International Journal of Science and Research Archive

eISSN: 2582-8185

Cross Ref DOI: 10.30574/ijsra

Journal homepage: https://ijsra.net/

(RESEARCH ARTICLE)

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The Potential of Radish Leaves (*Raphanus sativus*) Extract as Shoe Polish

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International Journal of Science and Research Archive, 2024, 11(02), 1426–1434

Publication history: Received on 26 February 2024; revised on 07 April 2024; accepted on 10 April 2024

Article DOI: https://doi.org/10.30574/ijsra.2024.11.2.0589

Abstract

The research titled "The Potential of Radish Leaves (*Raphanus sativus*) Extract as Shoe Polish" aims to investigate the feasibility of utilizing radish leaf extract as an alternative shoe polish. Conventional shoe polishes available in the market often contain hazardous chemicals that pose potential risks to human health and the environment. This study focuses on extracting radish leaves to formulate a natural shoe polish that is both safe for users and environmentally friendly. The study evaluates the physical attributes of the radish leaf shoe polish before application, such as melting point and pH, as well as post-application aspects including odor, texture, consistency, and color. Furthermore, the research assesses the effectiveness of the shoe polish in terms of glossiness, water repellency, and dust resistance. By combining radish leaves, coconut oil, soy wax, Gumamela, and calamansi, the researchers have successfully developed a shoe care product that not only enhances the appearance of leather shoes but also prioritizes environmental well-being. The outcomes of this research have the potential to contribute to the advancement of eco-friendly shoe polishes that offer efficient performance while minimizing the reliance on harmful chemicals.

Keywords: Gumamela; Radish leaves; Organic shoe polish; Extract; Effectiveness; Water repellency; Dust resistance; Glossiness

1. Introduction

The invention of shoe polish dates back to the 18th century in France. The first company to release it was Carr & Day 1 Martin, which initially developed it to nourish and darken shoes, rather than shine them. Primarily, it was used to enhance military leather shoes during wars. Initially, shoe polish was crafted from ingredients like egg whites and beer, but it evolved over time with beeswax becoming its base. Subsequently, various brands began selling it, and its formulation continued to evolve until the late 20th century. Over the centuries, natural elements such as banana peel, tallow, mango shell, and charcoal were utilized as shoe polish ingredients (Parvin et al., 2018). Modern formulations often combine natural and synthetic components, including naphtha, turpentine, dyes, and gum Arabic, through straightforward chemical engineering methods. In the Philippines, shoe polish is available in different forms, including paste, cream, liquid, or wax, and is readily accessible across the country. In Laguna province, students from Laguna University frequently use shoe polish to maintain a clean and presentable appearance, especially when wearing school uniforms. However, according to the Missouri Poison Center (2022), commercially available shoe polishes often contain harmful substances such as petroleum, naphtha, turpentine, and dyes. These toxic chemicals can have adverse effects on both human health and the environment. Inhalation of these substances can lead to breathing complications, skin irritation, and even cancer. Moreover, improper or excessive application may result in leather shoes cracking or drying out irreversibly. Given that conventional marketed shoe polish poses risks to both humans and leather shoes, it becomes prudent to opt for eco-friendly alternatives that do not pose harm. In this research, radish leaves are utilized to create an organically derived shoe polish, and its efficacy in cleaning, polishing, and preserving the appearance of leather shoes will be evaluated. The insights derived from this study could pave the way for a new generation of shoe care products

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that prioritize sustainability and environmental well-being, without compromising or even surpassing the performance of traditional shoe polishes.

2. Materials and Method

In this study, the researchers employed a variety of materials, tools, and equipment. A digital weighing scale was utilized to accurately measure the quantities of radish leaves, Gumamela, soy wax, coconut oil, and calamansi extract necessary for the shoe polish formulation. A pan was used for roasting the Gumamela, as well as for heating and melting the soy wax while mixing all the ingredients. The stove served as the primary heat source. Containers were employed to store the prepared shoe polish, ensuring proper preservation and facilitating easy application. Additionally, a thermometer was used to monitor and maintain the optimal temperature during the melting and mixing processes. Furthermore, pH meter was employed to determine the acidity level of the shoe polish, ensuring it adhered to the desired standards. By utilizing these materials, tools, and equipment, the researchers aimed to develop a natural shoe polish that could effectively clean and protect shoes while minimizing potential negative environmental impacts.

