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Formulation Soap Wash Extract Based Plates Kepok Banana Peel , Starfruit Wuluh , and Papaya Leaves: Evaluation of pH and Foaming Power

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ARTICLE INFO	ABSTRACT
Article History: Diterima: 25 Agustus 2026 Disetujui: 20 Oktober 2026 Dipublikasi: 31 Oktober 2026	This study examined the pH and foam formation characteristics of four dishwashing soap formulations made from extracts of kepok banana peel (<i>Musa paradisiaca</i>), starfruit (<i>Averrhoa bilimbi</i>), and papaya leaf (<i>Carica papaya</i>), with the addition of sodium carbonate (Na_2CO_3) and surfactants. This study used an experimental approach. Reported pH values ranged from 7.24 to 7.92. Foam height was 1 cm in formulation F1 and 2 cm in formulations F2, F3, and F4. Foam durations were 10, 15, 25, and 20 seconds, respectively. Formulation F3 showed the longest foam duration based on reported observations. These findings are descriptive in nature as the number of replicates and measurement variations have not been presented. The final products were not directly tested for antibacterial activity; therefore, this study does not conclude that the combination of kepok banana peel, starfruit, and papaya leaf has antibacterial effectiveness. Further testing is needed to evaluate their cleaning performance, stability, and antibacterial activity.
Keywords : starfruit, papaya leaves, kepok banana peel, dishwashing soap.	
Kata kunci: LELONG.ID, Ekonomi Biru, Rantai Pasok Perikanan, Biodiversitas Laut, Integrasi Islam.	Penelitian ini mengamati karakteristik pH dan pembentukan busa dari empat formulasi sabun cuci piring yang dibuat dari ekstrak kulit pisang kepok (<i>Musa paradisiaca</i>), belimbing wuluh (<i>Averrhoa bilimbi</i>), dan daun pepaya (<i>Carica papaya</i>), dengan penambahan natrium karbonat (Na_2CO_3) dan surfaktan. Penelitian ini menggunakan pendekatan eksperimental. Nilai pH yang dilaporkan berkisar antara 7,24 hingga 7,92. Tinggi busa sebesar 1 cm pada formulasi F1 dan 2 cm pada formulasi F2, F3, dan F4. Daya tahan busa masing-masing adalah 10, 15, 25, dan 20 detik. Formulasi F3 menunjukkan daya tahan busa terlama berdasarkan hasil pengamatan yang dilaporkan. Temuan ini bersifat deskriptif karena jumlah ulangan dan variasi pengukuran belum disajikan. Produk akhir tidak diuji secara langsung terhadap aktivitas antibakteri; oleh karena itu, penelitian ini tidak menyimpulkan bahwa kombinasi kulit pisang kepok, belimbing wuluh, dan daun pepaya memiliki efektivitas antibakteri. Diperlukan pengujian lebih lanjut untuk mengevaluasi kinerja pembersihan, stabilitas, dan aktivitas antibakterinya .

INTRODUCTION

Waste House ladder become material highlight related many waste produced every Today . Waste is one of the production processes in industry, households, and the environment that cannot be separated from the manufacture of a product. According to the Central Statistics Agency (2023), the amount of household waste in Indonesia has increased sharply over the past 10 years, so the urgency of household waste requires more attention. Among household waste that can provide more benefits if managed is food waste, both organic and non-organic. Bananas as an organic food have great potential for waste, such as being used as processed foods such as cupcakes, food bars, sponge cakes, and jam. In addition, there are also uses as liquid organic fertilizer, solid fertilizer, animal feed, activated carbon, activated charcoal, eco-enzymes, and can also be used as a cosmetic ingredient, namely shampoo (Lestari et al., 2025).

Bananas are one of Indonesia's leading fruits, consisting of flowers, fruit, peel, leaves, tubers, and stems, each with its own benefits. Banana peels, which are commonly used to make fertilizer, have proven to have potential for other uses, including making environmentally friendly dishwashing soap, using substances found in starfruit as natural surfactants. According to Bardin and Lumowa (2018), the active ingredients in kepok banana peels include flavonoids, alkaloids, tannins, saponins, and triterpenoids. Therefore, there is potential for making dishwashing soap from banana peels to inhibit bacteria (Tivani & Perwitasari, 2021).

