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DEVELOPMENT OF SCENTED SAND MOSQUITO REPELLENT PRODUCTS FROM POMELO

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ABSTRACT

Dengue hemorrhagic fever is one of the main health problems in Thailand with many deaths per year. The record of Department of Diseases Control reported a dead case and 1,621 cases. The majority was among age 15-24, followed by age 25-34. (DDC, 2021) The best way to prevent disease is mosquito bite prevention. Common products in the market are DEET, Ethyl Butyl Acetylamino Propionate (IR3535) and Icaridin (Picaridin). However, their side effect to human need to be concerned. (DMSC, 2021) Herbal with less human side effect were introduced such as Citronella, Basil, Bergamot and Pomelo. Samut Songkram province is the famous place of pomelo, so we decided the objective to develop the product of Mosquito Repellent by pomelo as the product development research. Requirement and satisfaction of the consumer on Scented Sand Mosquito Repellent were collected and analyzed. 7 steps of production were studied and developed to be 3 fragrances as original pomelo, citronella pomelo and lavender pomelo scent. The scents should strong enough for mosquito prevention without human disturbance. The value of the product was increase up to 1.6 times and consumer satisfaction was in high level as scored 3.76+0.80. This concluded as the Scented Sand Mosquito Repellent is effective to prevent mosquito and can be developed with other scents. It got high customer satisfaction score so we should promote the product not only to increase income of the local people but to reduce the waste product of pomelo shell every year.

Keywords: Mosquito repellent, Scented sand, Pomelo shell

INTRODUCTION

Dengue hemorrhagic fever is the main health problem in Thailand. According to Diseases Control Division, the incidence was one death and 1,621 cases just within 2 months. The highest age group was 15-24 years followed by 25-34 years. Factors related with death case were delayed diagnosis and positive source of mosquito^[1]. The best prevention of Dengue fever is to prevent the mosquito bite. Many products were developed as DEET, Ethyl Butyl Acetylamino Propionate (IR3535) and Icaridin (Picaridin), however, human side effect may occur^[2]. Many herbal products with less human side effect were developed such as Citronella, Basil, Bergamot and Pomelo in order to prevent mosquito bite and Dengue fever. Samut Songkram province is popular in Pomelo according to the geographic environment.^[3] However, the peel of the pomelo causes huge amount of trash. The usage of the peel may

reduce the trash and the product can be used to prevent disease and increase income to the local people, too.

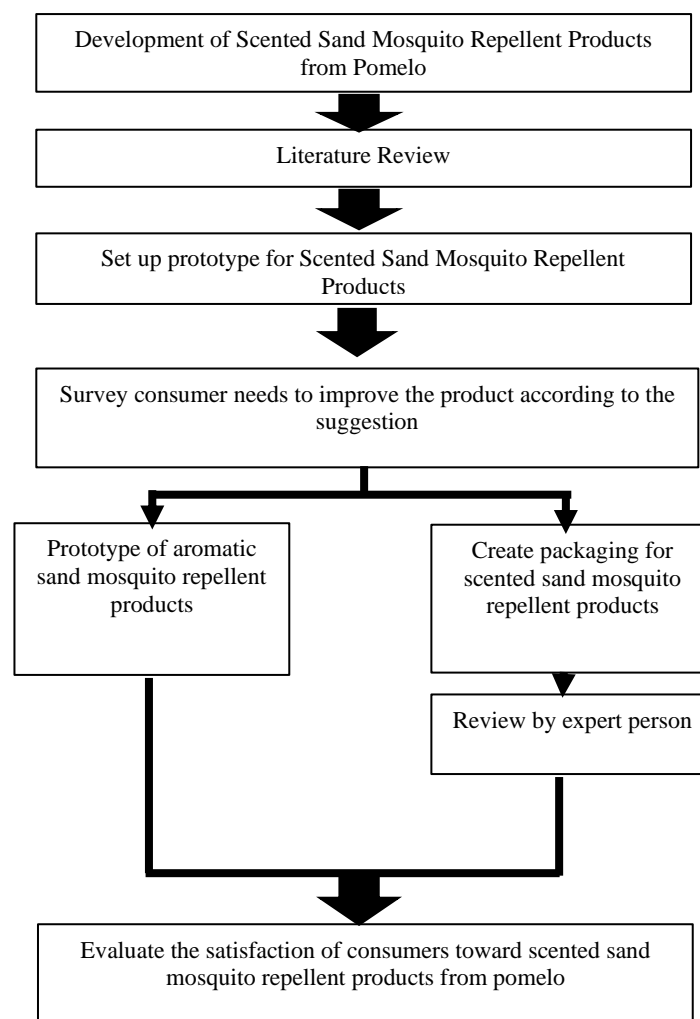
OBJECTIVE

1. Develop mosquito repellent products from pomelo as product development research
2. Create value for waste

METHODOLOGY

This is the Applied Research to search the wisdom and develop the useful product for the community as the Research and Development to be Scented Sand Mosquito Repellent Products from Pomelo. The tools were the prototype of Scented Sand Mosquito Repellent Products from Pomelo, the questionnaire of user requirement, packaging prototype^[5] and the questionnaire of user satisfaction. Data were analyzed by statistic then concluded the processes. The conceptual framework was as followed

Figure 1 Conceptual Framework
Source: Tipvarin Benjanirat (2565)



DATA ANALYSIS

The data of product development were collected in conjunction with the user requirement. The suggestion of the user and the consultant were analyzed and used to adjust the prototype. The final product was analyzed for the user satisfactions and the final data analysis were preformed.

