

*Jahe merah dapat diolah menjadi alternatif minuman herbal bagi masyarakat. Sirup jahe merah ini rasanya manis, pedas dan mengandung antioksidan yang baik untuk kesehatan. Telah dikembangkan teknik pemanasan dalam proses pembuatan sirup jahe merah. Penelitian ini bertujuan untuk mengetahui pembuatan sirup jahe merah, sifat organoleptik terhadap warna, aroma, rasa dan kekentalan sirup jahe merah serta uji hedonik label pada wadah sirup jahe. Jenis penelitian yang digunakan adalah metode eksperimen dengan desain one shot case study menggunakan 3 formula berbeda dengan variasi jumlah jahe merah dan gula pasir. Penelitian ini melibatkan 18 orang panelis terlatih untuk melakukan uji organoleptik dengan menggunakan skala hedonik. Hasil penelitian menunjukkan bahwa 61,11% panelis sirup jahe merah menyukai formula 3, 50% lebih menyukai formula 2, dan 44,44% lebih menyukai formula 1. Mayoritas menyukai Formula 2, dan 55,55% lebih menyukai formula 2. Uji viskositas menunjukkan kesamaan pendapat pada ketiga formula. Botol plastik lebih disukai 50%. Hasil uji kesukaan terhadap wadah menunjukkan bahwa panelis lebih menyukai wadah botol plastik dengan 50% panelis memilih menyukainya. Kesimpulan dari penelitian ini adalah tidak terdapat perbedaan tingkat kesukaan (warna, aroma, rasa, tekstur) panelis terhadap sifat organoleptik sirup jahe merah.*

*Kata kunci: Uji Organoleptik, Jahe Merah, Minuman Kesehatan, Sirup*

### **INTRODUCTION**

Indonesian people in general have a tradition of consuming food and drinks made from herbal plants. One of the well-known herbal drinks is a drink made from ginger because ginger is one of the herbal plants (Siregar et al., 2022)(Shaik et al., 2023)(Dhany et al., 2022). Red ginger is a shrub characterized

by small rhizome size, sharp spicy taste, red-orange color and sharp fibers. Red ginger has benefits as a herbal medicine (Supu et al., 2019)(Rosman et al., 2019)(Zhang et al., 2022). It is often used to relieve digestive problems, reduce inflammation, and boost the immune system. Additionally, red ginger is believed to have antioxidant properties that can help protect the body against free radicals and promote overall health (Mashadi NS et al., 2013). Another popular use of red ginger is in traditional Indonesian jamu, a herbal tonic that is consumed for its various health benefits(Zhang et al., 2022).

Red ginger is an ingredient that is often used as a mixture in drinks because it has a spicy taste and gives a warm feeling to the body when consumed (Budhi et al., 2022)(Sugimoto et al., 2018). Some empirical uses of red ginger are to improve the body's immune system, treat coughs, inflammation, allergies due to insect bites or wounds (Yaturramadhan & Syahdat, 2021)(Yuandani et al., 2023). The methanol extract of red ginger rhizomes contained secondary metabolite compounds such as tannins, flavonoids, saponins, terpenoids and alkaloids (Amalia & Sabila, 2021). Apart from that, it was found that red ginger rhizome extract has very strong antioxidant activity(Sholikhati et al., 2021). To attract people's interest in consuming red ginger, it needs to be made in a formulation that can cover the spicy taste of red ginger. One of them is a formulation in syrup form. Syrup form is a popular choice as it can be easily consumed and has a pleasant taste. Additionally, the syrup formulation allows for easy dosage control and can be conveniently added to various beverages or used as a topping for desserts.

Syrup is a soft drink with a high sugar content, thick and has various flavors (Vartanian et al., 2007). Syrup has a fairly long shelf life and only requires simple equipment in the manufacturing process. So syrup could be the right choice as a form of processed red ginger. Red ginger is known for its many health benefits and distinctive taste. By processing red ginger into syrup, it becomes easier to include it in various recipes and drinks. Additionally, the syrup's thick consistency allows for easy measuring and precise use in culinary applications(Steele et al., 2015). Apart from that, red ginger syrup can also be used as a flavor enhancer in other foods and drinks, giving it a unique and exotic touch. In this way, red ginger syrup can be an interesting alternative to enjoy the practical and varied benefits of red ginger. Herbal ingredients are widely used to treat various diseases (Hermawan & Novariana, 2018).

