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TRANSFORMATION OF LEMONGRASS PLANTS INTO ENVIRONMENTALLY FRIENDLY MOSQUITO REPELLENT SPRAYS: EMPOWERMENT AND DIGITAL BRANDING IN WRINGINANOM VILLAGE, MALANG REGENCY

Oleh :
Achmad Agus Priyono[1)], Ety Saraswati[2)], Moh Fahrezi Dimas[3)], M Fadhila Taufiqulhakum[4)], Viona Aulia Isma[5)], Meifiana Amalyani[6)]
[1,2,3,4,5,6] Islamic University of Malang
[1]email: aapuim@unisma.ac.id
[2]email: etysaraswati@unisma.ac.id
[3]email: 22101052038@unisma.ac.id
[4]email: 22101021005@unisma.ac.id
[5]email: 22101092119@unisma.ac.id
[6]email: 22101092051@unsima.ac.id

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ABSTRACT
The Thematic Service Undergraduate Candidate Program (KSM-T) of the Islamic University of Malang in Wringinanom Village aims to overcome public health problems and empower the local economy through the use of lemongrass plants as raw materials for natural mosquito repellent sprays and optimize product branding through social media. These activities include socialization, production training, and digital marketing. The results showed increased people's understanding and skills in processing lemongrass into effective, safe, and environmentally friendly products. Branding optimization through social media has succeeded in increasing brand awareness and sales, positively impacting health, the economy, and the environment. This program shows the importance of collaboration between local potential and digital technology as a sustainable approach to community empowerment.

Corresponding Author:
Nama: Achmad Agus Priyono
Afiliasi: Islamic University of Malang
Email: aapuim@unisma.ac.id

1. INTRODUCTION

Dengue Hemorrhagic Fever (DHF) is an infectious disease caused by the Dengue virus, which is transmitted mainly through the bites of Aedes aegypti and Aedes albopictus mosquitoes. Dengue continues to be a severe health threat, especially in tropical countries such as Indonesia, which have an ideal climate for breeding these vector mosquitoes. Every year, Indonesia records thousands of dengue cases with a high mortality rate, especially among children, making it an urgent public health problem to address (Tarmizi, 2024). In Malang Regency, East Java, reports show an increase in dengue cases by 2.5 times compared to the same period in the previous year, with cases reaching 1,005 and causing 10 deaths until April 2024 (Werdiono, 2024). This data emphasizes the need for a more effective and environmentally friendly prevention approach to control the spread of the virus.

Mosquito control efforts in Indonesia still rely heavily on chemical insecticides, which the government and the public widely use. Although

effective, chemical insecticides have several adverse side effects, including human health risks, environmental pollution, and insect resistance to chemicals. Mosquito resistance to insecticides is a growing global problem and reduces the effectiveness of these conventional methods in the long term (Abolade et al., 2024). Thus, innovative solutions that are effective in controlling mosquito populations, safe for humans, and environmentally friendly for long-term use are needed.

The natural material-based approach has attracted attention as a potential alternative to preventing mosquito-borne diseases. In this case, the lemongrass plant (Cymbopogon nardus) is a natural ingredient with great potential, known for its active compounds such as citronella and geraniol. These compounds are effective as mosquito repellents due to the unpleasant scent of the insect (Taufiq & Khatimah, 2023). Using lemongrass as an essential ingredient for mosquito repellent spray can be a safe and sustainable solution and by environmentally friendly principles. However, this potential is still not widely developed, especially at the community level, where there is direct access to lemongrass plants.

In Wringinanom Village, Malang Regency, lemongrass plants grow well and are available in abundant quantities. However, until now, its use in the village has been limited to a cooking ingredient and natural air freshener, while its economic potential as a raw material for natural mosquito repellent products has not been optimally exploited. Thus, the development of lemongrass-based mosquito repellent spray products can not only provide a compelling local solution against the threat of dengue but also offer economic opportunities for the local community. Through these local resources, the people of Wringinanom Village can be empowered to produce products with monetary value and help reduce the spread of diseases.

