BENCOOLEN JOURNAL OF PHARMACY

Program Studi S1 Farmasi Universitas Bengkulu

Article

Testing the Effectiveness of Anti-Mosque Lotion from the Formulation of Male Breadfruit (*Artocarpus altilis)* and Lemon (*Cymbopogon citratus*) Flower Extract

Nurasia [1], Ilmiati Illing [1] and Riska Nurhayati [1]

[1]Department of Chemistry, Faculty of Mathematics and Natural Sciences, Universitas Cokroaminoto Palopo, Jalan Latamacelling No. 19 Kota Palopo 91921

* Corresponding author: nurasiakimia99@gmail.com

Abstract: This study aims to compare the concentration of extracts of male Breadfruit and Lemongrass stalks which are effective as mosquito repellent lotions. Male Breadfruit (*Artocarpus altilis*) and Lemongrass (*Cymbopogon citratus*) stems can be used as natural mosquito repellents because they contain active ingredients (compounds) that do not liked by mosquitoes. The research method used in this study includes sample preparation, maceration using 96% ethanol, the distillation process to separate the filtrate and residue, making lotion formulations using the oil phase and water phase with different sample concentrations, then carried out three stages of testing, namely organoleptic test. , pH test and effectiveness test to determine the effectiveness of the male flower repellent lotion of Breadfruit (*Artocarpus altilis*) and Lemongrass (*Cymbopogon citratus*) stems. The results obtained showed that the effective concentrations used as mosquito repellent lotions for male Breadfruit (*Artocarpus altilis*) and Serai (*Cymbopogon citratus*) flowers were 15 mL and 20 mL of male flower extract of Breadfruit and Serai stems.

Keywords: Anti-mosque, Lotion, Breadfruit

1. Introduction

Indonesia is an endemic area that has a variety of tropical diseases such as mosquito-borne diseases. Mosquitoes are animals from the Phylum Arthropoda or animals that have a segmented body, have an exoskeleton and insulated limbs [1]. Mosquitoes are one type of animal that causes disease in the world, including Indonesia, which has a tropical climate. Tropical climates are great places for mosquitoes to breed. Diseases that can be spread by mosquitoes to humans include filariasis and encephalitis by Culex mosquitoes, malaria by Anopheles mosquitoes and dengue fever by Aedes mosquitoes [2].

Aedes aegypti is the main cause that transmits the virus that causes dengue fever. The virus will be transmitted to humans through the bite of an infective Aedes mosquito that feeds on blood [3]. Dengue hemorrhagic fever (DHF) is an acute disease similar to malaria. This disease is caused by a virus from the genus Flavivirus, family Flaviviridae [4].

Nationally, the number of DHF sufferers that have been reported during the period 2010-2014 is fluctuating. As for the average number of DHF cases from 2010-2014, January is the month with the highest DHF case reports than in other months [5].

The incidence rate (IR) of DHF in South Sulawesi in 2013 was 60.30 per 100,000 population with a CFR of 22.46%. The highest IR figures are Palopo City at 182.84 per

100,000 population, Bulukumba Regency at 151.40 per 100,000 population, Pare-Pare City at 142.01 per 100,000 population and the lowest in Selayar Regency at 3.14 per 100,000 population and Toraja Regency. North of 12.14 per 100,000 population. At the end of March 2014, South Sulawesi ranked 10th with the highest number of dengue cases in Indonesia, which was 2,904 cases [5].

The spread of dengue fever can be prevented in various ways, but until now the most effective way is to break the chain of transmission through vector control in order to reduce contact between mosquitoes and humans [6]. According to [7] states that mechanical and biological control is vector control that is more friendly to the environment than using synthetic chemicals. One solution to solve this problem is to make environmentally friendly mosquito repellents derived from natural and organic materials. available in large quantities in nature, and can produce products that can be used to repel mosquitoes such as lotions. Based on research conducted by [8] states that one way to protect the body from mosquito bites is to use anti-mosquito lotion.

Therefore, to minimize the effects of using insecticides and artificial chemicals that are toxic. So, we need environmentally friendly products, namely by making lotions from natural ingredients such as plants. According to [9], there are plants that have a distinctive smell and aroma that mosquitoes do not like, namely plants that contain various secondary metabolite compounds, including lemongrass, citronella, and breadfruit flowers.

Along with the development of research, researchers studied more deeply the benefits of Breadfruit where Breadfruit basically has many benefits, one of which is the male Breadfruit flower or onthel which is burned and then applied as an anti-mosquito burn [10]. The male Breadfruit flower contains flavonoid compounds, tannins and saponins which are effective for use as an anti-mosquito [11].

