Vera Balm: Aloe Vera-Based Burn Balm with Dual Functionality as a Mosquito Repellent

Jaimie Diane P. Ocampo[1], Aubrey Julienne P. Mariano[1], Joseph Alan C. Cruz[1], Annie R. Balajadia[2], June C. Musngi[2]

[1]*Student, College of Engineering & Architecture - Industrial Engineering Department, University of the Assumption, City of San Fernando, Pampanga, Philippines*

[2]*Professor, College of Engineering & Architecture - Industrial Engineering Department, University of the Assumption, City of San Fernando, Pampanga, Philippines*

Corresponding Author: josephalanc2883@gmail.com

***Abstract*: This study describes the creation and assessment of the VeraBalm, a natural skincare product, which is developed according to high-quality organic formula, consisting of pure aloe vera extract, beeswax, shea butter, eucalyptus oil, and citronella oil. The main ingredient, aloe vera is sourced from VeraBalm Co, that uses the vertical gardening techniques to maximize land use yet promote sustainability. The product targets the rising demand of consumers for organic and non-toxic substitutes for skincare. Testing done in a laboratory verified that VeraBalm does not have any acceptable level of lead hence complying with the safety guidelines of cosmetics by the U.S. food and drug administered (FDA). Treatment showed that VeraBalm is not only safe, but also effective, brings immediate relief and accelerates healing of minor burns, and possesses the properties of a mosquito repellent. These findings posit that VeraBalm provides dual-purpose, Eco-friendly skin care and insect repelling solution.**

***Keywords*: Aloe vera, burn treatment, cosmetic safety, dual-function skincare, lead-free cosmetics, mosquito repellent, natural ingredients, organic skincare, sustainable sourcing.**

1. Introduction

Aloe vera is a tropical succulent that has been used in Asian and African countries as a natural remedy for treating various illnesses and skin conditions. The extract from the Aloe vera plant is commonly used as ingredients in cosmetics and alternative medicine products, often promoted for their rejuvenating, healing, and soothing effects. Aloe vera has been utilized for its medicinal properties across various cultures for thousands of years, including in Greece, Egypt, India, Mexico, Japan, and China. Renowned Egyptian queens such as Nefertiti and Cleopatra incorporated it into their daily beauty routines. Additionally, historical figures like Alexander the Great and Christopher Columbus relied on it to heal soldiers' wounds (Surjushe et al., 2008).

Each leaf of the aloe vera plant has a glutinous texture gel called parenchyma cells. The gel not only soothes the skin but also helps protect it from infections and speeds up the healing process, making it a popular ingredient in many skincare products. Research has demonstrated that gels can enhance skin flexibility and decrease its fragility, as 99% of the gel consists of water. Furthermore, numerous studies have highlighted the beneficial effects of Aloe vera in healing various types of wounds, including those caused by psoriasis, mouth sores, ulcers, diabetes, herpes, bedsores, and burns.

Wound healing is an intricate biological process, with the primary goal of medical treatments being to enhance tissue repair. Both in vitro experiments and studies on living organisms have demonstrated that Aloe vera can block thromboxane (a compound that hinders wound healing), accelerate the wound-healing process, and alleviate inflammation (Davood et al., 2019).

Additionally, Hekmatpou (2019) stated that mucopolysaccharides, combined with amino acids and zinc found in Aloe vera, contribute to maintaining skin integrity, retaining moisture, reducing erythema, and preventing skin ulcers. Numerous studies have highlighted the beneficial effects of Aloe vera in managing medical conditions like psoriasis, mouth sores, ulcers, diabetes, herpes, bedsores, and burn wounds.

Aloe vera demonstrates greater effectiveness in treating chronic wounds compared to acute ones. It is particularly utilized for first- and second-degree burns, significantly shortening recovery time to just 9 days. Moreover, applying aloe vera dressing once or twice daily has proven more effective than conventional treatments such as petroleum jelly gauze dressing, 1% silver sulfadiazine ointment, and framycetin cream.

The tannin is also a poison for insects and functions as a plant defense mechanism by preventing insects from digesting food, leading to reduced growth and impaired water absorption, which can ultimately result in larval death. Additionally, flavonoids are plant-based defensive compounds that disrupt the digestive systems of insects and possess toxic properties. They act as respiratory inhibitors or toxins, entering the larvae's bodies through the respiratory system. This causes nerve impairment and damage to the spiracles, preventing the insects from breathing and eventually leading to their death (Ilyas & Panggabean, 2018).