In addition to product development, the success of marketing this natural ingredient-based product also depends on the right branding strategy. In the digital age, social media offers an efficient and affordable platform for people to promote their products to a broader audience. Platforms like Instagram allow small businesses to reach a larger market through engaging and informative visual content. Natali & Sirait, (2024) notes that marketing through social media can increase brand awareness and consumer interaction, which ultimately has the potential to increase product sales. Therefore, by utilizing social media as a marketing channel, lemongrass-based mosquito repellent spray products can be more easily recognized and accepted by consumers, especially those who support natural and environmentally friendly products.

The Thematic Service Undergraduate Candidate Program (KSM-T) initiated by the Islamic University of Malang aims to facilitate the utilization of this local potential through a series of digital production and marketing training. In this program, the people of Wringinanom Village were trained to process lemongrass into mosquito repellent spray products, from extracting active ingredients to safe mixing techniques. In addition, the training also includes branding and digital marketing strategies so that people have the skills needed to market their products independently. The program focuses on improving technical skills and developing insights into the importance of effective marketing to enhance the competitiveness of local products in the broader market.

The Thematic Service Undergraduate Candidate Program (KSM-T) is expected to be a community empowerment model based on local potential utilizing digital technology. By using lemongrass plants as raw materials and optimizing branding through social media, this program aims to increase public awareness of natural solutions in mosquito control and promote local products that are safe and environmentally friendly. Thus, lemongrass-based mosquito repellent spray products are expected to control dengue disease, local economic growth, and environmental sustainability.

2. METHOD

The implementation method in the program of *Utilizing Lemongrass Plants as Raw Materials for Mosquito Repellent Spray and Optimizing Product Branding through Social Media in Wringinanom Village* consists of three main stages: preparation, implementation, and evaluation. Each stage is designed to empower local communities through training, production mentoring, and sustainable digital marketing strategies.

a. Preparation

The preparation stage began with coordination and socialization with village officials and residents of Wringinanom Village to get support and active community participation. The KSM-T team then designed educational media, including presentation materials, video tutorials, posters, and booklets on how to make lemongrass-based mosquito repellent sprays. Preparation also includes identifying local resources, such as lemongrass plants, and logistical planning of training implementation.

b. Implementation

The implementation phase consists of two main sub-activities: mosquito repellent spray production training and branding and digital marketing training. Mosquito Repellent Spray Production Training: The KSM-T team started the activity by discussing the dangers of Dengue Hemorrhagic Fever (DHF) and the benefits of lemongrass as a natural mosquito repellent. The public is given an understanding of the content of active compounds in lemongrass, such as citronella, which functions as a mosquito repellent. Furthermore, the team provided practical training on making mosquito repellent sprays, including

preparing raw materials, simple extraction processes, and compounding of spray solutions. Each participant is taught safe and hygienic manufacturing techniques, so the products produced are effective and environmentally friendly.

Branding and Digital Marketing Training: The KSM-T team teaches basic branding techniques, such as creating product logos that reflect the natural and safe character of lemongrass-based mosquito repellent sprays. The public is also guided in developing and managing product Instagram accounts to reach a broader market. The uploaded content is focused on educating about product benefits, natural product advantages, and health tips to increase consumer interaction and awareness. In addition, the training includes using promotional features on social media to expand marketing reach.

c. Evaluation

The evaluation stage is carried out to ensure the effectiveness and sustainability of the program. The first evaluation was conducted at the end of each training session, where the KSM-T team measured the participants' understanding and skills in producing sprays and managing social media accounts. The evaluation continued as a survey of public satisfaction with the product and the impact of the digital branding campaign. In addition, the team analyzes the performance of the product's social media accounts (such as the number of followers, engagement rate, and sales conversion rate) to assess the effectiveness of the branding strategy implemented. The results of this evaluation are the basis for developing a follow-up plan, such as small business development and creating a more mature marketing strategy.

This method is expected to provide technical knowledge to the community and build a foundation for independent and sustainable local businesses in Wringinanom Village.

