

Formulation and Acceptability of Philippine Catmon Soap Sheets

Maria Teresa Tartana Samillano

Capiz State University-Main Campus, Roxas City, Philippines

Abstract: Soap sheets represent an innovative advancement in personal hygiene products because they provide convenience, portability, and efficient cleansing. This experimental-developmental study developed and evaluated a portable soap sheet formulated with Philippine Catmon (*Dillenia philippinensis*) extract, a locally sourced natural ingredient for hygiene use. Specifically, the study determined the sensory qualities, general acceptability, and effectiveness of the soap sheets and tested whether significant differences existed among three treatments with varying concentrations of Catmon extract: Treatment A (50 mL), Treatment B (75 mL), and Treatment C (100 mL), while glycerin, clean cotton scent, and foam booster were held constant. The products were evaluated by 100 evaluators composed of cosmetology teachers, students, and consumers using a researcher-made five-point Likert evaluation sheet. Data were analyzed using descriptive means and Analysis of Variance (ANOVA) at the 0.05 level of significance. Results showed that all treatments had an appealing appearance, fine texture, and very foamy consistency, while Treatment C had the most pleasant scent and obtained the highest mean for general acceptability. All treatments were effective in providing smoothing and moisturizing effects, with Treatment C showing the best overall performance, particularly in moisturizing. Statistical results indicated no significant differences among treatments in sensory qualities and in the measured effectiveness attributes. The study concluded that Philippine Catmon extract is a viable ingredient in soap sheet formulation and that higher extract concentration can enhance product performance without compromising acceptability.

Keywords: Soap Sheets, Herbal Soap, Product Acceptability, Natural Products

I. INTRODUCTION

Hand hygiene remains an essential practice for protecting health and preventing the spread of microorganisms. However, some hand soaps may have potential hydrogen (pH) levels or synthetic ingredients that can cause dryness or irritation, particularly among individuals with sensitive skin. This concern has contributed to a growing interest in herbal, natural, and plant-based personal care products. Although many herbal products are available commercially, their cost may limit access for ordinary consumers. This creates an opportunity to develop affordable hygiene products from locally available resources.

Globally, consumers are increasingly drawn to eco-friendly and plant-based personal care products because of concerns about skin safety, biodegradability, and responsible consumption. In the Philippines, indigenous plants provide an important resource for natural product innovation. One such plant is Catmon (*Dillenia philippinensis*), a native fruit-bearing tree whose fruit and other parts have been used traditionally and investigated for bioactive properties (PCAARRD, 2014). Research on Catmon has reported antimicrobial potential against organisms such as *Staphylococcus aureus* and *Escherichia coli*, while studies on *Dillenia philippinensis* have identified compounds with antimicrobial activity (Tubillo et al., 2016; Ragasa et al., 2009).

Soap sheets, also known as paper soaps, are thin soap films designed to dissolve in water and produce foam during washing. Their compact and single-use form makes them practical for travel, school, workplace, outdoor use, and emergency hygiene needs. Prior research on paper soap production has shown that oils and glycerin contribute to the structure, foam stability, and usability of soap sheets (Widyasanti et al., 2018). These characteristics make soap sheets a promising product format for integrating Philippine Catmon extract.

Despite the availability of commercial soap bars, liquid soaps, and some paper soaps, there is limited local research on the formulation of soap sheets using Philippine Catmon extract. The underutilization of Catmon in personal care products suggests a research gap that connects product development, consumer acceptability, and sustainable use of indigenous resources. By developing Catmon-based soap sheets, this study contributes to Technology and Livelihood Education, natural product innovation, and community-based livelihood possibilities.

This study was anchored on the need to create an affordable, portable, skin-friendly, and locally sourced hygiene product. It also supports broader goals related to good health and well-being, industry and innovation, responsible production, and the sustainable use of indigenous plant resources.

