



KEMENTERIAN PENDIDIKAN TINGGI

PITRAM 2026

Pertandingan Inovasi Antara Asasi Malaysia

Extended Abstract Book



11 dan 12 APRIL 2026

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KEMENTERIAN PENDIDIKAN TINGGI



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Chewrasa Herba: A Soothing Lozenge With White Roselle And Ginger

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ABSTRACT

Herbal gummy lozenges are gaining attention as functional confectionery products due to their potential health benefits and improved consumer acceptability. However, conventional lozenges are often hard, difficult to swallow, and commonly contain synthetic ingredients that may not be suitable for sensitive users. In addition, although Red Roselle has been widely studied, White Roselle remains underexplored despite its antioxidant and anti-inflammatory potential. This study aligns with Sustainable Development Goals (SDG) 3 (Good Health and Well-being), SDG 9 (Industry, Innovation and Infrastructure), and SDG 12 (Responsible Consumption and Production) by promoting healthier, innovative, and natural product development. Therefore, this study aims to prepare lozenges containing White Roselle and ginger extract, and to evaluate their texture properties, including texture, aroma, appearance, and elasticity. The gummy lozenges were prepared using a standardized formulation process involving weighing, mixing, heating, and molding to obtain a uniform product. Sensory evaluation was conducted with 35 participants using structured questionnaires to assess consumer perception and preference. The findings indicated that Red Roselle with ginger was the most balanced formulation (57.14%) and the most preferred (51.43%), followed by White Roselle with ginger and Chrysanthemum with ginger. In conclusion, although White Roselle lozenges were successfully developed and evaluated, Red Roselle demonstrated higher consumer acceptance. This study highlights the potential of herbal gummy lozenges as a natural alternative to conventional products. The formulation developed shows promising commercial potential as a functional, consumer-friendly lozenge while supporting sustainable and responsible product innovation.

Keywords: Herbal gummy lozenges, White Roselle, Ginger extract, Sensory evaluation, Consumer preference

1. INTRODUCTION

White roselle (*Hibiscus sabdariffa*) is a lesser-known variety of roselle valued for its milder taste and potential health benefits, including antioxidant and soothing properties (Almajid et al., 2023). In recent years, there has been increasing consumer demand for natural and plant-based remedies, particularly for minor ailments such as throat irritation caused by infections, environmental factors, or vocal strain.

Conventional throat lozenges are widely used to provide temporary relief; however, many products contain synthetic ingredients that may not be suitable for all users. This has created a need for safer, natural alternatives that are both effective and acceptable in taste and texture. Therefore, this project introduces Formulating a Soothing Lozenge with White Roselle and Ginger (*Zingiber officinale*), branded as ChewRasa Herba, which focuses on developing a

natural and consumer-friendly functional lozenge. By incorporating natural ingredients with potential therapeutic benefits, this innovation aims to provide a more effective and pleasant alternative to conventional lozenges.

The development process encompasses raw material preparation, controlled heating and mixing, molding, and solidification to achieve a stable gummy formulation, as outlined by Almajid et al. (2023). Given its preliminary nature, the evaluation is strictly limited to sensory analysis, including texture, aroma, appearance, and elasticity, based on consumer perception. This feedback was gathered from 35 respondents who participated in a sensory evaluation utilizing structured questionnaires. Consequently, this study excludes clinical testing, medical validation of therapeutic effects, chemical stability testing, long-term storage analysis, and pharmaceutical-grade production standards.

The initiative for this research stems from the fact that commercial lozenges frequently contain synthetic ingredients that may not suit sensitive consumers. While the demand for natural throat relief products is steadily increasing, the development of purely herbal lozenges remains limited. Furthermore, white roselle is highly underexplored in this context despite possessing significant potential soothing and antioxidant properties. This highlights a clear need to develop a safe, natural, white roselle-based lozenge as an alternative remedy.

To address these gaps, the primary objectives of this project are twofold: first, to successfully prepare lozenges containing white roselle and ginger extract, and second, to comprehensively evaluate their consumer-perceived quality through detailed sensory and texture analyses encompassing texture, aroma, appearance, and elasticity.

2. METHODOLOGY

This project focuses on the formulation of a white roselle-flavored soothing lozenge with ginger, aiming to produce a safe and acceptable product in terms of taste and texture. The methodology is carried out in three main phases, starting with raw material preparation, followed by gummy lozenge formulation and production, and finally evaluation and packaging of the finished product (Figure 1).