According to Whitney (2005), all wounds are initially considered acute at the time of injury and heal and repair skin

structure within a short time, however, when the healing process of the chronic wound is disrupted and discontinued, there will be a delay in recovery (Galea, 2018). The primary goal of wound treatment is to speed up the healing process as much as possible while minimizing pain, anxiety, and scarring. Therefore, the continuous search for innovative treatments is crucial to improving the quality of life for individuals with wounds and lowering the overall expenses associated with wound treatment. (Teplicki et al., 2018).

The Aloe vera plant is rich in a variety of natural compounds. Its phytochemicals provide numerous health benefits, including anthraquinones, essential nutrients, minerals, polysaccharides, sterols, amino acids, saponins, and salicylic acid. The plant's extracts contain significant amounts of alkaloids, proteins, carbohydrates, flavonoids, saponins, glycosides, steroids, terpenoids, phenols, and tannins, suggesting potential antimicrobial activity against both gram-positive and gram-negative bacteria.

Aloe vera is also effective against mosquito bites. Plant-based natural larvicides offer the benefit of being safe for beneficial non-target organisms and the environment, unlike synthetic alternatives (Pitasawat et al., 2007). In contrast, synthetic insecticides not only harm non-target species but also contribute to the increasing resistance of vectors to these chemicals (Wattal et al., 1981). The idea of combining aloe vera with mosquito-repelling ingredients is an innovative, convenient, and sustainable solution against skin burns and mosquito-borne illnesses.

2. Methodology

A. Product Description

A balm product formulated with the majority of organic components, mainly aloe vera, which can repel mosquitoes and has anti-burn properties. Verabalm Co. is convinced that the usage of natural products can provide sufficient vitamins and minerals when applied, which results in faster healing and moisturization of burned skin, and effective repellent from unwanted mosquito bites.

B. Formulation of Samples

The sample formulation of VeraBalm involves carefully measured proportions of natural ingredients to ensure effectiveness and quality.

Table 1
Sample ratio

INGREDIENTS	MEASUREMENT
Aloe Vera	5 tablespoon
Petroleum Jelly	3 tablespoon
Shea Butter	2 tablespoon
Beeswax	1 ½ tablespoon
Essential Oils	1 ½ tablespoon

C. Process & Procedures

Ensure that all ingredients, tools and equipment are clean and function properly.

Fig. 1. Preparation of materials

Wear the required PPE (nitrile gloves) to avoid possible accidents (cuts, burn, heat exposure to skin) that may occur.

Fig. 2. Wearing of PPE

Prepare and measure all ingredients needed before initiating the process.

Fig. 3. Measuring of ingredients

Cut the aloe vera leaves horizontally to separate them into individual leaves and get ready for extracting the aloe vera gel.

Fig. 4. Cutting of aloe vera leaves for individual separation

Soak aloe vera leaves for 5 minutes to remove latex/sap.

Fig. 5. Soaking of aloe vera leaves

Slice the aloe vera leaves vertically in the middle.

Fig. 6. Slicing of aloe vera leaves

Scrape the aloe vera gel from the leaf using a spoon and place them in a clean container.

Fig. 7. Scraping of aloe vera gel

Place the extracted gels in the blender and blend for 2-3 minutes until the desired liquid form of the gel is achieved.

Fig. 8. Blending of aloe vera gel

Transfer the aloe vera extracts from the blender into a clean container passing through a sifter to separate gels that are not completely blended.

Fig. 9. Transferring of aloe vera extract

Prepare a substitute for a two-layered boiler in which a saucepan with simmering water is placed over a heat-resistant bowl..

Fig. 10. Preparation in melting the ingredients

Place the aloe vera extracts, shea butter, beeswax, petroleum jelly, and essential oils in the heat-resistant bowl and mix while melting. The process is ongoing for 10-15 minutes. Mix until all ingredients are blended properly.

Fig. 11. Melting and mixing of all the ingredients

Remove the heat-resistant bowl from the pot to cool it down. Add another few drops of eucalyptus and citronella oil while continuously mixing for 2 minutes.

Fig. 12. Continuous Mixing of Ingredients

When all ingredients have properly combined together, monitor the temperature of the mixture in order to prepare for transferring to assigned balm containers.