3. RESULTS AND DISCUSSION

The Thematic Service Undergraduate Candidate Program (KSM-T) in Wringinanom Village has successfully involved the community in processing lemongrass plants into natural mosquito repellent spray products and implementing digital marketing strategies. This activity took place from August 13 to September 10, 2024, with various achievements that positively impacted health, the economy, and improving people's digital skills.

a. Improving Community Understanding and Skills

The socialization provided by the KSM-T team increased public understanding of the benefits of lemongrass plants as a natural mosquito repellent and its economic potential. The community showed high enthusiasm in training on producing mosquito repellent sprays, especially after understanding the content of active compounds such as citronella and geraniol that are effective in repelling mosquitoes. As a result, the trainees were able to produce quality mosquito repellent sprays with good hygiene standards. In addition, educational media such as posters and booklets have proven effective in strengthening public understanding of the production stages and product benefits.

Figure 1. Poster on the Use of Lemongrass as a Raw Material for Mosquito Repellent Spray

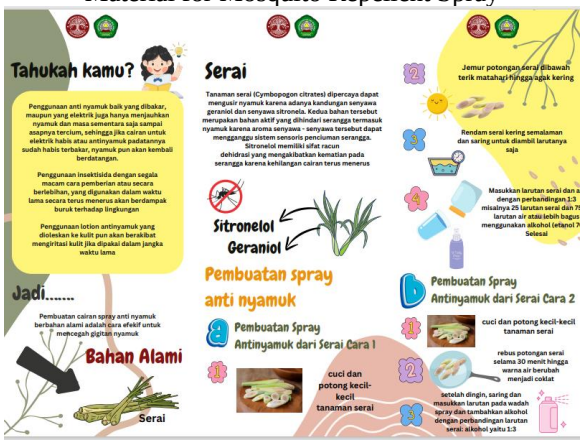

Figure 2. *Booklet* or brochure on the Utilization of Lemongrass as a Raw Material for Mosquito Repellent Spray

b. Production of Lemongrass-Based Mosquito Repellent Spray

Production training produces lemongrass-based mosquito repellent spray products that are quality and safe. This production process involves a simple extraction from lemongrass stalks, which are then mixed with ethanol as a solvent. The final product received a positive response from the public, who appreciated it because it effectively repelled mosquitoes without the chemical side effects often found in commercial products. The results of product trials show that this spray has an aroma lasting up to several hours, so it can be relied on as a natural alternative to protect the public from mosquito bites.

Figure 3. Mosquito Repellent Spray Products

c. Branding Optimization and Digital Marketing

In line with production, this program has also succeeded in increasing public understanding of the importance of digital branding and marketing. Through this training, the community can design a product logo that reflects lemongrass-based mosquito repellent spray's natural and safe character. Creating and managing a product's Instagram account allows people to promote their products more broadly. Thanks to the support of quality content and active promotion on social media, the product's Instagram account managed to reach a larger audience, increase brand awareness, and increase the number of followers and interactions with consumers. This strategy aligns with the branding theory put forward by Kotler & Keller (2016), which emphasizes the importance of solid visual branding and continuous interaction with consumers to increase brand loyalty.

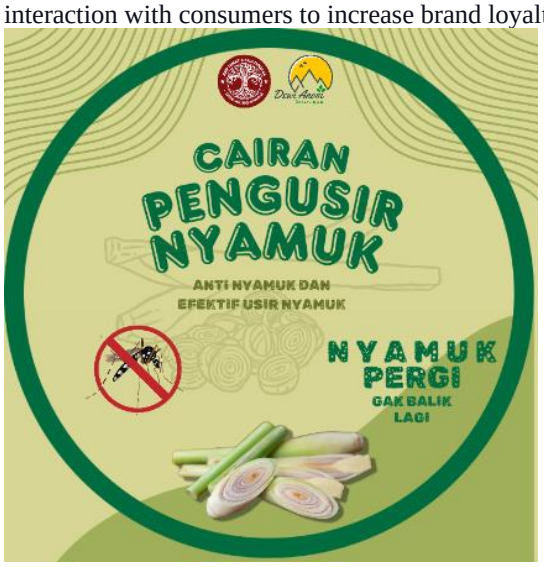

Figure 4. Mosquito Repellent Spray Product Logo

d. Economic and Social Impact Evaluation

The program positively impacts improving the skills and income of the local community. The success in producing and marketing lemongrass-based mosquito repellent sprays provides new business opportunities for the participating community. The evaluation also showed increased public awareness of the importance of environmentally friendly products for health and environmental sustainability. The program's economic impact can be seen from the increase in local demand for spray products and people's purchasing power from selling these products. In addition, new digital marketing skills allow people to be more independent in sustainably promoting their products.