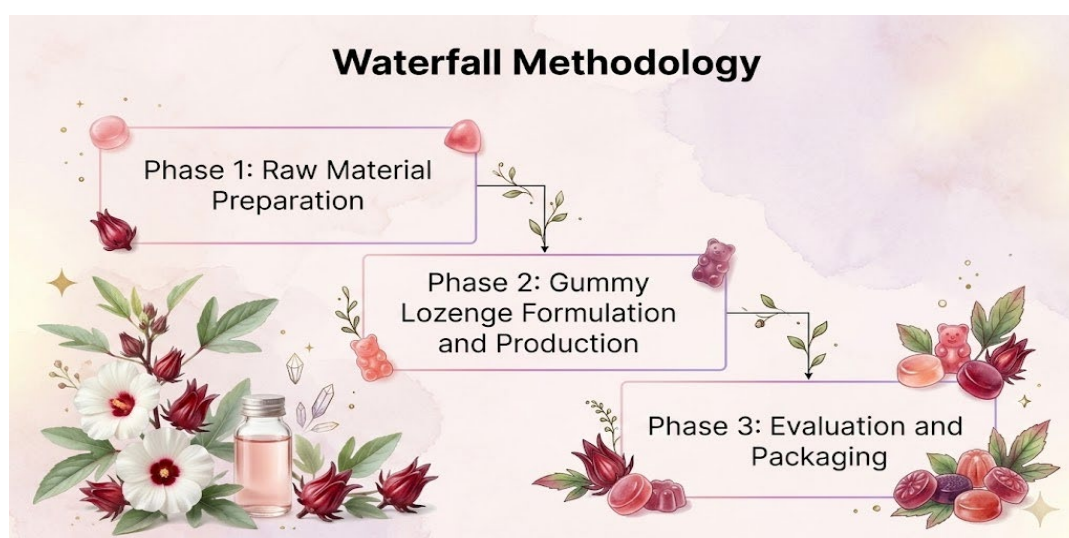


Figure 2. Waterfall Methodology

2.1 Phase 1: Raw Material Preparation

Phase 1 involves raw material preparation, where fresh White Roselle calyces and ginger were selected as the main ingredients. Gelatin was used as the gelling agent, honey as a sweetener, and water as the base for extraction and formulation.

The White Roselle and ginger extracts were prepared by boiling in hot water to obtain concentrated solutions. The extracts were then strained to remove solid particles and blended to ensure a smooth consistency suitable for gummy formulation.

Finally, gelatin was dissolved into the prepared extracts, while honey was gently warmed to facilitate mixing. All ingredients were carefully measured to ensure accurate proportions for the gummy lozenge formulation.

2.2 Phase 2: Gummy Lozenge Formulation and Production

Phase 2 is the gummy lozenge formulation and production stage. Gelatin was first added into the ginger decoction and stirred until fully dissolved. This step is important to make sure the gelatin is cooked properly and forms a smooth, lump-free mixture that will give a soft and chewy texture.

Next, the White Roselle extract was added into the mixture and gently heated while stirring until everything was well mixed. The heating was controlled to avoid overcooking, and stirring was done carefully to prevent bubbles that could affect the texture and appearance of the lozenges.

After that, the heat was turned off, and honey was added for sweetness. The mixture was then poured into silicone molds and left at room temperature for a short time before being placed in the refrigerator for 2 to 3 hours until fully set and firm.

2.3 Phase 3: Evaluation and Packaging

Phase 3 involves evaluation and packaging of the gummy lozenges. The finished gummies are stored in an airtight container to prevent them from drying out or absorbing moisture, ensuring that their texture and quality are maintained.

After that, the product is labelled with important information such as ingredients, basic nutritional content, and storage instructions. This is to ensure proper identification, safe usage, and correct storage by users.

3. RESULTS AND DISCUSSION

3.1 Texture Analysis of Gummy Lozenges with Different Plant Extracts

The gummy lozenge formulations using White Roselle, Red Roselle, and Chrysanthemum were successfully produced and formed stable gel structures after cooling (Figure 2). All samples showed a uniform shape, smooth surface, and acceptable firmness, indicating that the gelatin concentration and formulation method were suitable for gummy production. No defects such as phase separation, excessive stickiness, or incomplete gelation were observed, showing that the heating and mixing processes were well controlled.