This study underwent various trials and processes to create an eco-friendly and safer shoe polish. With the assistance of respondents from the Bachelor of Secondary Education, Bachelor of Science in Mechanical Engineering, and Bachelor of Science in Accountancy programs, the researchers evaluated the product's characteristics, including odor, color, texture, and consistency. The product's performance upon application and its effectiveness in terms of glossiness, water repellency, and dust resistivity were also assessed. Additionally, the melting point and pH level of the Radish leaves shoe polish were measured using specific instruments such as a thermometer and pH level meter. The researchers employed the Likert Scale, a rating tool, to gather respondents' opinions and views. The study used Quantitative Analysis, specifically the descriptive method, which involves statistical or mathematical modeling. The collected data were evaluated using statistical tools, with the weighted mean being calculated for analysis.

The following are the methods on how the Radish leaves shoe polish was made and tested;

- The researchers began by gathering all the necessary materials, including radish leaves, Gumamela, soy wax, calamansi, and coconut oil.
- Radish leaves were extracted using the infusion method for about a week. In the infusion method, the researchers soaked 50g of radish leaves in 400 ml of coconut oil in order to obtain the radish leaves extract.
- Then, proceeded to the roasting of Gumamela in low heat. Once the Gumamela is roasted, it will be powdered.
- The next step was mixing of the 400 mL infused radish leaves and 52g powdered Gumamela in a pan using low heat.
- The researchers then added 500g of soy wax to the mixture and continued to stir until all ingredients were well combined.
- Calamansi extracts are added to the mixture to ensure the proper pH level required in a shoe polish.
- The 960g radish leaves shoe polish was transferred to a 20g container. (48 pieces)
- The participants from the Bachelor of Secondary Education, Bachelor of Science in Mechanical Engineering, and Bachelor of Science in Accountancy programs were given a 20g shoe polish to test its effectiveness as a shoe product.
- After the participants tested the shoe polish, a questionnaire was answered which is about the product’s characteristics, odor, texture, color, and consistency.
- The researchers analyzes the Shoe Polish’ melting point, pH level and glossiness through certain methods.

3. Results and Discussions

This chapter summarizes the findings of the statistical analyses that led to data interpretation.

3.1. Melting Point

In terms of the shoe polish’s melting point, the melting point for the shoe polish is 50 °C. This signifies that when the shoe polish is heated to or surpasses this temperature, it will change into a liquid form. The melting point holds significance as it offers insights into the substance's purity and composition. The depicted melting point of 50°C in the figure informs users about the temperature range ensuring the product's stability and effective usage. This information aids in proper storage, handling, and application, thereby enhancing the overall user experience and satisfaction with the shoe polish.

Figure 1 Measuring the melting point of the Radish Leaves Shoe Polish

3.2. Characteristics of the Shoe Polish

3.2.1. pH level

Trial 1	Trial 2	Trial 3
		
6.08	**6.10**	**6.10**

Figure 2 Measuring the pH level of the Radish Leaves Shoe Polish under three attempts

The pH levels were observed during three distinct trials. The recorded pH level for Trial 1 is 6.08, while the pH levels for both Trial 2 and Trial 3 are consistent at 6.10, showcasing a uniformity in the acquired outcomes. Across these trials, all three pH levels slightly fall below 7, indicating that the tested solution carries an acidic nature. This alignment with the preferred pH level for shoe polish suggests its suitability for the intended purpose

3.2.2. Evaluation of the Characteristics

Table 1 The Evaluation of the Characteristics of Shoe Polish through its weighted mean.

	Weighted Mean	Verbal Interpretation
Physical Characteristics	4.35	Strongly Agree
Performance of the product upon application	4.45	Strongly Agree
Effectiveness of the product	4.54	Strongly Agree
Average	4.45	Strongly Agree

The table illustrates the respondents' outcomes concerning the physical traits, application performance, and efficacy of the product. The results clearly indicate that respondents strongly agree with all categories. The weighted mean scores of 4.35, 4.45, and 4.54 for these categories respectively consistently reflect a high level of satisfaction among respondents, spanning all evaluated categories. The robust agreement evident in the weighted mean scores implies that the product has effectively met or exceeded users' expectations in relation to its physical characteristics, application performance, and overall effectiveness.