Starfruit (*Averrhoa bilimbi*) has long been known for its strong sour taste in traditional medicine and home cooking. Its high oxalic acid and vitamin C content makes it a natural cleaning agent. Its mild abrasive properties and the fat-dissolving properties of organic acids make starfruit a popular choice as a base ingredient for dishwashing soap. Its potential as a base ingredient for dishwashing soap is based on its ability to emulsify oil and dissolve dirt. The acid in starfruit can react to break down fat bonds, making them easier to remove from the surfaces of plates and utensils. Starfruit, often wasted, was chosen because of its potential use as a raw material for dishwashing soap and its natural antibacterial properties that can help clean utensils (Darajat et al., 2022).

This effort also aims to provide a solution for waste management and reduce the use of chemicals in dishwashing soap, thus positively impacting human life. This initiative aligns with the Quranic verse, Surah Yasin 36:12, where Allah says:

وَأَنذَرَهُمْ ۖ كُلَّ شَيْءٍ أَحْصَيْنَاهُ فِي إِمَامٍ مُّبِينٍ God willing

Translation:

"Indeed, it is We who give life to the dead and We (also) record what they have done and the marks they (leave behind). We collect everything in a real master book (Lauhul Mahfuz)." (Ministry of Religion of the Republic of Indonesia, 2022)

Tafsir al-Qurtubi explains the above verse by dividing it into four sections. In the second section, every human being has a record of all their deeds. Qatadah, Mujahid, and Ibn Zaid said that the meaning is good deeds. In line with His words in Surah al-Infitar verse 5, Surah al-

Prophet Muhammad SAW. said the meaning of the verse above.

Translation:

This study aims to describe the pH value and foaming characteristics of four dishwashing soap formulations made from extracts of kepok banana peel, starfruit, and papaya leaves with the addition of sodium carbonate (Na_2CO_3). The antibacterial activity of the products was not directly tested in this study; the discussion regarding the antibacterial potential of the ingredients is based solely on previous research.

This research is a quantitative study with an experimental approach. The study was conducted by creating four dishwashing soap formulations from extracts of kepok banana peel

(*Musa paradisiaca*), starfruit (*Averrhoa bilimbi*), and papaya leaves (*Carica papaya*), with the addition of sodium carbonate (Na_2CO_3) and surfactants. The parameters observed in this study were pH and foaming power. The antibacterial activity of the final product was not directly tested, so the results of the study cannot be used to conclude the product's antibacterial effectiveness.

Making Starfruit Extract

Fresh, ripe starfruit was selected, washed under running water, and then cut into pieces of approximately 1–2 cm. A total of 100 g of starfruit pieces was placed in a stainless steel pan and 600 mL of distilled water was added. The mixture was heated at approximately 90–100 °C for 40 minutes, stirring every 5 minutes. The mixture was then filtered using a clean filter cloth; the filtrate was gently squeezed and its volume was measured. The filtrate was reheated at 75 °C for 10 minutes and then stored in a clean, closed container in the refrigerator.

Making Kepok Banana Peel Extract

Kepok banana peels were selected, washed under running water, and then cut into pieces of approximately 1–2 cm. A total of 100 g of kepok banana peel pieces were placed in a stainless steel pan and 800 mL of distilled water was added. The mixture was heated at approximately 90–100 °C for 40 minutes, stirring every 5 minutes. The mixture was then filtered using a clean filter cloth; the filtrate was gently squeezed and its volume was measured. The filtrate was reheated at 75 °C for 10 minutes and then stored in a clean, closed container in the refrigerator.

Making Papaya Leaf Extract

Fresh, mature papaya leaves were selected, washed under running water, and then cut into small pieces. A total of 100 g of papaya leaves were boiled in 800 mL of distilled water for 30–40 minutes. The mixture was filtered and the filtrate was taken, then pasteurized at 70–75 °C for 10 minutes. The filtrate was stored in a closed bottle and refrigerated. Papaya leaf extract was used as an additional component in the formulation, but its contribution cannot be separated from the influence of other ingredients because its concentration was not kept constant throughout the formula.