The good gel formation suggests that the formulation parameters, especially gelatin hydration and heating conditions, were appropriate for developing a stable structure. Gelatin acts as a gelling agent by forming a three-dimensional network that traps water and other components, producing the gummy texture (Kaewpetch et al., 2024). Consistent ingredient proportions such as ginger extract, honey, and gelatin also contributed to product stability.

Differences in color and aroma among the samples were mainly due to the type of plant extract used rather than formulation errors. This shows that the extraction methods successfully preserved the natural properties of each ingredient while maintaining overall product uniformity (Roudbari, 2024).

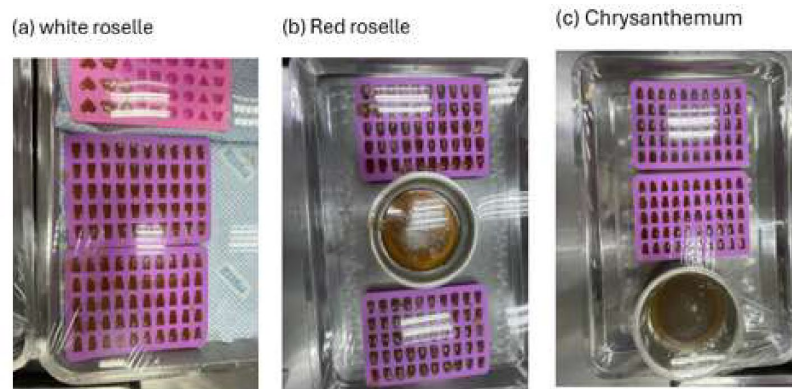


Figure 2. Three formulas of lozenges

3.2 Sensory Analysis of Gummy Lozenges

Sensory evaluation was conducted to assess consumer acceptance of three gummy lozenge formulations based on appearance, color, aroma, texture, sweetness, taste, aftertaste, and overall acceptability. Statistical analysis using one-way ANOVA (Table 1) showed that there were no significant differences ($p > 0.05$) among all samples for the evaluated attributes.

Although no significant differences were found, the Red Roselle (Sample B) formulation recorded the highest mean scores for most parameters, including overall acceptance, followed by White Roselle (Sample A) and Chrysanthemum (Sample C). This indicates a general preference trend towards the Red Roselle sample, even though all formulations were considered acceptable. The percentages of acceptance and taste balance are shown in Table 1.

Table 1: Overall sensory properties of soothing lozenges

Sample	A	B	C
Appearance	4.11 ± 1.76 ^a	4.34 ± 1.77 ^a	4.06 ± 1.89 ^a
Colour	4.09 ± 1.79 ^a	4.31 ± 1.89 ^a	4.06 ± 1.89 ^a
Aroma	3.20 ± 1.76 ^a	3.46 ± 1.92 ^a	3.57 ± 1.84 ^a
Texture	3.74 ± 1.77 ^a	3.69 ± 1.81 ^a	3.77 ± 1.86 ^a
Sweetness	2.49 ± 1.38 ^a	3.26 ± 1.67 ^a	3.06 ± 1.85 ^a
Taste	2.46 ± 1.25 ^b	3.34 ± 1.64 ^a	2.97 ± 1.77 ^{ab}
Aftertaste	2.69 ± 1.61 ^a	3.37 ± 1.73 ^a	3.17 ± 1.98 ^a
Overall acceptance	3.29 ± 1.64 ^a	3.77 ± 1.72 ^a	3.26 ± 1.77 ^a

Data values are expressed as mean ± standard deviation of 35 replicates (n=35). Values with different superscripts within the row are significantly different at ($p < 0.05$); Sample A: White Roselle: Ginger; Sample B: Red Roselle, Ginger; Sample C: Chrysanthemum, Ginger.

The lack of significant differences suggests that sensory properties were mainly influenced by the standardized base formulation rather than the type of plant extract used. Consistent ingredient ratios contributed to stable texture and sweetness, which are important factors in confectionery acceptance (Renaldi, 2022).

The slightly higher preference for Red Roselle may be due to its stronger color and flavor, which enhances visual appeal and taste perception. However, all formulations remain suitable for product development, with potential improvements in flavor intensity and sweetness balance (Kaewpetch et al., 2024).

