CHAPTER I

INTRODUCTION

A. Background

Indonesia is a tropical country that has many biological and animal natural resources. This natural resource has many species and is very useful, and can be used as traditional medicine. Medicinal plants are used as medicine because they contain chemical compounds that can be utilized physiologically and psychologically for human health.[1]

One of the health problems that is often encountered in Indonesian society is a disease transmitted by mosquitoes which causes millions of deaths every year, such as dengue fever.[2] Dengue Hemorrhagic Fever (DHF) is commonly found in tropical and sub-tropical countries. Asia ranks first in the number of DHF sufferers each year. From 1968 to 2009 the World Health Organization (WHO) recorded that Indonesia was the No. 1 country with the highest dengue cases in Southeast Asia.[3]

The *Aedes sp* mosquito is a vector of Dengue Hemorrhagic Fever (DHF) which often occurs in tropical countries. Dengue Hemorrhagic Fever (DHF) is an infectious disease caused by the dengue virus and transmitted to humans through the bite of the *Aedes sp.* mosquito. *Aedes sp* mosquitoes thrive in water reservoirs such as stagnant water, bathtubs

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[1] Dyera forestryana, Arnida, Phytochemical Screenings And Thin Layer Chromatogaphy Analysis Of Ethanol Extract Jeruju Leaf *(Hydrolea spinosa* L.*),* Journal Homepage :Vol.11; No. 2; Juli 2020 Halaman 113-124.

[2] Smriti Kala et al, Chitosan-Acrylate Nanogel For Durable Anti Mosquito Finishing Of Cotton Fabric And Its Dermal Toxicity Profiling On Swiss Albino Mice, jurnal: Koloid dan Permukaan B: Biointerfaces 181 (2019) 789–797, hal 790.

[3] Firda Yanuar Pradani, Rohmansyah Wahyu Nurindra, Daya Proteksi Serai Dapur *(Cymbopogon nardus* L*)* Terhadap Nyamuk *Aedes aegypti*, Spirakel, Vol. 9 No. 2, Desember 2017:60-67, hal 61.

that are rarely drained, gutters in front of the house full of garbage.[4] The 3M movement is an effort made in Indonesia to prevent and break the life cycle of the *Aedes sp* mosquito by covering, draining and recycling.

We must maintain the cleanliness of the surrounding environment. By maintaining the cleanliness of the environment, we can already prevent the breeding of *Aedes sp* mosquitoes. Because Allah likes something clean, as in the hadith below:

إِنَّ اللهَ تَعَالَى طَيِّبٌ يُحِبُّ الطَّيِّبَ ، نَظِيفٌ يُحِبُّ النَّظَافَةَ ، كَرِيمٌ يُحِبُّ الْكَرَمَ ، جَوَّادٌ يُحِبُّ الْجُودَ فَنَظِّفُوا أفنيتكم

"Indeed, Allah is good and loves goodness, clean and likes cleanliness, noble is likes glory, is generous and likes generosity, so clean your yard" (HR. Tirmidhi from Abu hurairah)."[5]

The movement to maintain cleanliness in Indonesia is intensified during the rainy season, because Aedes sp mosquitoes are easier to breed in stagnant rainwater. So many Indonesian people use repellents to avoid mosquito bites. Repellents circulating in Indonesia contain a lot of synthetic chemical ingredients. If used continuously, it can cause skin irritation.

One of the plants that will be used as a mosquito repellent is celery leaves and lemongrass leaves. The repellent ability of citronella plants against mosquitoes has been carried out by Halim and Adelina with levels *citronellal* (39.7%), citronella, (12.0%) geraniol (17.6%) these compounds act as mosquito *repellents.6* In research according to Dian Kartika and Mentari Novitasari celery herb juice can be used

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[4] Melawati Olevia Ningum and Khurin In Wahyuni, "Studi Formulasi Sediaan Lotion Anti Nyamuk *Oleum Citronella*," *Journal of Pharmaceutical Care Anwar Medika* 1, no. 1 (2018): 7–11.

[5] Mia Fitriah, "Kajian Al-Quran Dan Hadits Tentang Kesehatan Jasmani Dan Ruhani," *Tajdid: Jurnal Ilmu Ushuluddin* 15, no. 1 (2016): 105–126.

