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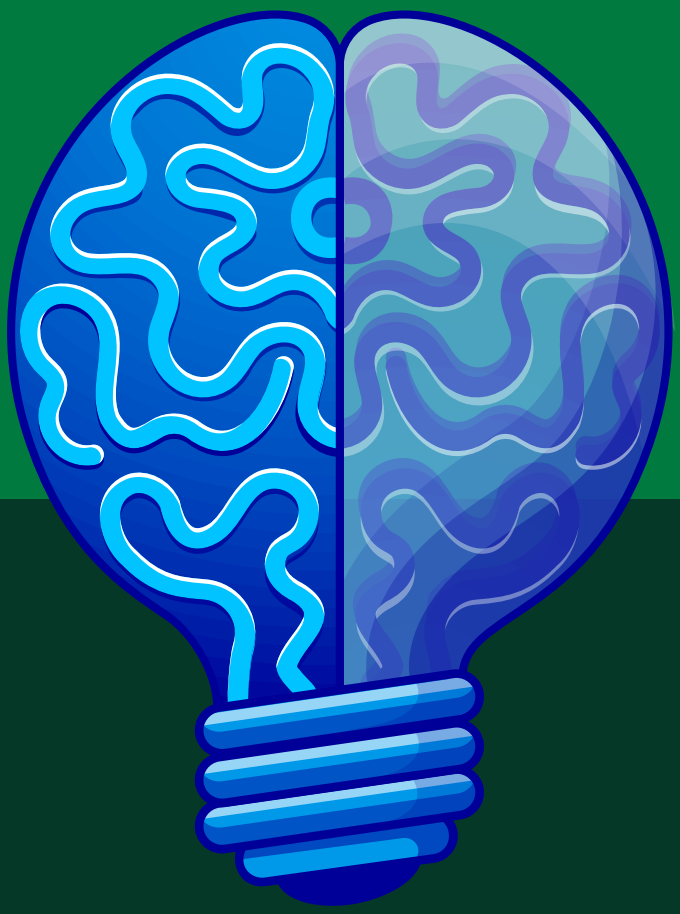

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Preface

The Scientific Project Colloquium offers a platform for publishing Diploma Science final year projects (FYP). The objective is to effectively distribute research findings throughout all scientific disciplines. The primary objective of including final year projects into the course curriculum is to encourage students to put their theoretical knowledge into practical applications.

We would like to express our gratitude to our primary establishment, the Faculty of Applied Sciences and Universiti Teknologi MARA, Perak Branch, for their invaluable assistance.

Lastly, we would like to express our gratitude to all of the authors for the tremendous help in preparing the articles, without which this undertaking would not have been completed.

Editors

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DEVELOPMENT AND EVALUATION OF ROSELLE SOAP USING PALM AND COCONUT OILS

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Abstract: This study focuses on the formulation of natural soap enriched with roselle (Hibiscus sabdariffa) extract using two different base oils: palm oil and virgin coconut oil. Roselle is known for its antioxidant and antibacterial properties, making it a promising natural ingredient for skincare. The objective was to compare the physical and functional qualities of palm oil-based and coconut oil-based soaps, with emphasis on texture, lather, color, and cleansing performance. Soap samples were prepared using the cold process method and tested for cleansing efficiency using marker stain removal time. Findings indicate that coconut oil-based soap produced harder bars with rich, bubbly lather, while palm oil-based soap created softer bars with creamy, stable lather. The palm oil formulation showed faster cleansing (12.76 s) compared to coconut oil (15.63 s), though the latter maintained roselle's reddish-brown color more effectively. This study highlights roselle's potential as a functional and sustainable additive in natural soap production, aligning with growing consumer demand for eco-friendly personal care products.

Keywords: *Roselle, Hibiscus sabdariffa, Soap, Palm oils, Coconut oils*

INTRODUCTION

Growing consumer demand for natural skincare products has encouraged the exploration of plant-based ingredients with functional benefits. Roselle (Hibiscus sabdariffa), a tropical plant rich in anthocyanins, flavonoids, and organic acids, has been studied for its antioxidant, antibacterial, and anti-inflammatory properties (Cavalcanti et al., 2020; Riaz et al., 2021). These compounds contribute to reducing oxidative stress and enhancing skin health.

Several herbal soaps have been developed using turmeric (Monisha, 2021), green tea (Crudu, 2024), and papaya (Heena & Sunil, 2019), demonstrating the potential of plant extracts in improving cosmetic functionality. However, limited studies have examined roselle in soap formulations, especially regarding its stability during saponification and its topical effectiveness.