RESULTS AND DISCUSSION

Table 1 presents the composition of the four dishwashing soap formulations tested:

Formula	Kepok Banana Peel Extract (mL)	Extract Star fruit Wuluh / Papaya Leaf (mL)	Sodium Carbonate (Na_2CO_3)*
F1	40 mL	40 mL / 35 mL	9 mL
F2	53.3 mL	20 mL / 35 mL	12 mL
F3	26.7 mL	50 mL / 40 mL	18 mL
F4	45 mL	40 mL / 35 mL	15 mL

1. pH test

The pH values recorded for the four formulations ranged between 7.24 and 7.92. Formula F2 showed the highest pH value (7.92), while F4 showed the lowest pH value (7.24). The available data are presented descriptively; since the number of replicates and interreplicate variations have not been included in this manuscript, differences in values are not interpreted as statistically significant.

2. Soap Foaming Power Test

In the foam height observation, formula F1 produced a foam height of 1 cm, while F2, F3, and F4 each produced a foam height of 2 cm. The recorded foam duration was 10 seconds in F1, 15 seconds in F2, 25 seconds in F3, and 20 seconds in F4. The highest value in this observation was found in F3. These results are descriptive comparisons and cannot be generalized without information on the number of repetitions, variation in results, and standardized testing procedures.

3. Summary of pH and Foaming Power Test Results

Formula	Kepok Banana Peel Extract (mL)	Extract Starfruit / Papaya Leaves (mL)	pH value
F1	40 mL	40 mL / 35 mL	7.31
F2	53.3 mL	20 mL / 35 mL	7.92
F3	26.7 mL	50 mL / 40 mL	7.71
F4	45 mL	40 mL / 35 mL	7.24

Formula	Foam Height (cm)	Duration of Survival (seconds)	Information Observation
F1	1 cm	10 seconds	Doesn't last long
F2	2 cm	15 seconds	Doesn't last long
F3	2 cm	25 seconds	Enough endure
F4	2 cm	20 seconds	Enough endure

4. Antibacterial Potential of Materials Based on Previous Research

Bacteria can be found on kitchen utensils and repeatedly used washing sponges. Gusti et al. (2022) examined the bacterial counts on kitchen sponges. However, this study did not conduct microbiological testing on the four GREENCLEAN formulations produced.

Research by Maulana et al. (2025) reported the antibacterial activity of a combination of kepok banana peel extract and clove oil against *Staphylococcus aureus*. Mulyani et al. (2021) also reported the activity of the ethanol fraction of kepok banana peel against several bacteria. The findings from these previous studies demonstrate the potential of the ingredients under the test conditions reported by each researcher, but do not prove that the GREENCLEAN formulation in this study has the same antibacterial activity.

Research by Saroh (2019), Maryam et al. (2015), and Naufali et al. (2025) discussed the antibacterial activity of starfruit extract against several bacteria. Nugraha and Leliqia (2023) and Raudah et al. (2024) discussed the antibacterial potential of papaya leaf extract with various solvents against a number of bacteria. These results are findings from extracts tested in previous studies, not the results of testing dishwashing soap formulations in this study.

CONCLUSION

The four dishwashing soap formulations studied had pH values between 7.24 and 7.92. F2 showed the highest pH value (7.92), while F4 had the lowest (7.24). In foaming performance

measurements, F1 produced a foam height of 1 cm with a duration of 10 seconds, while F2, F3, and F4 produced a foam height of 2 cm with durations of 15, 25, and 20 seconds, respectively. Among the available observations, F3 showed the longest foam duration, at 25 seconds. These findings are descriptive; without reporting the number of replicates, variation in results, and statistical analysis, differences between the formulas cannot be considered significant. The pH data are also insufficient to declare skin safety or establish compliance with quality standards. This study did not test the antibacterial activity of the final product, so the stated antibacterial potency refers only to previous research and does not prove the antibacterial efficacy of GREENCLEAN. Further research should report the complete formulation procedure, replicate measurements, and test the cleaning power, stability, and antibacterial activity of the final product if such claims are to be made.

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