In addition to the male flower Breadfruit, another plant that can be used as an anti-mosquito lotion is Lemongrass. Lemongrass plant extract which can be used as an anti-mosquito in several types of mosquitoes such as *Culex* sp, *Aedes aegypti* and *Aedes albopictus*. can be used as a mosquito repellent [12]. Based on this, the researchers took the initiative to use Breadfruit male flowers and Lemongrass stems as raw materials for making mosquito repellent lotions which aim to make the essential oil stick longer to the skin so that it can provide a longer repulsion. , compared to using essential oils directly. The lotion produced is based on an oil in water emulsion with the use of an emulsifier to form a good emulsion.

2. Results and Discussion

In this study, each used as much as 500 grams of male flowers of breadfruit and lemongrass stalks. Simplisia from male flowers of breadfruit and lemongrass stalks was then macerated using a polar solvent, namely 1 liter of 96% ethanol for 24 hours, after that the solution was filtered using filter paper to obtain extracts from each solution of male Breadfruit flowers and lemongrass stalks as much as 250 mL. The filtrate obtained was then collected and evaporated using a distillation apparatus to obtain a 50 mL thick extract.

The lotion formulation is made using an oil phase and a water phase. Each ingredient was put into a container based on its phase, after which the extracts of the male

Breadfruit flower and Serai stem were added according to the concentration to be made, namely (10 mL, 15 mL, and 20 mL). Organoleptic testing was given to 20 respondents by physically testing mosquito repellent lotion from extracts of male Breadfruit flowers and lemongrass stems. Organoleptic testing of each lotion can be seen in table 1.

Testing the pH of mosquito repellent lotion from extracts of male Breadfruit and Lemongrass stems was carried out using a pH meter. The sample was dissolved in distilled water with a ratio of 1 gram of sample to 10 milliliter of distilled water. The results of the pH test can be seen in table 2.

Table 1. Organoleptic test results

Sample	Test		
	Texture	**Color**	**Scent**
Lotion 1	59	68	64
Lotion 2	60	65	72
Lotion 3	58	67	71

Information: Number 58-72 = Percentage of organoleptic test of 20 respondents

Table 2. pH test results

Sample	pH
Lotion 1	5.5
Lotion 2	5.4
Lotion 3	5.6

The effectiveness test was carried out by physical testing using mosquitoes that were bred for 14 days, then the respondent would put the hand that had been smeared with lotion into the mosquito cage for 5 minutes. The results of the effectiveness test can be seen in table 3.

Table 3. Effectiveness test results

Sample	Time	
	Morning (08.00 am)	**Afternoon (04.30 pm)**
Kontrol	There are mosquitoes	There are mosquitoes
Lotion 1	There are mosquitoes	There are mosquitoes
Lotion 2	There are no mosquitoes	There are no mosquitoes
Lotion 3	There are no mosquitoes	There are no mosquitoes

3. Conclusion

Based on the results of the research that has been done, the results show that the most effective concentrations of male Breadfruit (*Artocarpus altilis*) and Lemongrass (*Cymbopogon citratus*) flower extract lotion are concentrations of 15 mL and 20 mL of male Breadfruit flower extract and Lemongrass stalks.

4. Experimental Section

The type of research used in this research is experimental, namely making mosquito repellent lotion from the extract formulation of male Breadfruit (*Artocarpus altilis*) and Lemongrass (*Cymbopogon citratus*) flower extract. The tools used in this research are mortar and pestle, separating funnel, glassware, tube rack, stirring rod, analytical balance, distillation apparatus, water bath, pH meter, oven and knife. The materials used in this study were Breadfruit male flowers and lemongrass stalks, aquadest, 96% ethanol, adeps lanae, glycerin, liquid paraffin, span 60, tween 60, propyl paraben, methyl paraben, stearic acid, oleum rosae and filter paper.

