



## Kamias (*Averrhoa Bilimbi*), Starfruit (*Averrhoa Carambola*), and Karamay (*Phyllanthus Acidus*) Fruit Extract as Alternative Stain Remover

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### ABSTRACTS

This study generally aimed to determine the effectiveness of kamias, star fruit, and karamay fruit extracts in removing stains. Previous studies revealed the effectiveness of Kamias as a stain remover, while, this study compared the effectiveness of different fruit extracts as a stain remover and the potential utilization of other fruit extracts from trees that are locally available. We determined the cost of making stain remover using kamias, karamay, and star fruit extracts, the ability of these fruit extracts as a stain remover in terms of the degree of strain reduction and whitening of the cloth, and ultimately, the significant difference between the various treatments. Results revealed that the use of star fruit extract was the cheapest among the four treatments while the highest cost was incurred using Karamay extract. There was a significant difference observed between treatments. Bleach was the most effective in removing the stains and whitening the fabric, followed by the kamias extract. In terms of removing stains, whitening the cloth, and availability in the neighborhood, the extract was found to have the best results. We, therefore, recommended the use of kamias extract as an alternative organic stain remover for fabrics and be used by the households. Being derived from natural fruit extract and contain no dangerous chemicals, the product is safe for human use and environment-friendly.

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## 1. INTRODUCTION

Stain is one of the common problems of households especially to those who cannot afford to buy expensive bleach. Using commercial bleach can cause harm to humans and to the environment as well.

Related studies about bleaching have been done include the Effectiveness of kamias as an alternative stain remover (Martinez, 2013), Pineapple peels as organic stain removal and whitening agent on fabrics passion fruit peel as a bleaching agent for kraft pulp (Martins et al., 2018), (Martins et al., 2018), a potential strain remover on the White Tea on Chocolate-stained (Santamaria et al., 2017), and lemon peel.

However, there is no study about karamay (Phyllanthus acidus). Therefore, this study aims to compare the potential and effectiveness of Kamias, Star fruit and Karamay fruit extracts in removing stains. Kamias, Balimbi and Karamay can be easily found in the locality and demand lower price therefore its utilization as bleach is potential. If found effective as stain remover, using the product will help the household avoid too much spending. The use of Kamias extract as an alternative organic stain remover were recommended for fabrics and be used by the households. Being derived from the natural fruit extract and contain no dangerous chemicals, the product is safe for human use and environment-friendly.

## 2. METHODS

The research had an experimental nature of the study. The study was carried out in Complete Randomized Design (CRD) with four (4) treatments replicated three (3) times.

The data gathered in this study were the cost of using the fruit extracts which was done by recording all the expenses, extent of stains removed and whitening the fabric that was determined by inviting ten (10) housewives as evaluators to rate the preference using the rating scale.

The fruits were harvested from the identified sources with the province of Sultan Kudarat. During the harvesting, the researchers made sure that over-ripe fruits were excluded. The harvested fruits were washed with clean running water and drained. After which, the upper, center, and the lower portion of Kamias, Star fruit and Karamay fruits were cut to facilitate juice extraction. The experiment was set-up following the experimental layout of the study. The white cotton cloth was cut into small pieces measuring 3.5" X 4" and was used as fabric to be stained with 2.5 ml of soy sauce.

The data gathered were analysed using the Analysis of Variance (ANOVA) in Complete Randomized Design (CRD). Test for the significant differences among treatment means were further analyzed using Tukey Kramer Multiple Comparison in SPSS Software v.17 at 5% level of significance.

## 3. RESULTS AND DISCUSSION

The following results were obtained after the experiment. The Star Fruit extract was the cheapest of the four (4) treatments with only Php10.00 pesos total expenses. This was followed by Kamias extract which costs 15 pesos for every 100 grams and commercial bleach (Php 17.00). The highest cost was incurred in Treatment 4 (Karamay Extract) with Php 25.00 total expenses. The prices of each treatment were based on the market current price.

**Table 1** shows that there were significant differences between the treatments. Evaluators rated the clothes with 1 being the best stain remover, and 3 being the least stained removed (lower mean = better). Based on the means, the commercial bleach or Treatment 0 has shown the best performance in terms of the extent to the stains it removed. In terms of the extent of stains removed, the bleach was still the best treatment among the treatments with a significant difference between the results. Meanwhile, the best alternative stain remover for removing the stain was Kamias. Kamias is an ethanolic fruit that contains oxalic acid (Lao, 2015). The content of oxalic acid in the kamias extract could scrape stain on the cotton cloth.

**Table 1** shows that there were significant differences between the treatments used in the study. Evaluators rated the clothes with 1 being the best fabric whitener, and 3 being the worst fabric whitener (lower mean = better). Based on the means, the commercial bleach or Treatment 0 has shown the best performance in terms of whitening the fabric. When compared to the total mean of Treatment 0 to 1, the absolute difference between the means is 0.9. This was followed by Treatment 1, the Kamias extract. Its absolute difference when the bleach's total mean was compared to other treatments was the lowest. Treatment 3 (Karamay extract) was next with an absolute difference of 1.5 when Treatment 0 was compared to the total mean of it, and 0.6 absolute difference when compared to the total mean of Treatment 1. In terms of whitening the fabric, the bleach was still the best treatment among the treatments with a significant difference between the results. Meanwhile, the best alternative fabric whitener was Kamias. The star fruit reported could color changes of enamel tooth, the kandungan pada star fruit dapat digunakan juga untuk diaplikasikan pada kain (Musnadi *et al.*, 2018). Karamay has biodegraded oil (Dajiang *et al.*, 1988). Kamias have a strong chemical content of strain removal qualities (Madarang, 2020).

**Table 1.** Extent of stains removed and whiteness of the fabric as rated by the evaluators

Evaluators	Treatment				Whiteness by type of fruit			
	0	1	2	3	Bleach (A)	Kamias (B)	Starfruit (C)	Karamay (D)
1	1	1	3	2	1	1	3	2
2	1	2	3	3	1	2	3	3
3	1	2	3	3	1	2	3	3
4	1	2	3	2	1	2	3	2
5	1	2	3	3	1	2	3	3
6	1	2	3	3	1	2	3	3
7	1	2	3	2	1	2	3	2
8	1	2	3	3	1	2	3	3
9	1	2	3	2	1	2	3	2
10	1	2	3	2	1	2	3	2
Sum	10	19	30	25	10	19	30	25
Mean	1	1.9	3	2.5	1	1.9	3	2.5
variance	0	0.1	2.5	0.28	0	0.1	2.5	0.28

#### 4. CONCLUSION

Star fruit was the most affordable, followed by kamias, bleach, and Karamay, which was the most expensive. Bleach was the most preferred stain remover by the evaluators in both categories, followed by Kamias. Karamay and Star Fruit came in last place. When all factors were considered, bleach outperformed the other three treatments in stain removal. Kamias extract was the best alternative to commercial bleach used in the study in terms of removing stains, whitening the fabric, cost, and availability in the neighborhood.

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#### 5. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. Authors confirmed that the paper was free of plagiarism.

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