3.2.3. Glossiness

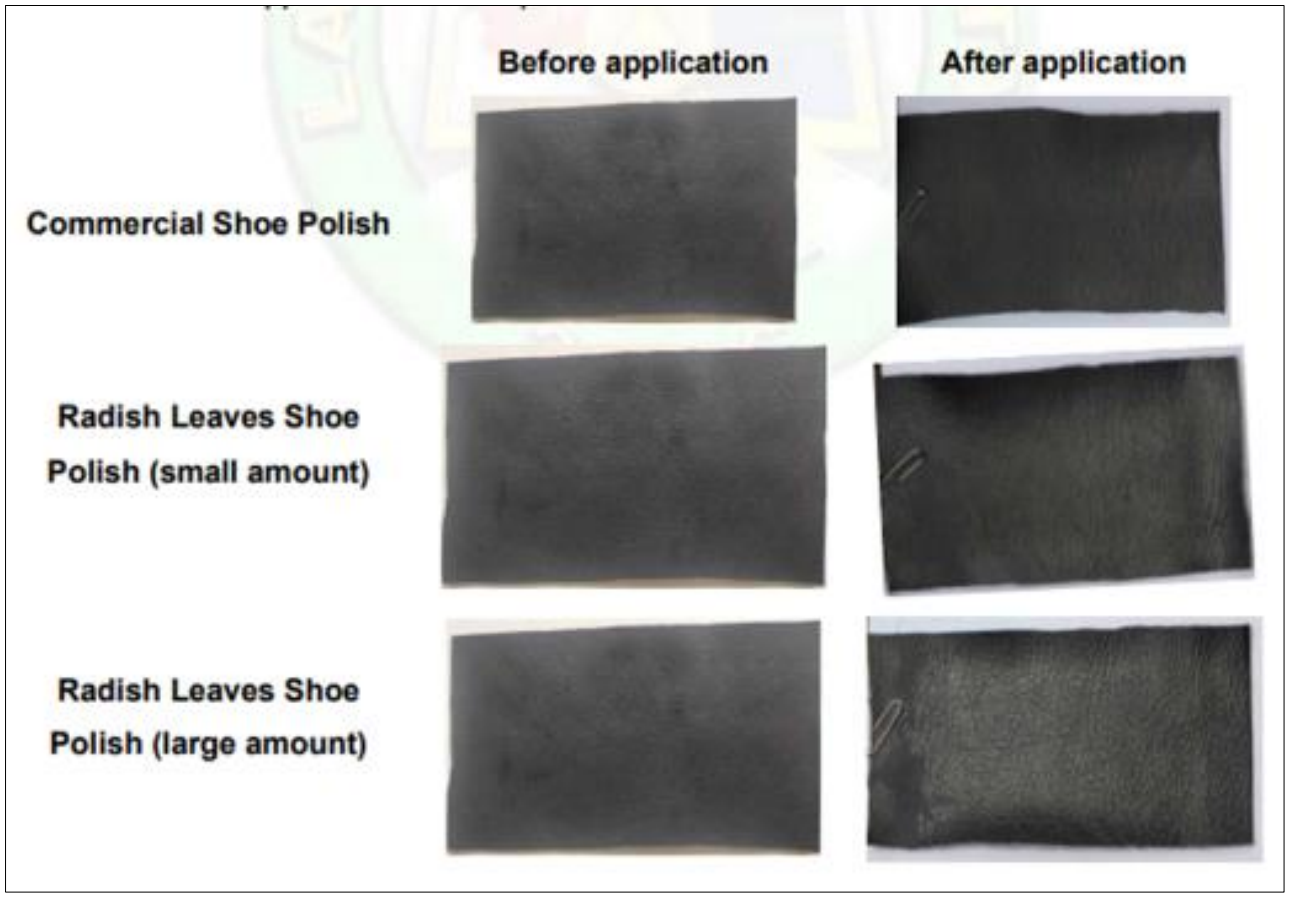

Figure 3 The Glossiness of the Radish Leaves Shoe Polish when applied in leather

The table presents the results of the data collected by the researchers in assessing the impact of Radish leaves shoe polish on glossiness. Ten (10) randomly selected respondents were asked to determine which shoe exhibited more gloss. From the data, it is evident that 9 out of 10 respondents chose the radish leaves shoe polish (large amount), while only one respondent preferred the radish leaves shoe polish (small amount). Consequently, the radish leaves shoe polish with a larger amount effectively enhances the gloss of the leather, making it easily distinguishable.