ETHICAL CONSIDERATION

This research proposal was already considered by Suan Sunandha Rajabhat University Ethics Committee. Ethics Committee certificate number COE. 1- 002 / 2022. Ethics Committee agreed to implementation of the proposal of this research.

RESULTS

Activities 1 The development of Scented Sand Mosquito Repellent Products from Pomelo has 7 steps as following steps;

1. Fined sand 280 gram was washed twice with water then sun dry for 3 hours

Figure 1 Fined sand in sun dry
Source: Tipvarin Benjanirat (2565)



2. Food grade green color 4 ml was mixed with the sand then continue sun dry for another 3 hours

Figure 2 Color mixed
Source: Tipvarin Benjanirat (2565)



3. Sun dried Pomelo peel was chopped and crutch as powder

Figure 3 Crutch the Pomelo peel to be powder
Source: Tipvarin Benjanirat (2565)



4. Mixed 15 g of powder to the sand

Figure 4 Mixed the powder and sand
Source: Tipvarin Benjanirat (2565)



5. Mixed Camphor 1 g. with the sand

Figure 5 Mixed Camphor
Source: Tipvarin Benjanirat (2565)



6. Added Pomelo scent 2 ml.

Figure 6 Pomelo scent adding
Source: Tipvarin Benjanirat (2565)



7. Put the product to the closed container

Figure 7 Put to the closed container
Source: Tipvarin Benjanirat (2565)



The figure showed the 7 processes of the Scented Sand Mosquito Repellent from Pomelo shell production. As the picture 2 shows the product development process of scented mosquito repellent sand, which had a total of 7 steps, starts to bring 280 grams of fine sand and wash with water 1-2 times thoroughly. Then, put it in the sun to dry which takes about 3 hours and drops 4 ml of green liquid food coloring into the prepared sand and mix thoroughly. Next, put it in the sun to dry completely, should take about 2-3 hours. After that, put the peel of the pomelo to dry in the sun for 1-2 days. Then, cut into small pieces, put in a container and grind until fine powder. Take 15 grams of dried pomelo peel powder and add it to the colored sand and mix. Then, put 1 gram of camphor into a container with sand and dried pomelo peel powder and mix. After that, add essential oil 2 ml. and cover container. Finally, send to evaluate with customer.

Activities 2 Development of Scented Sand Mosquito Repellent Products from Pomelo model

The development of pomelo peel scented mosquito repellent sand products and packaging design, interviews were conducted on consumer needs. They had suggestion that the scent

should be added to make it smell for more diverse. Then, the researcher developed it by added 3 scents: original pomelo, citronella pomelo and lavender pomelo scent. As following figure;

Figure 10 lavender pomelo scent
Source: Tipvarin Benjanirat (2565)



Figure 8 original pomelo
Source: Tipvarin Benjanirat (2565)



Figure 9 citronella pomelo
Source: Tipvarin Benjanirat (2565)



Activities 4 Consumers' satisfaction towards the product and the packaging of pomelo peel mosquito repellent scented sand an analysis of consumer satisfaction toward pomelo peel scented mosquito repellent sand and packaging design by collecting data from a sample of 280 person of College of Allied Health Sciences, Suan Sunandha Rajabhat University. There was a summary of consumer satisfaction towards the pomelo peel mosquito repellent sand product and the packaging design of the samples in 3 aspects, namely, 1) Product 2) Packaging and 3) Distribution channel. As below table

Table 3.

The analytical results, mean (\bar{x}), standard deviation (S.D.), level of consumer satisfaction towards the pomelo peel scented mosquito repellent sand product, packaging and distribution channel. (n = 280)

Consumer Satisfaction	\bar{x}	S.D.	Result
Product	3.76	0.92	High
Packaging	3.75	0.81	High
Distribution channel	3.78	0.84	High
Total	3.76	0.80	Hgh

From table 3. The result showed the analysis that mean (\bar{x}) = 3.76 and standard deviation (S.D.) in high level.

DISCUSSION AND CONCLUSION

The objective to develop the product of Mosquito Repellent by pomelo as the product development research. So, the results showed that the 7 steps of production were studied and developed to be 3 fragrances as original pomelo, citronella pomelo and lavender pomelo scent were in good practice. Especially, the process of products (three pomelo scents). The analysis of consumer satisfaction toward pomelo peel scented mosquito repellent sand and packaging design (Phanee and et al, 2022) ^[5] by collecting data from a sample of 280 person and the analytical results satisfaction of mean (\bar{x}), standard deviation (S.D.), level of consumer satisfaction towards the pomelo peel scented mosquito repellent sand product, packaging and distribution channel in high level, which accord with Kittichai Chinachai (2018) ^[4] to study about the extraction of essential oil from citronella by kelventure technique, the result showed that the extracted citronella oil was used to produce mosquito repellent spray and tested for its repellent efficacy around 3 – 5 hours. Beside, to accord with Ratthaom Bamrung et al. (2016) ^[6], to study about mosquito repellent spray from pomelo peel, and the result proved that in good condition.

LIMITATION

This research only studied of The Development of Scented sand Mosquito Repellent Products from Pomelo. Should have studied more for other products to get more value added

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