[6] Rd Halim and Adelina Fitri, "Aktivitas Minyak Sereh Wangi Sebagai Anti Nyamuk *Citronella* Oil Fragants As Anti Mosquito," *Jurnal Kesmas Jambi (JKMJ)* 4, no. 1 (2020): 28.

as a mosquito repellent containing alkaloids, flavonoid, tannins and saponins which can work as larvicides. Alkaloids and saponins act as poison in the stomach of the larvae. Flavone work by interfering with the respiratory system of the larvae and tannins, affecting the failure of moulting in the larvae so that they die before they develop into pupae.[7]

The use of essential plant oils as natural insecticides is not new. Many plants have been proven to have the ability to be natural repellents. Plants can be used as natural insecticides because they have a higher safety level and are easily decomposed in nature, so they do not cause serious harm and do not poison surrounding living things.[8] The essential plant oil that is made is a compound that is easy to make as a lotion preparation. There are many efforts to prevent mosquito bites, such as using mosquito nets when sleeping, using mosquito repellent lotions, mosquito spray, burning and electricity.[9]

Anti-mosquito preparations in the form of lotions were chosen because they are very easy to use, and also environmentally friendly because they do not cause smoke and also do not interfere with the respiratory tract. The lotion that will be used in this study is a combination of citronella and celery essential oils as a mosquito repellent. Because citronella essential oil contains mosquito repellent compounds, namely citronellal, citronella, geraniol.[10] Celery essential oil contains mosquito repellent compounds in the form of alkaloids, flavone, saponins and tannins.[11] In the research by Juliyanty Akuba and Nurain Thomas, they

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[7] Dian Kartikasari and Mentari Novitasari, "Uji Aktivitas Larvasida Perasan Herba Seledri *(Apium gaveolens* L.*)* Terhadap Larva *Aedes aegypti*," *Jurnal Ilmiah As-Syifaa* 10, no. 2 (2018): 152–160.

[8] Yani Ambari and Ni Made Dharma Shantini Suena, "Uji Stabilitas Fisik Formulasi Lotion Anti Nyamuk Minyak Sereh," *Jurnal Ilmiah Medicamento* 5, no. 2 (2019): 111–115.

[9] Ibid.

[10] Halim and Fitri, "Aktivitas Minyak Sereh Wangi Sebagai Anti Nyamuk *Citronella* Oil Fragants As Anti Mosquito. " Jurnal Kesmas Jambi (JKMJ) Vol. 4 No. 1 (2020): 29

[11] Kartikasari and Novitasari, "Larvicidal Activity Test of Celery Herb Juice (Apium gaveolens L.) Against Aedes aegypti Larvae. As-Syifaa Scientific Journal Vol 10 (02) : (2018) Hal. 152-160

made natural insecticides using celery leaves with concentrations of 5% w/v, 10% w/v and 15% w/v, by spraying 8 times 2 times on the left side of the cage, 2 times on the right side of the cage, 2 times on the front side of the cage and 2 times on the rear side of the cage. Mesental oil celery leaves which have concentrations of 5%, 10%, 15% are effective as mosquito-killer insecticides.[12] When these compounds combine to form a new innovation, namely a natural insecticide or *Aedes sp* mosquito repellent in the form of a lotion.

Lotion is a liquid emulsion consisting of an oil phase and a water phase stabilized by an emulsifier, containing one or more active ingredients in it. Lotion generally does not directly kill mosquitoes or insects but rather functions in preventing mosquitoes and insects from getting closer to the body. Lotion is a preparation that is easy to apply with an even distribution on the skin.[13] In the study according to Safaruddin and Asnah Marzuki, citronella extract was made into a lotion formula with concentrations of 1.25%, 2.5%, 5% and 10% which had a repellant effect on *Aedes sp* mosquitoes and there were significant differences from each concentration.[14] In Siskayanti's research, Kosim said that lemongrass essential oil made into lotions with concentrations of 0%, 0.5%, 1% and 2% had a repellent effect on mosquitoes, the best results were at a concentration of 2%. Variations in the concentration of essential oils greatly affect the viscosity of lemongrass anti-mosquito lotion.[15]

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[12] Juliyanty Akuba,M.Sc.,Apt, Nurain Thomas, and Rendy Dwy Jayanto Palay, "Efek Ekstrak Metanol Daun Seledri *(Apium gaveolens* L.*)* Sebagai Insektisida Terhadap Nyamuk," *Journal Syifa Sciences and Clinical Research* 1, no. 1 (2019): 1–7.

[13] Rini Siskayanti, Muhamad Engkos Kosim, and Dedi Andika Saputra, "Analisis Konsentrasi Minyak Atsiri Dari Sereh Sebagai Aditif Dalam Pembuatan Lotion Anti Nyamuk" 6 (2021): 26–34.