Fig. 13. Monitoring the temperature

Once transferred, let the liquid mixture cool down inside the container in order to solidify. The cooling process may vary from 20-50 minutes depending on the dimensions and volume capacity of the balm container.

Fig. 14. Cooling and setting

Once solidified, attach labels on the balm containers indicating the ingredients used and the batch code of the product.

Fig. 15. Labeling and batch coding process

Attach the company logo sticker on the packaging for finalization

Fig. 16. Packaging finalization with logo application

3. Results & Discussion

A. Lead Test

Lead Test Result
(White and Yellow beeswax)

F.A.S.T. Laboratories

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TEST REPORT

Reference No. CP2412-7036
Page 1 of 2

CUSTOMER : JAIME DIANE P. OCAMPO
ADDRESS : CENTRO, SAN SEBASTIAN, SAN LUIS PAMPANGA
CONTACT PERSON : JAIME DIANE OCAMPO / 09650653251
SAMPLE(S) RECEIVED : VERABALM AN ALOEVERA - BASED BALM FOR BURN TREATMENT W/ DUAL - FUNCTIONALITY AS MOSQUITO REPELLENT (WHITE BEESWAX) (AS DECLARED)
SAMPLED BY : CUSTOMER
SAMPLE CODE : CP2412-7036-01
DATE/TIME RECEIVED : 09 DEC 2024 / 1127H
DATE ANALYZED : 16 DEC 2024 – 04 JAN 2025
DATE REPORTED : 07 JAN 2025

Parameter	Unit	Result	Test Method
ᴬ Lead	μg/g	Less than 2.0**	Flame AAS

REMARKS: Results are those obtained at time of examination and relate only to the sample/s tested.

Certified By:
Maverjarah B. Gerolaga, RCh
Authorized Signatory
Chem Reg. No. 0013921

Approved By:
Mary Beth Joy B. Concepcion, RCh
Laboratory Business Manager
Chem Reg No. 0012232

Fig. 17. Lead test report of white beeswax

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TEST REPORT

Reference No. CP2412-7036
Page 2 of 2

CUSTOMER	: JAIMIE DIANE P. OCAMPO
ADDRESS	: CENTRO, SAN SEBASTIAN, SAN LUIS PAMPANGA
CONTACT PERSON	: JAIMIE DIANE OCAMPO / 09850553251
SAMPLE(S) RECEIVED	: VERABALM AN ALOEVERA - BASED BALM FOR BURN TREATMENT W/ DUAL - FUNCTIONALITY AS MOSQUITO REPELLENT (YELLOW BEESWAX) (AS DECLARED)
SAMPLED BY	: CUSTOMER
SAMPLE CODE	: CP2412-7036-02
DATE/TIME RECEIVED	: 09 DEC 2024 / 1127H
DATE ANALYZED	: 16 DEC 2024 – 04 JAN 2025
DATE REPORTED	: 07 JAN 2025

Parameter	Unit	Result	Test Method
Lead	µg/g	Less than 2.0**	Flame AAS

REMARKS: Results are those obtained at time of examination and relate only to the samples tested.

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Mary Seth Joy B. Concepcion, RCh
Laboratory Business Manager
Chem Reg No. 0012332

Fig.18. Lead test report of yellow beeswax

B. Results in Testing the Product on a Burn Wound

Fig.19. Day 1 of applying verabalm on a burn wound (october 04, 2024)

Fig. 20. Day 2 of applying verabalm on a burn wound (october 05, 2024)

Fig. 21. Day 5 of applying verabalm on a burn wound (october 08, 2024)

Fig. 22. Day 8 of applying verabalm on a burn wound (october 11, 2024)

4. Estimated Costs in the Verabalm Production

A. Computation for Direct Product Cost per Unit

The computation of direct product cost of Verabalm was derived from adding all the prices of the ingredients. Cost increases depending on the grams of the product being produced.