Objectives of the Study

This study aimed to develop a soap sheet formulation utilizing Philippine Catmon and determine its acceptability. Specifically, it aimed to:

1. determine the sensory qualities of the Philippine Catmon Soap Sheets in terms of appearance, ability to foam, scent, and texture;
2. determine the general acceptability of the Philippine Catmon Soap Sheets in terms of appearance, ability to foam, scent, and texture;
3. determine the level of effectiveness of the Philippine Catmon Soap Sheets in three treatments in terms of smoothing and moisturizing effects;
4. find out if there is a significant difference in the sensory qualities of the Philippine Catmon Soap Sheets in terms of appearance, ability to foam, scent, and texture; and
5. find out if there is a significant difference in the general acceptability of the Philippine Catmon Soap Sheets; and
6. find out if there is a significant difference in the effectiveness of the Philippine Catmon Soap Sheets in terms of smoothing and moisturizing effects.

II. METHODOLOGY

Methods of Research

The study employed an experimental-developmental research design. The developmental method was used to design, formulate, and refine soap sheets derived from Philippine Catmon fruit extract. The experimental method was used to compare three formulations that differed only in the amount of Catmon extract. The design was appropriate because the study involved both product development and the evaluation of treatment effects on sensory qualities, acceptability, and effectiveness.

Research Design

A Completely Randomized Design (CRD) was adopted to provide an unbiased comparison of treatments. The experimental units were considered homogeneous, and the three treatments were randomly presented to evaluators to minimize order and preference bias. Replication of ratings across 100 evaluators improved the reliability of the results.

Materials and Treatments

Fresh Catmon fruits were collected from Barangay Sta. Teresa, Dumalag, Capiz. Catmon fruit extract served as the main active ingredient, while glycerin functioned as a humectant and plasticizer. Clean cotton scent was added for fragrance, and foam booster was used to improve lather production. Glassine or baking paper served as the forming medium during drying.

Table 1. Experimental treatments and proportions used in the study.

Ingredients	Treatment A	Treatment B	Treatment C
Catmon Fruit Extract	50 mL	75 mL	100 mL
Glycerin	100 mL	100 mL	100 mL
Clean Cotton Scent	5 mL	5 mL	5 mL
Foam Booster	10 mL	10 mL	10 mL
Total Volume	165 mL	190 mL	215 mL

Experimental Procedures

The experimental procedure began with the preparation of Catmon fruit extract. Fresh fruits were washed, peeled, sliced, crushed with a mortar and pestle, and strained to separate the liquid extract from solid residues. The extracted juice was measured according to the required treatment volume and placed in clean beakers.

For soap sheet preparation, glycerin was heated until it reached a uniform liquid consistency. The measured Catmon fruit extract was gradually added and mixed thoroughly. Foam booster and clean cotton scent were then incorporated, and the solution was stirred until homogeneous. Baking paper was dipped into the mixture three times to form thin layers, dried under controlled conditions, peeled off, cut into uniform sheets, packed, and labeled according to treatment.

Evaluation Procedure and Instrumentation

The finished soap sheet samples were evaluated by 100 participants composed of 10 cosmetology teachers, 40 consumers, and 50 students. The evaluators were oriented on the purpose of the study and the proper use of each sample. The three treatments were distributed in randomized order. After testing, evaluators rated the products using a researcher-made evaluation sheet based on a five-point Likert scale.

The instrument measured appearance, foamability, scent, texture, smoothing effect, moisturizing effect, and overall acceptability. Descriptive ratings were interpreted using the following scale: 4.21 to 5.00 indicated the highest category, 3.41 to 4.20 indicated the second-highest category, 2.61 to 3.40 indicated moderate acceptability or effectiveness, 1.81 to 2.60 indicated low acceptability or effectiveness, and 1.00 to 1.80 indicated the lowest category. The evaluation tool was checked for clarity, relevance, and alignment with the study objectives.