Discussion

The success of the KSM-T program shows the effectiveness of a local potential-based approach combined with branding and digital marketing strategies in empowering village communities. Using lemongrass plants as raw materials for mosquito repellent sprays has proven to be a local health solution and a sustainable economic opportunity. With its citronella and geraniol content, the lemongrass plant has long been recognized as a natural mosquito repellent. For this reason, continuous innovation is needed in processing them into commercial products, and the application of digital-based branding provides significant added value, turning traditional products into high-selling value commodities that can compete in the broader market (Katuuk et al., 2023).

Branding strategy plays a vital role in the success of these products. Strong branding, as described by Kotler & Keller, (2016), includes the creation of logos and packaging and consumer perceptions built through consistent communication and compelling visuals. Here, the logo developed involves visual elements such as images of lemongrass and mosquitoes presented in a simple design, thus creating an easily recognizable identity. In addition, using green in the logo emphasizes the concept of natural and environmentally friendly, two things that are the main attraction of lemongrass-based products. Using these elements creates emotional value and a positive perception of the product that encourages consumer loyalty to the brand.

Social media applications as a digital marketing channel have also shown significant results in expanding product reach and increasing consumer interaction. Through Instagram, the people of Wringinanom Village can introduce their mosquito repellent spray products to a broader audience at a relatively low cost. Using informative and educational visual content, including product benefits and usage tips, increases consumer engagement and amplifies the health message it wants to convey. This is in line with research that shows that digital marketing through social media effectively creates active interactions with consumers, builds online communities, and increases loyalty to products (Sutrisno, 2024). In this regard, digital strategies have

helped strengthen product image and accelerate sales by overcoming geographical constraints commonly faced by small businesses in villages.

The economic impact of this program also needs to be noted as one of the essential outcomes. Developing lemongrass-based mosquito repellent sprays opens up new economic opportunities for village communities that previously depended on subsistence agriculture. With their production knowledge and branding skills, people can use local plants to generate additional income. In addition, the evaluation results showed an increase in regional demand for this product, which indicates a positive reception from consumers towards the product based on natural ingredients. This success also demonstrates that integrating science, technology, and community skills can create an independent and sustainable economic model based on local potential.

The KSM-T program shows how a collaborative approach between universities, society, and digital technology can drive socio-economic and health sustainability. By combining natural product innovation and modern branding strategies, the program meets health needs and supports the development of the local economy. The success of this program can inspire other villages to optimize local resources to produce environmentally friendly and high-quality products that can compete in the digital market while preserving the environment.

4. CONCLUSION

The Thematic Service Undergraduate Candidate Program (KSM-T) of the Islamic University of Malang in Wringinanom Village has succeeded in achieving the primary goal of empowering the community through the use of lemongrass plants as raw materials for natural mosquito repellent sprays and optimizing product branding using social media. Through training and mentoring, the community understands how to process lemongrass into effective and safe products and acquires new digital marketing skills that expand their local products' market reach.

The program's results show that using lemongrass as an anti-mosquito spray provides an effective natural solution to reduce the risk of spreading Dengue Hemorrhagic Fever (DHF) in the community. The success of branding and digital marketing through social media, especially Instagram, increases public awareness of products and improves competitiveness in the market. Branding strategies that involve creating attractive logos and content have succeeded in building a natural and environmentally friendly product image, which has received a positive response from consumers.

The economic impact of this program is also significant, as the community can produce value-added products from local resources and market these products independently. The success of this program is proof that collaboration between universities and the community in utilizing local potential and digital technology can create sustainable economic opportunities and improve the quality of life of village communities.

This program can be an example of a local potential-based community empowerment model that can be applied in other villages. The abundant use of local plants and digital branding strategies have the potential to produce products that not only support public health but also contribute to regional economic growth while preserving the environment.

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