One way to find out whether the quality of a product meets consumer expectations in terms of taste is to conduct a comparative study of sensory attributes. There are several types of comparative studies carried out, one of which is the hedonic test. The hedonic test is an analysis using sensory organs which is carried out organoleptically to compare the quality of several products by giving certain values or scores to the categories being assessed such as taste, shape, color and texture. Organoleptic evaluation was performed to evaluate the color, odor, and taste (Mutia et al., 2023)(Putri et al., 2023) This research aims to determine the manufacture of red ginger syrup, the organoleptic properties of the color, aroma, taste and viscosity of red ginger syrup as well as the hedonic test of the label on the ginger syrup container. The novelty of this research lies in the use of red ginger as the main ingredient in making syrup, which has not been studied much before. Apart from that, this research will also involve consumer participation in testing their satisfaction with the labels on red ginger syrup packaging.

## **METHOD**

### *Research design*

This research is experimental research conducted in the laboratory. The design used is a One Shot Case Study (Study of one activity/treatment) of making red ginger syrup using the addition of granulated sugar and cinnamon. This product will be treated with 3 different formulas using their respective ratios.

### *Time and Place of Research*

The research was carried out from July to October 2023 in the ITP laboratory, Department of Nutrition, Health Polytechnic, Ministry of Health, Jayapura. The organoleptic test research was carried out at the Health Polytechnic Food Laboratory of the Ministry of Health, Jayapura, using 18 panelists from students majoring in nutrition, so they were categorized as somewhat trained panelists.

### *Procedure*

#### 1. Making Red Ginger Syrup

##### a. Ginger preparation:

The red ginger is washed and cleaned in a container then washed using running water until there is no soil attached to the red ginger

##### b. Weigh the ingredients as in the following formula:

**Table 1.** Red Ginger Syrup Formula

No	Material Type	Formula I	Formula II	Formula III
1.	Red ginger	200 Grams	250 Grams	300 Grams
2.	Sugar	300 Grams	250 Grams	200 Grams
3.	Lemongrass	20 Grams	20 Grams	20 Grams
4.	Cinnamon	50 Grams	50 Grams	50 Grams
5.	Mineral water	1,000 ml	1,000 ml	1,000 ml
<b>Total:</b>		<b>1,570 Grams</b>	<b>1,570 Grams</b>	<b>1,570 Grams</b>

c. Making red ginger syrup: put each of the ingredients that have been weighed in the form of red ginger, granulated sugar, lemongrass and cinnamon into a pan then stir evenly over low heat until the syrup solution thickens, then turn off the stove and let cool.

d. After the red ginger syrup has cooled, a filtering process is carried out so that no red ginger pulp is included in the packaging container. Filtering was carried out 3x with different red ginger syrup formulas

e. Packaging containers in the form of plastic bottles and glass bottles are first sterilized before use. Bottles and bottle caps are sterilized by immersing the packaging in boiling water for 10 minutes.

f. After the packaging container has cooled, the product packaging process is carried out in 3 bottles of red ginger syrup

#### 2. Organoleptic test of red ginger syrup

a. The researcher explained the aims and objectives of the research to the panelists

b. For organoleptic testing, prepare red ginger syrup in a glass until it is ½ full, then add warm mineral water until the glass is full. Then stirred evenly, the red ginger syrup drink is ready to be served

c. The panelists were then given a questionnaire to assess the red ginger syrup in terms of: color, aroma, taste and viscosity.

d. Each panelist assessed 3 formulas for red ginger syrup products, then gave a check list mark (✓) according to the panelists' perception of the color, aroma, taste and viscosity of red ginger syrup

e. Panelists can provide an assessment by selecting one of the criteria, and each criterion is given a score, as follows: 5 (Very like), 4 (like), 3 (Neutral), 2 (Dislike) and 1 (Strongly dislike)