Data Gathering and Statistical Analysis

Data were gathered from the completed evaluation sheets immediately after product testing. Responses were checked for completeness, encoded, tabulated, and summarized. Weighted means were used to describe the sensory qualities, general acceptability, and effectiveness of each treatment. Analysis of Variance (ANOVA) was used at the 0.05 level of significance to determine whether significant differences existed among the three treatments.

III. RESULTS AND DISCUSSION

Sensory Qualities of Philippine Catmon Soap Sheets

The sensory evaluation showed that all treatments demonstrated acceptable sensory qualities. Treatment C, which contained 100 mL of Catmon fruit extract, obtained the highest overall sensory mean of 4.00. This result suggests that a higher concentration of Catmon extract improved the product's appearance and scent without reducing its foamability or texture.

In terms of appearance, Treatment C obtained the highest mean of 4.20 and was described as appealing. Treatments A and B both obtained 3.70, also interpreted as appealing. For foamability, all treatments received the same mean of 4.50 and were described as very foamy, indicating that the constant amount of foam booster and glycerin supported consistent lather production. In terms of scent, Treatment C obtained the highest mean of 3.60, described as pleasant, while Treatments A and B were moderately pleasant. For texture, all treatments were described as fine.

Table 2. Sensory qualities of Philippine Catmon Soap Sheets in terms of appearance, foamability, scent, and texture.

Sensory Attribute	Treatment A	Treatment B	Treatment C
Appearance	3.70 (Appealing)	3.70 (Appealing)	4.20 (Appealing)
Foamability	4.50 (Very Foamy)	4.50 (Very Foamy)	4.50 (Very Foamy)
Scent	2.70 (Moderately Pleasant)	3.10 (Moderately Pleasant)	3.60 (Pleasant)
Texture	3.80 (Fine)	3.60 (Fine)	3.70 (Fine)
Overall Sensory Quality	3.68	3.73	4.00

Legend: 4.21-5.00 = very high descriptive category; 3.41-4.20 = high descriptive category; 2.61-3.40 = moderate descriptive category; 1.81-2.60 = low descriptive category; 1.00-1.80 = lowest descriptive category.

General Acceptability of Philippine Catmon Soap Sheets

The general acceptability results indicated that all three formulations were acceptable. Treatment C again obtained the highest overall mean of 4.00, followed by Treatment B with 3.73 and Treatment A with 3.68. Although the numerical differences were small, the trend showed that increasing the concentration of Catmon fruit extract improved consumer preference, especially for appearance and scent.

Foamability received the highest rating across all treatments, with each treatment described as very acceptable. This finding indicates that the soap sheets consistently produced satisfactory lather during use. Texture ratings remained acceptable across treatments, showing that the formulation maintained a usable physical feel despite changes in extract concentration.

Table 3. General acceptability of Philippine Catmon Soap Sheets in terms of appearance, foamability, scent, and texture.

Acceptability Attribute	Treatment A	Treatment B	Treatment C
Appearance	3.70 (Acceptable)	3.70 (Acceptable)	4.20 (Acceptable)
Foamability	4.50 (Very Acceptable)	4.50 (Very Acceptable)	4.50 (Very Acceptable)
Scent	2.70 (Moderately Acceptable)	3.10 (Moderately Acceptable)	3.60 (Acceptable)
Texture	3.80 (Acceptable)	3.60 (Acceptable)	3.70 (Acceptable)
General Acceptability	3.68 (Acceptable)	3.73 (Acceptable)	4.00 (Acceptable)

Legend: 4.21-5.00 = Very Acceptable; 3.41-4.20 = Acceptable; 2.61-3.40 = Moderately Acceptable; 1.81-2.60 = Less Acceptable; 1.00-1.80 = Least Acceptable.

Effectiveness of Philippine Catmon Soap Sheets

The effectiveness results showed that all treatments were effective in providing smoothing and moisturizing effects. For smoothing, the means were very close: Treatment C obtained 4.03, Treatment A obtained 4.02, and Treatment B obtained 4.00. This indicates that the smoothing effect was consistent across extract concentrations. For moisturizing, Treatment C obtained the highest mean of 4.29 and was described as very effective, while Treatments A and B were effective.