The work procedures in the research broadly consist of the preparation stage and the testing stage. The preparation stage consisted of two stages, namely 1) Making extracts of male breadfruit flowers and lemongrass stalks and 2) Formulation of extracts of jangtan breadfruit flowers and lemongrass stalks as lotion for mosquitoes. In the manufacture of extracts of male breadfruit flowers and lemongrass stalks, male Breadfruit flowers and lemongrass stalks were washed using aquadest and then air-dried. After that, each sample was weighed 500 grams, then the samples were chopped (cut into small pieces) and crushed using a mortar and pestle. The finely ground samples were put into a beaker and added 1 liter of 96% ethanol each for the maceration process for 24 hours. Furthermore, the solution is filtered to separate the filtrate and residue. The resulting filtrate is then evaporated using a distillation device to obtain a concentrated sample solution. In the formulation of Breadfruit male flower extract and Serai stem as an anti-mosquito lotion. The oil phase was prepared by melting adeps lanae, liquid paraffin, stearic acid and span 60 and adding propyl paraben at 70^{0}C. The aqueous phase is made by dissolving methyl paraben into hot water at 90^{0}C and then the temperature is lowered to 70^{0}C, then the solution is added with glycerin and twen 60 at 70^{0}C. After that, the solution was added respectively to the extract of the male Breadfruit flower and the stem of the Serai. The oil phase and the water phase were mixed and homogenized at a constant speed.

Table 4. Lotion Formulation design

Materials	**Lotion Formulation**		
	S1 (mL)	**S2 (mL)**	**S3 (mL)**
Ekstract	10	15	20
Adeps lanae	3	3	3
Gliserin	15	15	15
Paraffin cair	5	5	5

Span 60	5	5	5
Tween 60	5	5	5
Propil paraben	5	5	5
Metil Paraben	0.1	0.1	0.1
Asam stearat	0.1	0.1	0.1

Information:

S1 = Sample Concentartion 1 (10 mL)

S2 = Sample Concentartion 2 (15 mL)

S3 = Sample Concentartion 3 (20 mL)

The testing phase consists of three stages, namely pH test, organoleptic test and effectiveness test. Testing pH using a pH meter that has been calibrated. Organoleptic test to determine the aroma, color and texture using 20 respondents. The effectiveness test was carried out using 3 examiners who put their arms into the mosquito container for five minutes and then observed and recorded the presence of mosquitoes attached to the skin. This test was carried out in the morning (at 08.00 am) and in the afternoon (04.30 pm).

5. Aknowledgement

Thank you to the head of the Natural Material Laboratory of the Faculty of Science, Cokroaminoto Palopo University for collaborating in providing facilities in the form of tools and materials used in research.

References

1. Suwito. (**2010**) *Relationship of Climate, Anpheles Mosquito Density and Malaria Disease Incidence*. Sekolah Tinggi Kesehatan Abdi Nusa. Pangkalpinang.
2. Depkes RI. (**2002**) *Public Healthe Extension Module*. Pusat Promosi Kesehatan. Jakarta.
3. WHO (World Health Organization) (**2016)** *Monitoring and Managing Insecticide Resistance in Aedes mosquito Population*, pp: 6-7.
4. Cahyati, W, H, S. (**2006**) *Dynamics of Aedes aegypti as a Disease Vector*. Volume II No. 1, hlm 40-50.
5. Kementerian Kesehatan RI. (**2015**) *Profile of Disease Control and Environmental Health on 2014*. Jakarta.
6. Sucipto, C. (**2011)** *Tropical Disease Vector*. Yogyakarta: Gosyen Publishing.
7. Utomo, M. (**2010)** *The Effect of Amount of Water Added to Breadfruit (Artocarpus communis) Powder Packaging as a Replacement for Electric Mosquito Refill on the Effective Time of Killing Power of Anopheles aconitus Mosquitoes in the Field*. Fakultas Kesehatan Masyarakat Universitas Muhammadiyah Semarang. Semarang.
8. Kardinan (**2003**) *Mosquito Repellent and Repellent Plants*. PT Agromedia Pustaka.Depok.
9. Hariana, A, H, Drs. **(2009)** *Medicinal Plants and Their Benefits*. Penebar swadaya. Jakarta
10. Ragone, D. (**1997**) *Breadfruit Artocarpus altilis (Parkinson) Fosberg*. Italy International Plant Generic Resources Institute. Italy
11. Lumowa, S, V, T. (**2013)** *The Effect of Breadfruit Flower Powder Mat (Artocarpus altilis L.) As Refill Against Aedes aegypti Mosquitoes*. Prosiding Seminar Nasional X Pendidikan Biologi FKIP UNS, vol.10, No. 1.

12. Tawatsin, A., Steve, D, W., Rederic, S., Thavara, U., Techadamrongsin, Y. (**2001**) *Repellency of Volatile Lols from Plant Againt Three Mosquito Vectors*.Journal of Vector Ecology. 26 (1): 76-82.