#### 3. Making labels for red ginger syrup packaging

a. Prepare a sticker to be placed on the red ginger syrup container

- b. The sticker was made using the piscart application with a sticker size of 720 mm wide and 1412 mm high according to the size of the bottle.
  - c. The stickers that have been designed are then printed using sticker paper that does not fade easily.
  - d. The sticker is then attached to the red ginger syrup bottle
4. Organoleptic test on types of packaging containers
- a. The researcher explained the aims and objectives of the research to the panelists
  - b. The researcher then gave the panelists the opportunity to assess the packaging in terms of: content or message, image, design and color of the plastic bottle and glass bottle containers.
  - f. The panelists then gave a checklist (✓) on one of the following criteria: 5 (Strongly like), 4 (like), 3 (Neutral), 2 (Dislike) and 1 (Strongly dislike)

Fresh red ginger that has been prepared is soaked, then peeled. After that, grated red ginger is prepared to be boiled together with other additional ingredients such as granulated sugar, lemongrass and cinnamon. The boiled product is then filtered and cooled. The finished syrup is then stored in a sterilized container, then given a label.

## RESULTS AND DISCUSSION

### Color organoleptic test results

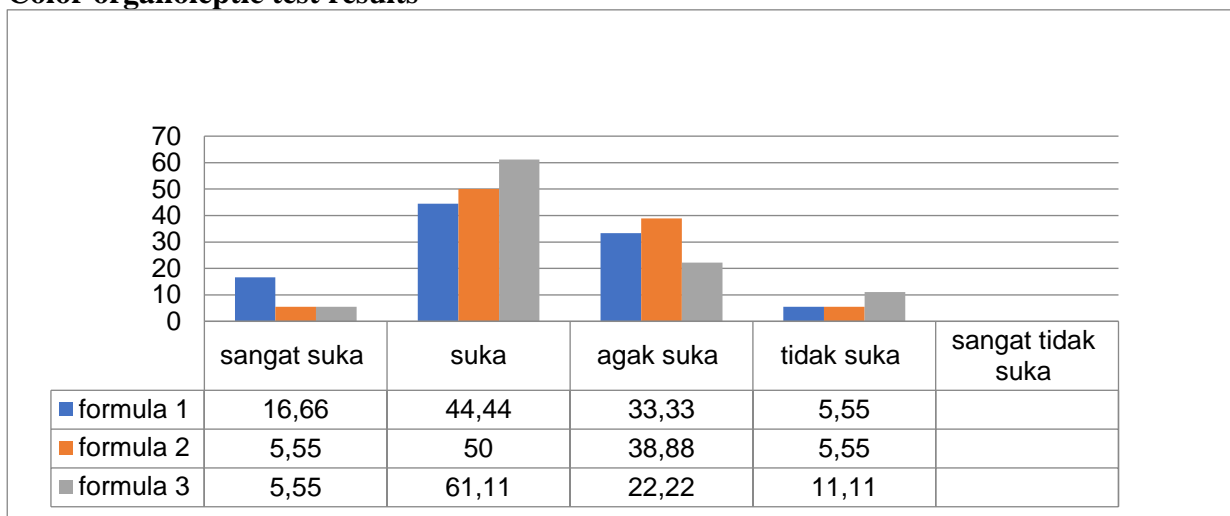


Figure 1 Organoleptic Color Test

From the results of the red ginger syrup panelists' preference test data regarding color, namely in formula 3 (F3), the majority (61.11%) of the panelists said they liked it, in formula 2 (F2), 50% of the panelists said they liked it and in formula 1 ( F1) only 44.44% of panelists said they liked the formula.