[14] Safaruddin, Asnah Marzuki, and Amran Ilyas, "Uji Efektivitas Formula Ekstrak Sereh *(Cymbopogon nardus* L.) Sebagai Lotion Antinyamuk Demam Berdarah *(Aedes aegypti)*," *Universitas Hasanuddin*, no. *Cymbopogon nardus* L (2013): 1–9.

[15] Siskayanti, Kosim, and Saputra, "Analisis Konsentrasi Minyak Atsiri Dari Sereh Sebagai Aditif Dalam Pembuatan Lotion Anti Nyamuk. " Fakultas Teknik, Universitas Muhammadiyah Jakarta (2021): 26

B. Formulation of The Problem

The formulation of the problem in this study is:

1. How effective is the combination of celery essential oil*(Apium gaveolens* L.) and *citronella (Cymbopogon nardus* L) as a mosquito repellent *Aedes sp*?
2. Which formula met the quality evaluation standard of celery essential oil combination *(Apium gaveolens* L.) and *citronella (Cymbopogon nardus*L) as a mosquito repellent*Aedes sp*?

C. Research Purpose

The aim of this research is :

1. Knowing a combination of celery essential oil *(Apium gaveolens* L.)and *citronella (Cymbopogon nardus* L) is effective an Aedes sp mosquito repellent in an effort to prevent DHF.
2. Knowingthe best lotion formula and meet the quality evaluation standards of preparation, swhich can be useful as a repellant against Aedes spin for the prevention of dengue disease.

D. Benefits of Research

The benefits of this research are as follows:

1. Theoretical Benefits

The results of this study provide knowledge of natural insecticides from a combination of celery essential oil *(Apium gaveolens* L.) and *citronella (Cymbopogon nardus* L) against *Aedes sp* mosquitoes that cause DHF.

2. Practical Benefits

The research results provide information in the health sector about the potential combination of celery essential oil *(Apium gaveolens* L.)andessential oillemongrass *(Cymbopogon nardus* L) in the manufacture of lotions and as an alternative to traditional natural insecticides.

E. Research Authenticity

This study refers to several sources of literature including:

Table 1 Research Authenticity

Research Title	Research methods	Variables	Results	Research Differences
Repellent Activity Test of Celery Leaf Ethanol Extract *(Apium gaveolens)* Against *Aedes aegypti* Mosquitoes.[16]	Observational	**dependent :** *Aedes aegypti* mosquito **Independent :** Celery leaf ethanol extract*(Apium gaveolens)*	The adult mosquito *Ae. aegypti* and celery oil produce a promising and extraordinary repellency potential. Celery oil provides 100% protection against humans in the first 150 minutes followed by only one to two bites in the next 30 minutes of exposure. At concentrations of 5%, 10% & 15%.	**dependent :** *Aedes sp* **Independent :** Combination of celery essential oil *(Apium gaveolens*L.) andessential oil lemongrass *(Cymbopogon nardus* L) with a concentration of 0%, 0.5%, 1% and 2%.
Citronella Oil Activity (*Cymbopogon nardus* L*)* As Anti Mosquitoes.[17]	observational	**dependent :** *Aedes aegypti* mosquito	Composition Results of Fragrant Citronella Oil were obtained with levels of: *Citronellal* (39.7%),	**dependent :** *Aedes sp*

[16] Dias Anita Fajarini and Mimiek Murrukmihadi, "Test of *Repellant* Activity of Basil Leaves Essential Oil *(Ocimum basilicum* (L.) f. Citratum Back) Against *Aedes aegypti* Mosquitoes in Lotion Preparations and Test the Physical Properties of Lotion," Traditional Medicine Journal 20, no. 2 (2015): 91–97.

[17] Halim and Fitri, "Activity of Citronella Oil as Mosquito Repellent Citronella Oil

Independent : *Citronella* oil *(Cymbopogon nardus* L*)*	Citronellol, (12.0%) Geraniol (17.6%). The average number of mosquitoes that bite in the control sample is 9.17, in the treatment sample is 0.17, the protection value is 98.3%. There is a significant difference in the use of citronella oil formula to prevent *Aedes aegypti* mosquito bites. Fragrant citronella oil formulations can be applied and the community can use their yards to plant citronella.	**Independent :** Combination of celery essential oil *(Apium gaveolens* L.) and essential oil lemongrass (*Cymbopogon nardus* L) with a concentration of 0%, 0.5%, 1% and 2%.