The higher moisturizing mean of Treatment C suggests that the increased Catmon extract concentration may have strengthened the skin-conditioning quality of the soap sheets. The presence of glycerin in all treatments also likely contributed to moisture retention and skin softness. Overall, Treatment C achieved the highest effectiveness mean of 4.16.

Table 4. Effectiveness of Philippine Catmon Soap Sheets in three treatments in terms of smoothing and moisturizing effects.

Effectiveness Attribute	Treatment A	Treatment B	Treatment C
Smoothing Effect	4.02 (Effective)	4.00 (Effective)	4.03 (Effective)
Moisturizing Effect	4.20 (Effective)	4.19 (Effective)	4.29 (Very Effective)
Level of Effectiveness	3.90 (Effective)	3.87 (Effective)	4.16 (Effective)

Legend: 4.21-5.00 = Very Effective; 3.41-4.20 = Effective; 2.61-3.40 = Moderately Effective; 1.81-2.60 = Less Effective; 1.00-1.80 = Least Effective.

Differences in Sensory Qualities

The statistical analysis showed that there were no significant differences among treatments in appearance, foamability, scent, and texture at the 0.05 level of significance. Although Treatment C obtained higher mean scores for some sensory attributes, the differences were not statistically significant. Therefore, the null hypothesis for sensory qualities was accepted.

Table 5. Differences in the sensory qualities of Philippine Catmon Soap Sheets.

Sensory Attribute	z	p-value	Remarks
Appearance	3.63	0.163	ns
Foamability	0	1.000	ns
Scent	4.51	0.105	ns
Texture	0.325	0.850	ns

Legend: p-value > 0.05 = ns = not significant; 0.05 = level of significance.

Differences in General Acceptability

The study reported no significant difference in the general acceptability of the three Catmon soap sheet treatments. Although Treatment C obtained the highest descriptive mean, the difference among treatments was not sufficient to

establish statistical superiority. This indicates that all formulations were comparable in terms of overall user preference and that each treatment may be considered acceptable for further refinement or small-scale production.

Differences in Effectiveness Attributes

The ANOVA results for smoothing and moisturizing effects also showed no significant differences among the three treatments. For smoothing, the p-value was 0.851, and for moisturizing, the p-value was 0.382. Both values exceeded the 0.05 level of significance. This means that the variation in Catmon extract concentration did not significantly change the perceived smoothing and moisturizing effects, although Treatment C obtained the highest descriptive means.

Table 6. ANOVA results for the effectiveness of Philippine Catmon Soap Sheets.

Attribute	Between-Groups SS	df	Mean Square	F-value	p-value	Remarks
Smoothing Effect	0.052	2	0.026	0.162	0.851	ns
Moisturizing Effect	0.541	2	0.270	0.967	0.382	ns

Legend: p-value > 0.05 = ns = not significant; 0.05 = level of significance.

IV. CONCLUSION

Overall, the findings confirmed that Philippine Catmon extract can be incorporated into soap sheet formulation without compromising appearance, foamability, scent, texture, acceptability, or perceived skin benefits. Treatment C, which contained the highest concentration of Catmon extract, consistently obtained the highest or most favorable descriptive results. However, the statistical analyses showed that the differences among treatments were not significant. This indicates that all three formulations were acceptable and effective, while Treatment C may be prioritized when the goal is to maximize sensory appeal and moisturizing performance.

The findings support the practical feasibility of developing a portable and locally sourced hygiene product from Philippine Catmon. Since all formulations produced acceptable results, future production may consider either the preferred Treatment C formulation or a cost-efficient lower-extract formulation depending on market needs. Further studies may include antimicrobial testing, pH testing, shelf-life analysis, dermatological safety assessment, and a larger consumer acceptability trial.

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