### Aroma organoleptic test

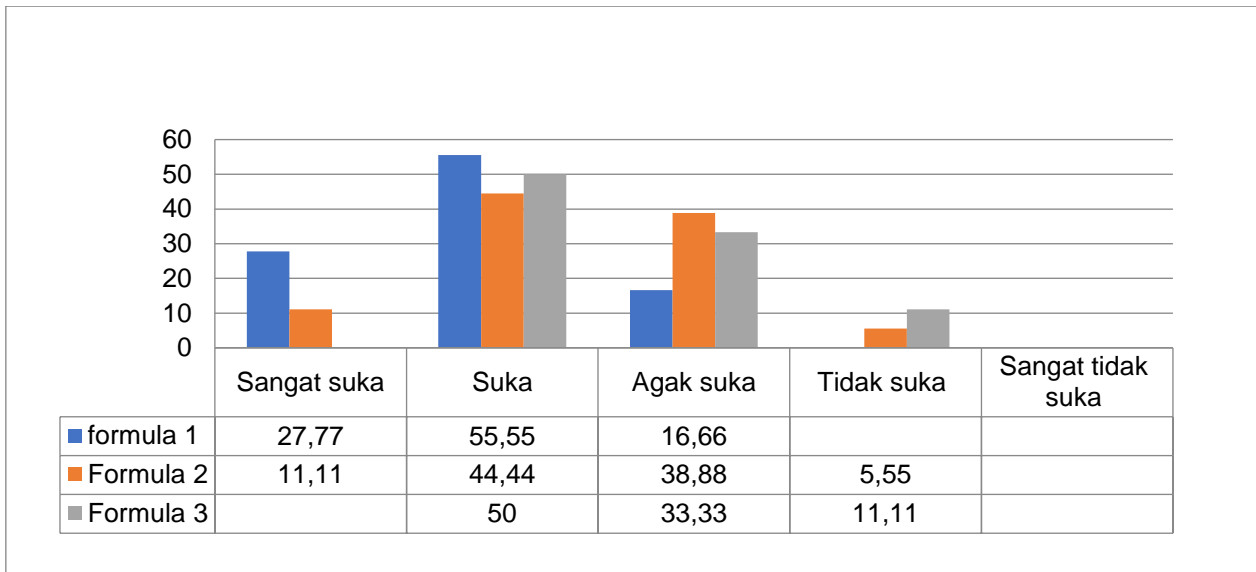


Figure 2 Organoleptic aroma test

From the results of the preference test data from the red ginger syrup panelists regarding the aroma that the panelists liked, the most panelists said they liked formula 1 at 55.55 and also the choice of really like it, was chosen by 27.77% of the panelists for formula 1. Meanwhile, 50% panelists liked the aroma of formula 3 and in formula 2, only 44.44% of panelists said they liked the aroma.

### Organoleptic taste test

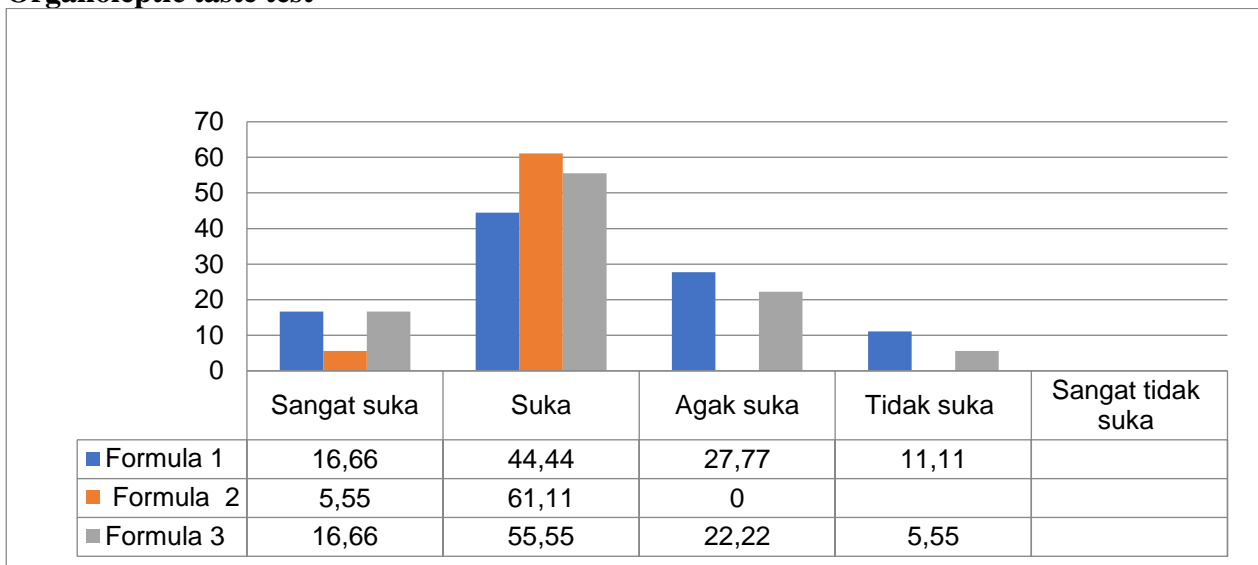


Figure 3 Organoleptic Taste Test

From the results of the red ginger syrup panelists' preference test for the taste of the three formulas, it was found that the majority (61.11%) said they liked the taste of formula 2, compared to 55.55% in formula 3 and 44.44% in formula 1. 11.11% of panelists did not like the taste of formula 1.