Table 2
Product cost of ingredients (8 grams)

Product	Price	Measurement Needed	Cost per balm
Beeswax	₱169 per 500ml	17.74ml	₱5.18
Shea Butter	₱658 per 500ml	23.67ml	₱26.87
Eucalyptus Oil	₱185 per 50 ml	0.4ml	₱1.28
Citronella Oil	₱216 per 30ml	0.4ml	₱2.49
Petroleum Jelly	₱200.00 per 200ml	82.50ml	₱71.47
			Total Cost: ₱107.28

Table 3
Product cost of ingredients (10 grams)

Product	Price	Measurement Needed	Cost per balm
Beeswax	₱169 per 500ml	22.18ml	₱7.50
Shea Butter	₱658 per 500ml	29.57ml	₱38.91
Eucalyptus Oil	₱185 per 50 ml	0.5ml	₱1.85
Citronella Oil	₱216 per 30ml	0.5ml	₱3.6
Petroleum Jelly	₱200.00 per 200ml	103.50ml	₱103.5
			Total Cost: ₱ 155.36

B. Computation for Packaging Materials Cost

The computation of packaging materials cost of Verabalm was derived from adding all the cost per balm in order to achieve the total cost.

Table 4
Packaging materials cost

Product	Price	Needed Each	Cost per balm
Container	₱31	1	₱31
Sticker Label	₱4 per 100 pcs	1	₱0.04
Packaging	₱890 (total packaging materials)	1	₱4.83
			Total Cost: ₱35.87

C. Computation for Production Supplies & Personal Protective Equipment Cost

The computation for production supplies and personal protective equipment cost was derived by dividing the cost of supplies by 18,000 units made in a year. Then the results from labor cost per unit was added to get the total cost.

Table 5
Production supplies & PPE cost

Supplies	Cost of Supplies	Labor Cost per Unit
Production Supplies	₱2,994	₱0.1663333
Personal Protective Equipment	₱1,078	₱0.0598888
		Total Cost: ₱0.2262221

D. Computation for Overall Cost

The computation for overall cost was derived by adding the cost for ingredients, packaging, labor cost and cost of supplies.

Table 6
Overall cost

Ingredients	Packaging	Labor Cost	Cost of Supplies	Overall cost per balm
₱155.36	₱35.87	₱52.16	₱0.2262221	₱243.616
				Total Cost:₱243.616

The following sections discuss the project expenses if Verabalm decides to initiate large scale production.

E. Production Supplies

Table 7
Projected supplies cost

10. Weighing Scale		Shopee	₱137.00	1	₱137.00
11. Stainless Steel Strainer		Public Market	₱50.00	1	₱50.00
12. Metal Spoon		Public Market	₱60.00	1 set	₱60.00
					Total Production Supplies Cost: ₱2,994.00

F. Janitorial Supplies

Table 8
Projected janitorial supplies cost

8. Toilet Pump		Public Market	₱40.00	1	₱ 40.00
9. Hand Soap		Public Market	₱148.00	4	₱ 592.00
					Total Janitorial Supplies: ₱ 2,030.00

G. Personal Protective Equipment

Table 9
Projected personal protective equipment cost

1. Rubbing Alcohol		Mercury Drugstore	₱ 141.00	500 ml	₱ 141.00
2. Apron		Public Market	₱ 119.00	3 pieces	₱ 357.00
					Total Personal Protective Equipment Cost: ₱ 1,078.00

5. Conclusion

VeraBalm is not only a skin care product but rather a valuable contribution to one's personal wellness and community building. VeraBalm uses high-quality, certified organic ingredients like aloe vera extract, beeswax, shea butter, eucalyptus oil, and citronella oil so this company provides a natural, healthier alternative to products typically containing rough or toxic chemicals. It sends a message for the skin health as well as speeds up wound healing and strongly deters mosquitoes, which makes it particularly useful in areas, where insect-carried diseases are common and medical aid might be scarce.

Vertical gardening used for obtaining aloe vera also influences the company's commitment to being sustainable by maximizing land usage coupled with less harm to the environment. Apart from conserving the green space, this method can also be a model for other agricultural methods that the communities can follow for living in a more sustainable manner.

VeraBalm's legitimate adherence to FDA safety practices, including lead-free certification offers assurance to individuals

as far as the safety of using the product is concerned, as the fear of harmful side effects is eliminated. Such an assurance is so important in the market today whereby increasing integrity and safety is constantly demanded by knowledgeable consumers.

After all, VeraBalm is an embodiment of a greater purpose – to provide effective, ethical, and environmentally responsible skincare. By combining innovation with customs, the preservation of health with sustainability, VeraBalm Co makes the world healthier, more conscious, and empowered. It is not just a product. It is one step towards community well-being, environment stewardship, and economic inclusivity.

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