Palm oil and coconut oil are among the most common soap base oils. Coconut oil produces a harder soap with strong cleansing but can be drying, while palm oil contributes to creamier texture and milder cleansing (Dayrit, 2014; Botanie Soap, 2025). Combining these oils with roselle extract provides an opportunity to develop a soap with enhanced cleansing, aesthetic qualities, and skin benefits.

Therefore, this study aims to formulate roselle soap using palm and coconut oils and evaluate their performance through comparative analysis of texture, lather, color, and cleansing ability.

METHODOLOGY

This research employed the cold process method to prepare Roselle soap. Fresh Roselle calyces were cut into small pieces and boiled in distilled water to extract pigments and bioactive compounds. The extract was then filtered and combined with measured quantities of palm oil or virgin coconut oil. A lye solution, prepared from sodium hydroxide, was added to each mixture. The solutions were mixed with a hand blender until homogeneous, poured into soap molds, and allowed to cure for 24 to 48 hours.

The cleansing ability was assessed using a marker stain removal test. A square mark was drawn on a volunteer's hand, which was then washed with each soap formulation separately. The time taken for complete removal of the stain was recorded. In addition to cleansing, other qualitative observations were made regarding soap texture, lather quality, and retention of Roselle's natural pigment. These parameters provided a comprehensive evaluation of how different oils influenced Roselle soap properties.

FINDINGS

The virgin coconut oil-based Roselle soap produced a harder bar with a reddish-brown hue that reflected greater pigment retention. Its lather was rich, bubbly, and fluffy, consistent with previous reports that coconut oil produces abundant lather due to its lauric acid content (Dayrit, 2014). However, the cleansing test revealed that it took 15.63 seconds to remove the marker stain, making it slightly less efficient compared to palm oil-based soap. While its durability was advantageous, the soap's tendency to be drying on the skin suggests that coconut oil formulations require balancing with conditioning agents.

Table 1 Comparison of roselle soap properties

Aspect	Coconut Oil-Based Soap	Palm Oil-Based Soap
Texture	Harder bar	Softer, brittle bar
Color	Reddish-brown retained	White, muted color
Lather quality	Rich, bubbly, fluffy	Creamy, stable, less bubbly
Cleansing ability	15.93 s	12.76 s

Palm oil-based Roselle soap, in contrast, exhibited a softer texture and produced a creamier, more stable lather. The soap's whitish color indicated muted retention of Roselle pigments, likely due to palm oil's creamy base diluting the extract's natural hue. However, the cleansing test showed superior performance, removing the stain in 12.76 seconds. This supports previous findings that palm oil provides balanced cleansing and moisturizing properties (Botanie Soap, 2025). The refatting quality of palm oil, which helps restore skin lipids, contributed to its gentler feel on the skin, making it more suitable for individuals with sensitive skin.

Overall, the results demonstrate that both oils confer distinct advantages. Coconut oil-based soap excels in hardness and foaming ability, making it durable and visually appealing with a natural reddish tint. Palm oil-based soap, meanwhile, excels in moisturizing capacity and cleansing efficiency, though at the expense of color retention. These findings align with studies on other plant-based soaps, which emphasize the influence of base oils on product characteristics (Arasaretnam & Venujah, 2019).

The incorporation of Roselle further enhances both formulations by contributing antioxidants and antibacterial compounds. This indicates that Roselle-infused soaps not only meet basic cleansing requirements but also provide additional skin benefits, aligning with consumer demand for multifunctional natural skincare products.

CONCLUSIONS

The study demonstrated that Roselle is a valuable additive in natural soap formulations, offering both functional and aesthetic benefits. Coconut oil-based Roselle soap produced harder bars with rich lather and color retention but required longer time for cleansing. Palm oil-based Roselle soap, by contrast, provided creamier lather, gentler cleansing, and faster stain removal, though its texture was softer and color less vibrant. These differences underline the importance of oil selection in soap-making.

For future improvements, stability testing should be conducted to assess soap durability over time. Incorporating natural hardeners such as beeswax or cocoa butter could improve texture, while the use of natural pigments like beetroot powder may enhance color stability. Expanding research into consumer acceptability and dermatological testing will also provide further insights into the commercial viability of Roselle soap. Ultimately, Roselle soap offers a sustainable, eco-friendly, and health-conscious alternative to commercial soaps, aligning with global trends toward natural skincare solutions.

COMPLIANCE OF ETHICAL STANDARDS

Not applicable.

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Sekian, terima kasih.

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