### Organoleptic viscosity test

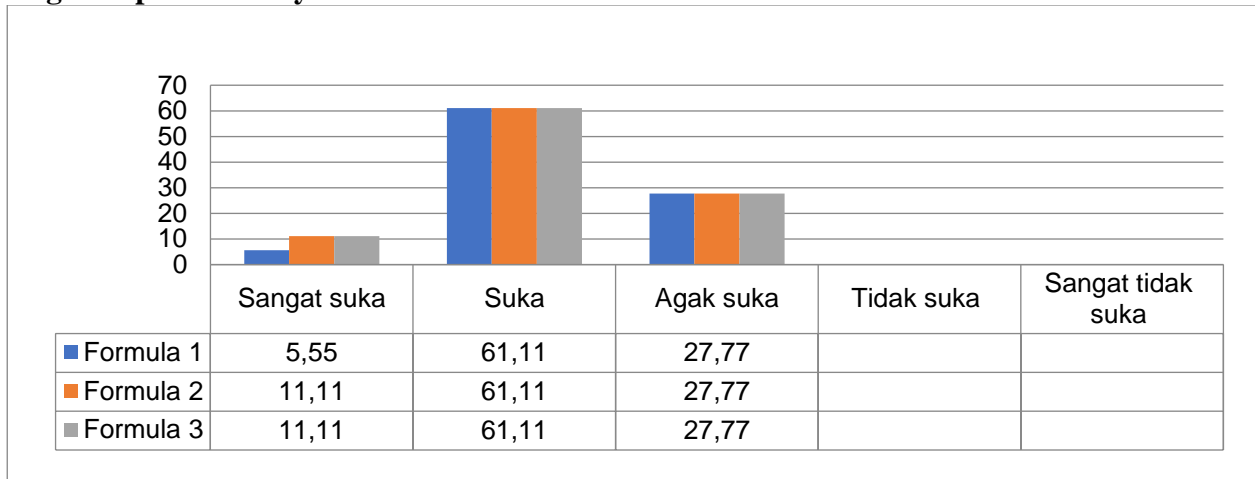


Figure 4 Organoleptic Viscosity Test

In the viscosity test, the panelists had opinions that were not too different for the three formulas, where 61.11% of the panelists said they liked the viscosity of the three formulas.

### Packaging preference test results

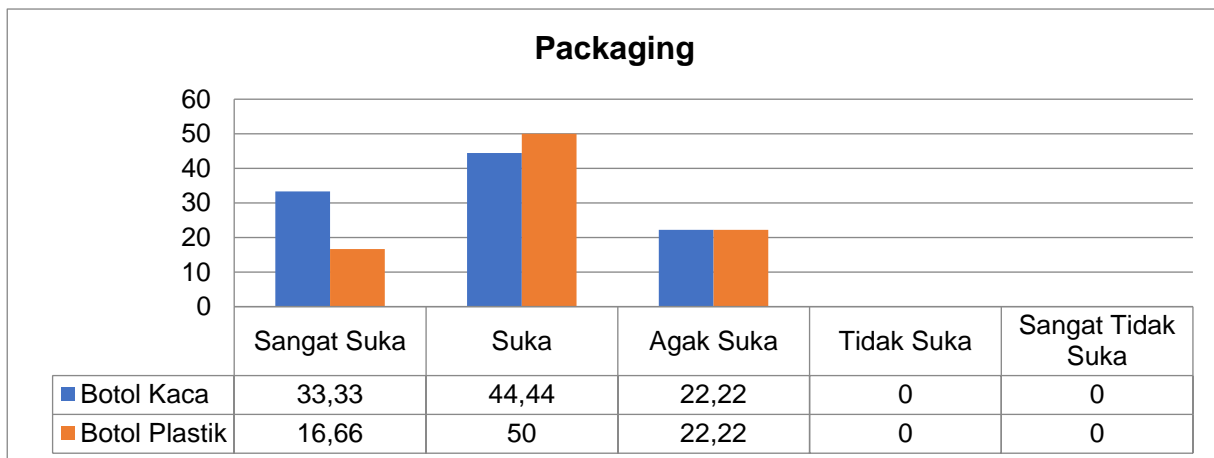


Figure 5 Test the Likes of Syrup Packaging

Panelists were asked to choose the packaging they preferred from the two types of packaging used in this study. It was found that the most results. 50% of panelists said they liked plastic bottles, compared to glass bottles, which were preferred by 44.44% of panelists as can be seen in Figure 5.