3.2.4. Water Repellency

State of the different samples after dropping the water

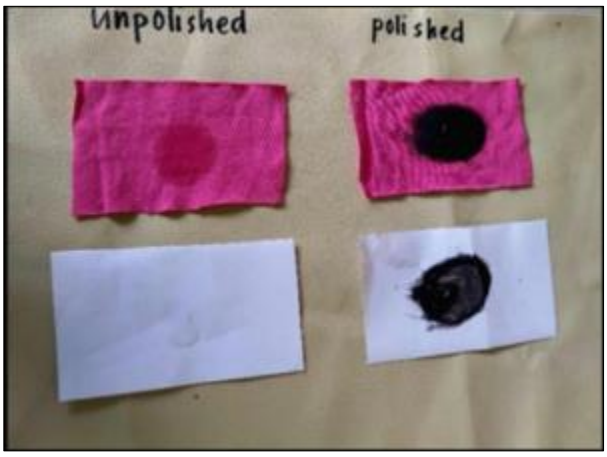

Figure 4 Checking the ability to repel water using paper and cloth

Three (3) minutes after the water drops

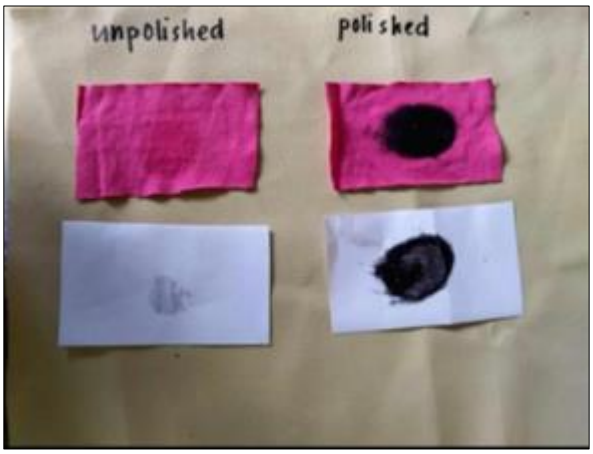

Figure 5 Three minutes after dropping an ample amount of water in polished and unpolished cloth and paper

The figures above depict the impact of the radish leaves shoe polish on water repellency. The researchers conducted a test using both unpolished and polished cloth and paper with the radish leaves shoe polish to assess its resistance. Three drops of water were applied to each material, and the time it took for water absorption was recorded. The unpolished cloth immediately absorbed the water, while the unpolished paper absorbed it within 3 minutes. In contrast, the polished materials showed no water absorption. This indicates that the radish leaves shoe polish can effectively enhance the water repellency of leather shoes.