Based on pie chart analysis (Figure 3 and Figure 3), Sample 436 (Red Roselle with Ginger, Sample B) was identified as the most balanced and most preferred formulation among respondents, indicating the highest consumer acceptance compared to the other samples. Sample 321 corresponds to White Roselle (Sample A), while Sample 249 represents Chrysanthemum (Sample C).

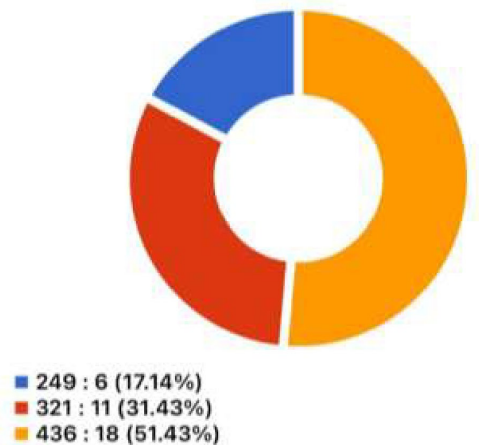


Figure 3. Pie chart of preferred sample

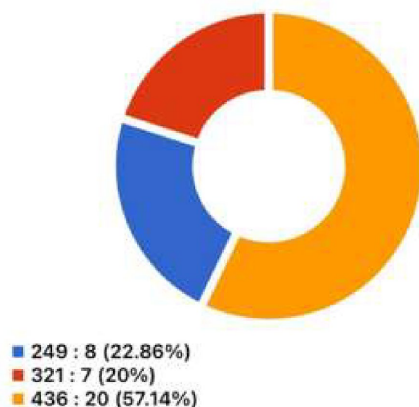


Figure 4. Pie chart of most balanced sample

4. CONCLUSION AND POTENTIAL COMMERCIAL

The main objective of this project was to prepare gummy lozenges containing white roselle and ginger extract and to evaluate their texture and sensory characteristics. Based on the results obtained, three formulations (white roselle, red roselle, and chrysanthemum with ginger) were successfully produced, all showing stable gel structures with acceptable texture, firmness, and appearance. Texture analysis confirmed that all samples were free from defects such as stickiness, phase separation, or structural instability, indicating that the formulation process was well controlled.

Sensory evaluation showed no significant differences ($p > 0.05$) among all formulations for all attributes. However, the red roselle with ginger sample recorded slightly higher preference and was identified as the most balanced formulation based on pie chart analysis. Despite this, the white roselle with ginger formulation, which is the focus of this project, also demonstrated acceptable sensory qualities. Overall, the findings show that white roselle has good potential as a natural ingredient for gummy lozenge development with satisfactory texture and consumer acceptance.

Several improvements can be made to enhance the quality of the gummy lozenge in future studies. The sweetness level can be adjusted to achieve a better taste balance, while the type and concentration of gelatin can be optimised to produce a more ideal chewy texture. In addition, maintaining consistent ingredient proportions is important to ensure fair comparison between formulations. Future sensory evaluations should also involve a larger number of respondents or trained panelists to obtain more accurate and reliable results.

From a commercial perspective, the formulation shows potential for development as a natural throat-soothing product. Improvements in flavor balance, particularly in adjusting sweetness, roselle concentration, and ginger intensity, may further increase consumer acceptance. With proper optimisation, the white roselle and ginger gummy lozenge has potential to be commercialised as a functional confectionery product that offers a natural alternative to conventional lozenges.

ACKNOWLEDGEMENT

At the end of this project, the author would like to express sincere appreciation to everyone who contributed directly and indirectly to the completion of this work. First, the author would like to thank the supervisor, Madam Nur Syahida binti Abdul Rahim, for her continuous guidance, support, and valuable feedback throughout the development of this project. The author also extends appreciation to the co-supervisor, T.S. Dr. Fisal bin Haji Ahmad, for his advice and academic support throughout this study.

The author would also like to acknowledge the teammates, Aisyah Humaira, Auni Nurdini and Nur Adlin for their cooperation, teamwork, and assistance during the preparation, formulation, and evaluation stages of this project. Finally, appreciation is given to the STEM Foundation Centre, Universiti Malaysia Terengganu (UMT) for providing the necessary facilities, resources, and academic environment that contributed to the successful completion of this project.

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