Domestic demand for red ginger continues to increase every year because many Indonesians are interested in the health benefits of the rhizomes and spices (Saputro & Anggrasari, 2021)(Miranda, 2023). High public interest has encouraged diversification of processed products from red ginger (Diana & Darmawan, 2023). This aims to improve the economic value of a basic ingredient, besides that processed products can facilitate the consumption of red ginger, facilitate transportation, and expand product affordability for all levels of society(Sinurat et al., 2021). Red ginger syrup is a form of diversification from the basic ingredient of red ginger. In principle, making syrup is done by mixing red ginger juice with a high level sugar solution so that a thick liquid is formed(Rahmawati et al., 2022).

Red ginger syrup is obtained by mixing red ginger juice with sugar solutions and to obtain a syrup solution that is thick and has a spicy taste. To make red ginger syrup, use other additional ingredients in the form of lemongrass, cinnamon and granulated sugar. The purpose of adding lemongrass is to add aroma and improve the taste of the syrup. Apart from that, the addition of lemongrass adds to the benefits of red ginger syrup because lemongrass is known to act as an antifungal, antibacterial and anti-inflammatory (Shah et al., 2011) (Mukarram et al., 2022) (Boukhatem et al., 2014). This is because lemongrass leaves contain secondary metabolites such as flavonoids, saponins, alkaloids, polyphenols and essential oils. The higher the levels of flavonoids, the higher the benefits of flavonoids as antioxidants (Sholehah et al., 2022) (Pratiwi & Juniarto, 2022)

The addition of cinnamon functions to improve the taste and aroma of red ginger syrup so that it can provide a sweet taste and aroma. Cinnamon can also act as a preservative for red ginger syrup because it contains eugenol and cinnamylaldehyde. Add sugar to improve the spicy taste of red ginger. Apart from that, sugar can also increase the viscosity of the syrup and give it a more defined brown color due to the browning reaction formed during the process of forming red ginger syrup.

The container that will be used to hold the red ginger syrup must be sterilized first. The goal is to ensure that there is no bacteria in the bottle so that it can extend the product's shelf life. After that, stickers were prepared to be attached to the red ginger syrup container to make the product more attractive. In making labels, the design application, color, label sticker material and label size are selected according to the size of the container. The aim of making label stickers for packaging is to provide an explanation of the contents of the product in language that is easy to understand. Apart from that, labels are used with the aim of attracting customer attention (Oliveira et al., 2016). Researchers chose bright colors by adding the characteristics of the product. The material for the labeling sticker uses plastic so that it does not mix with the writing ink from the labeling

For the organoleptic quality testing process, each syrup formula is prepared by dissolving it in warm water with a concentration ratio of 50:50. Organoleptic testing is a testing method using the five senses or also called sensory testing and has been around since humans started using their senses to assess the quality and safety of food and drinks. Organoleptic testing is the process of product identification through the five senses that humans have, namely the senses of sight, smell, taste, touch and hearing (Pan & Pan, 2019).

Organoleptic tests were carried out on red ginger syrup for the categories of color, aroma, taste and viscosity. The panelists selected to assess were 18 trained panelists who were students majoring in nutrition who had received training as panelists. The data obtained was then analyzed descriptively qualitatively on the organoleptic quality of red ginger syrup consisting of color, aroma, taste and viscosity using a hedonic scale. The scale in the hedonic test is used to determine differences in product quality by giving a score according to the level of liking for the product. This level of liking varies from very like, like, somewhat like, dislike and very dislike or what is known as the hedonic scale. The principle of implementing the hedonic test is the panelists' assessment of their preferences for a product in the form of a hedonic scale.