3.2.5. Dust Resistivity

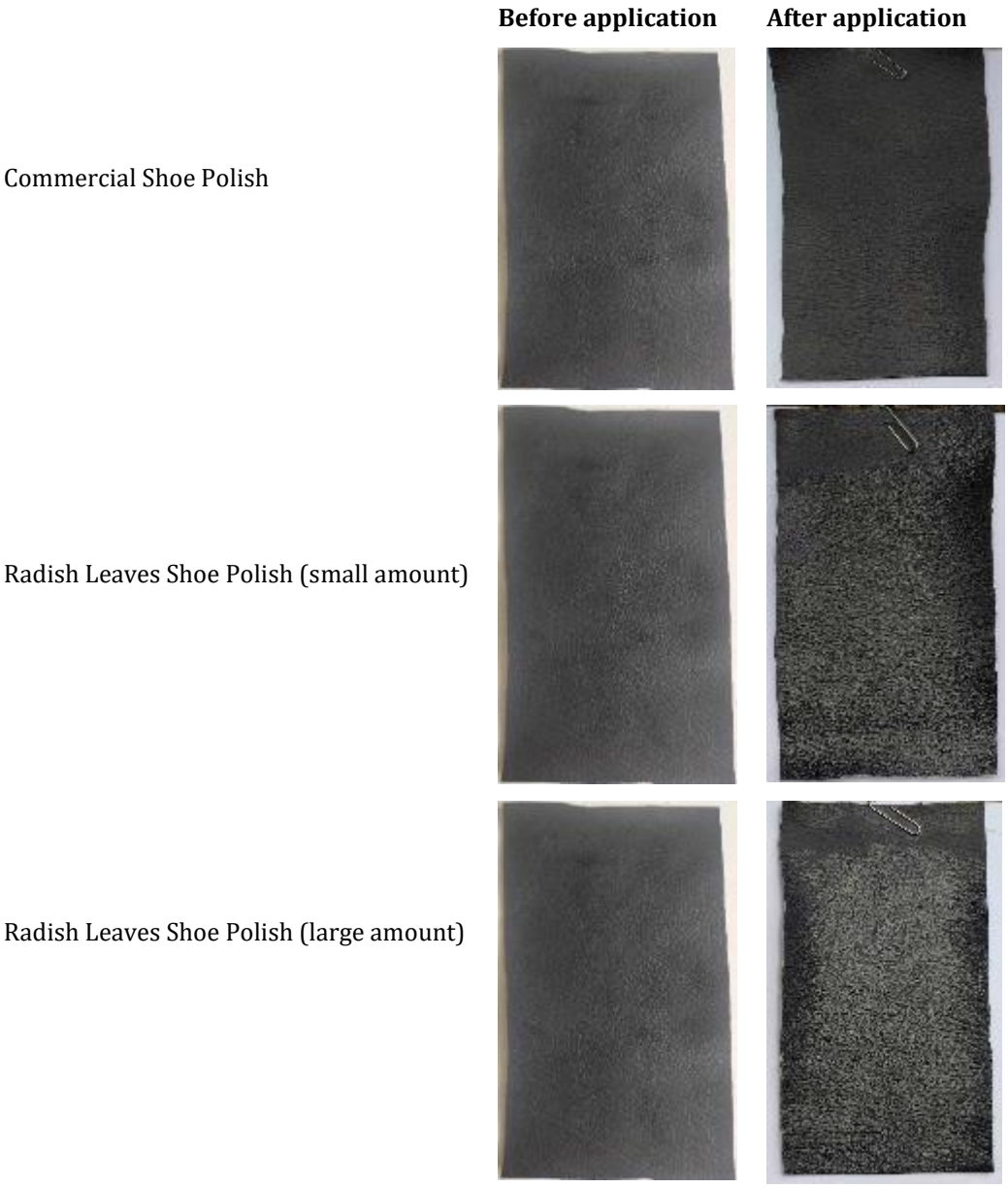

Figure 6 Checking the ability to resist dust over twenty four (24) hours

The table presents the results of the 24-hour dust resistivity test conducted in a dusty environment. The purpose of the test was to evaluate the product's impact on shoe dust resistivity. The researcher monitored the samples at regular 6-hour intervals and observed changes in dust accumulation. During the initial 6 hours, all three samples showed minimal dust. However, from the 13th to the 18th hour, sample 3 with commercial shoe polish exhibited noticeable dust accumulation. Over time, dust levels increased on sample 1 and 2, while sample 3 maintained relatively low dust levels. These findings suggest that the type and quantity of shoe polish can affect its ability to repel dust particles on leather surfaces.

4. Conclusions

The shoe polish formulated with radish leaves extract was tested for its characteristics, performance upon application, and effectiveness, including tests for dust resistivity, water repellency, and glossiness. In conclusion, based on the collected data, the researchers determined that the shoe polish based on radish leaves extract can be utilized as an organic shoe polish.

Compliance with ethical standards

Acknowledgements

The researchers extend their heartfelt acknowledgments to the following individuals for their invaluable contributions to this research paper titled "The Potential of Radish Leaves (*Raphanus sativus*) Extract as Shoe Polish":

DR. ROSEMARIE D. SABADO, Dean of the College of Education at Laguna University, for her steadfast guidance and assistance in nurturing the academic success of the students.

DR. MARIE JOY Q. ELOMINA, for the guidance in improving the research paper.

MS. CATHERINE JOY B. POLO, HAPPY JANE P. BAYANI and **MR. ROMMER JOHN P. DE GUZMAN**, for the validation of questionnaire necessary for data collection.

PROFESSOR ROSE NANNETTE J. SAN JUAN, **JOVELLE M. REYES,** and **LEAH E. PEREZ**, the researchers' professors, for their assistance and advice in improving the study.

MS. JASMIN F. VELASCO, the researchers' thesis adviser, for her supportive words, understanding, and trust that played a pivotal role in facilitating the execution of this study.

MR. KING LEONARD D. NOGRADA, the researchers' co-thesis adviser, for his continuous support and kindness in aiding the refinement of the manuscript.

Disclosure of conflict of interest

The authors declare no conflicts of interest.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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