Product color is one factor in the attractiveness of a product. In this study, the color comparison of the three formulas was assessed by the panelists using a Likert scale where it was found that the panelists said they liked the color of the third formula the most. Color is the first identifying sign and quality attribute of a product because color is the main attraction of a product. Color should give an attractive impression so that the product is more easily accepted. The color of a processed food or drink should not deviate too much from the color of the product's raw materials because it affects the assessment of its quality.

Aroma is one of the factors assessed by looking at the panelists' responses to the product. Aroma is a smell that is smelled by the nose due to stimulation of the nerves in the nasal cavity. Smell is a response when volatile compounds from a food or drink enter the nasal cavity and are felt by the olfactory system. The aroma of this syrup is the aroma of red ginger because the smell of red ginger is quite sharp. Aroma is one of the factors determining the deliciousness of food and beverage products, so it is usually one of the factors determining the level of consumer acceptance of product

quality(Maina, 2018).The results of the quality test of red ginger syrup from the assessment of the aroma of red ginger syrup can be seen that 55.55% of panelists said they liked formula 1. The aroma of ginger syrup is mainly influenced by the essential oil content, namely zingiberol and zingiberene and other oleoresin components..

Taste is a factor that determines comfort in consuming a product. The taste of a product is influenced by temperature, chemical compound content, concentration and interaction of its constituent ingredients (Chen et al., 2018). The panelists most often chose the option they liked the second formula, namely 61.11%. Taste is part of the taster's sensory response to a food or drink. Red ginger syrup generally has a spicy taste so sugar is added as a sweetener. Sugar also acts as a balance between sour and bitter tastes(Lee & Owyang, 2017).

The taste that is captured through the sense of taste is formed due to the combination of the composition of red ginger syrup. In this research, the difference between the three formulas lies in the composition of red ginger and sugar. The response of the panelists' tongues to the stimulation provided by red ginger syrup influenced their level of acceptance of this syrup. Taste has an important role in product acceptance, because even though it has good color, aroma and viscosity, with a bad taste, the level of acceptance of the product will be lower (Martin et al., 2023).

One of the factors that influences the acceptance of syrup products by consumers is viscosity. A good syrup should be thick enough, but not difficult to pour.The viscosity assessments of the three formulas were not much different, but it was apparent that the panelists preferred F2 and F3 over F1. This is because F1 is thicker than the other two formulas. The viscosity of a solution will increase in direct proportion to the increase in the total concentration of dissolved solids in it (Ju et al., 2019). The thickness of red ginger syrup is influenced by the heating process and sugar composition. Heating a product will increase its viscosity (Dominique et al., 2013). Apart from that, formulas with higher sugar content, such as pF1, have a thicker consistency compared to other formulations.

From the results of the analysis of red ginger syrup on color, aroma, taste and viscosity which was made using SPSS, the Non-Parametric Test was used, namely: Kruskal Wallis, which was caused by the data being distributed abnormally, the obtained value was  $-p(0.00) > 0.05$  so there is no difference in color, aroma, taste and viscosity of red ginger syrup.

From the results of the preferred packaging assessment for the glass and plastic bottles used, the panelists assessed the message, image, design and color of the labels on the packaging. The percentage of panelists who chose plastic bottles was greater than glass bottles. This can be caused because plastic packaging is lighter so it is easier to use for pouring red ginger syrup.

## **CONCLUSIONS AND SUGGESTIONS**

Panelists' preference test data revealed that 61.11% of red ginger syrup panelists liked formula 3, 50% liked formula 2, and 44.44% liked formula 1. Panelists preferred formula 1's aroma at 55.55, with 27.77% choosing it as their favorite. Formula 3's aroma was preferred by 50%, and formula 2's aroma was preferred by 44.44%. The majority of panelists (61.11%) preferred formula 2, with 55.55% preferring formula 3 and 44.44% preferring formula 1, with 11.11% disliking formula 1. The panelists' opinions on the viscosity test were similar across the three formulas, with 61.11% of them expressing their preference for the viscosity. Panelists preferred plastic bottles 50% of the time, while 44.44% preferred glass bottles, according to a study. Based on the study, it can be suggested that formula 2 is the most preferred choice among panelists, with a majority of 61.11% expressing their preference for it. Additionally, the results indicate that there is a slight preference for plastic bottles over glass bottles, with 50% of panelists choosing plastic as their preferred packaging option.

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## Conflict of Interest Statement

No Conflict of Interest

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