

THE EFFECTIVENESS OF PINEAPPLE PEEL EXTRACT (*Ananas comosus*) AS A MOSQUITO REPELLENT FOR *Aedes aegypti*

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ABSTRACT

The *Aedes aegypti* mosquito is a vector of Dengue Hemorrhagic Fever (DHF). DHF vector control is carried out in various ways, including the use of insecticides and by using repellent. The use of chemical-based for mosquito repellents cause residues on the environment and endanger for health. Many studies have been carried out to find natural repellents derived from plants, one of them is by using pineapple peel extract. Pineapple peel extract contains flavonoid compounds, tannins, saponins which have the potential to repel mosquitoes and can kill mosquitoes. This study aims to determine the effectiveness of pineapple peel extract (*Ananas comosus*) as a mosquito repellent for *Aedes aegypti*. This research is an experimental study, using 180 *Aedes aegypti* mosquitoes with three treatments and three repetitions. Observation of the number of mosquitoes perched on hand bait was carried out every 5 minutes in the first hour and every hour for 4 hours. The data analyzed using the one-way ANOVA test. The results showed that the average number of mosquitoes perched at a concentration of 10% (18); at a concentration of 20% (16); and at a concentration of 30% (12). The higher the concentration used, less mosquitoes perched on hand. The results of the ANOVA test showed that there was an effect of pineapple peel extract on the number of mosquitoes that perched on hand ($p < 0.05$). The LSD test showed that there was a significant difference in the number of mosquitoes perched between a concentration of 30% with a concentration of 10% and 20%. It can be concluded that pineapple peel extract (*Ananas comosus*) can be a repellent to reduce the number of mosquitoes that perch on hand bait.

Keywords: Pineapple peel extract, Repellent, *Aedes aegypti*

Introduction

Mosquitoes are insects that cause many health problems for humans. In addition to the buzz that disturbs mosquitoes, it also acts as a vector or transmitter of several types of dangerous and deadly human diseases, such as dengue fever caused by the dengue virus, elephantiasis, dengue fever, elephantiasis, dengue fever caused by the dengue virus, elephantiasis. Various kinds of diseases are spread by more than 2,500 species of mosquitoes.¹ Especially in Indonesia the types of mosquitoes that usually cause outbreaks are *Aedes aegypti*, *Culex* sp, and *Anopheles*².

Aedes aegypti mosquitoes have an active habit in the morning and evening. The activity of the *Aedes aegypti* mosquito sucking blood is generally at 08.00-12.00 WIB and in the afternoon between 15.00-17.00 WIB. The habit of sucking blood is carried out from one individual to another, this is what causes the spread of dengue fever to be out of control³.

Efforts that can be made to overcome the problem of the *Aedes aegypti* mosquito vary starting from eradicating mosquito breeding places, using anti-mosquito lotion, using chemical-burning anti-mosquitoes, anti-mosquito spray, chemical-based electric mosquito repellent, and others. Of the several ways to deal with the problem of *Aedes aegypti* mosquitoes, the most commonly used are chemical-based mosquito coils, chemical-based

lotions, mosquito repellent sprays, and electric mosquito repellents. However, each of these mosquito repellents has side effects that are detrimental to health and damage the environment⁴.

Pineapple (*Ananas comosus*) is a type of tropical plant and is one of the fruit plants that are widely available and easily obtained in Indonesia. Indonesian people are no stranger to pineapple because it is widely consumed as fresh fruit. In addition, in the industrial field, it is used in the manufacture of jams, chips, beverage essences, and syrup making. However, the use of pineapple fruit is limited to the flesh, the skin of the pineapple itself is underutilized and becomes organic waste that is simply thrown away, even though the skin of the pineapple has many benefits such as compost, materials for making disinfectants, and even for body health in the form of traditional medicine. Currently, the content of pineapple skin has been widely researched and developed into various beneficial ingredients. Quoted from one of the phytochemical examination studies of pineapple peel, it was stated that the active ingredients contained in pineapple skin consisted of flavonoids, phenols, terpenoids, alkaloids, steroids, tannins, and saponins. The content of this active ingredient is believed to be effective as a repellent and insecticide for insects⁵.

However, until now research on the use of pineapple peel extract as a repellent has not been reported. Repellent itself serves to protect the person from the *Aedes aegypti* mosquito, repellents can be made in various levels of concentration, according to Sari WE repellent extract in garlic is effective at repelling mosquitoes at a concentration of 30%. alternative to overcome the problem of the *Aedes aegypti* mosquito. This study was conducted to determine "The effectiveness of pineapple peel extract (*Ananas comosus*) is a mosquito repellent *Aedes aegypti*".⁸

Research purposes

The purpose of this study was to determine the effectiveness of pineapple peel extract (*Ananas comosus*) as a natural repellent for the *Aedes aegypti* mosquito.

Methods

This study used an experimental design intending to test the effectiveness of pineapple peel extract (*Ananas comosus*) as a repellent against *Aedes aegypti* mosquitoes. The sample used in this study was 180 *Aedes aegypti* mosquitoes consisting of 3 mosquito cages, each cage containing 20 mosquitoes with 3 repetitions of the test. The eggs of the *Aedes aegypti* mosquito were obtained from the FKH IPB Laboratory, the eggs of the 146th generation *Aedes aegypti* mosquitoes were developed to become adult mosquitoes. While the pineapple skin sample was obtained from the Lambaro market, Aceh Besar. The selected pineapple is a ripe pineapple with green skin. This research was carried out on 09-22 May 2021 at the author's residence and the Integrated Campus Laboratory of Poltekkes, Ministry of Health, Aceh. Soekarno-Hatta Street, Darul Imarah District, Aceh Besar and Lorong Teuku Mud, Alue Naga, Syiah Kuala District, Banda Aceh, Aceh.

Result and Discussion

Table 1.1 Average number of *Aedes aegypti* mosquitoes perched on hand bait after being treated with pineapple peel spraying.

No	Treatment	Test			Amount	Average
		1	2	3		
1	Control	20	20	20	60	20
2	10%	17	18	18	53	18
3	20%	15	17	17	49	16
4	30%	14	12	10	36	12

Source: *Primary Data Year 2021*

Based on table 1.1 the average of the fewest mosquitoes perched on hand baits treated with pineapple peel extract (*Ananas comosus*) was found at a concentration of 30%, namely 12 mosquitoes, and the average number of mosquitoes that perched the most was on hand baits that were not given treatment (control) that is 20 mosquitoes.

Table 1.2 Percentage of mosquitoes perched on hand bait.

No	Treatment/ Concentration	Number of Mosquitoes For Testing	Average Number of Mosquitoes Perched on Hand Bait	Percentage of Mosquitoes Perched on Hand Bait (%)
1	Control	20	20	100%
2	10%	20	17,6	88%
3	20%	20	16,3	81,5%
4	30%	20	12	60 %

Source: *Primary Data Year 2021*

Based on table 1.2, it can be seen that the highest percentage (%) of the number of mosquitoes that perch on hand bait is at a concentration of 10%, which is 88%. While the lowest percentage of the number of mosquitoes that perch on hand bait is at a concentration of 30%, which is 60.

Table 1.3 Results of one-way ANOVA statistical test on pineapple peel extract (*Ananas comosus*) as a repellent *Aedes aegypti* mosquito

Variable Source	Number of Squares	Db	Mean of square	F	P Value
Between groups	406.667	3	135.556	28.223	.000
In Group	211.333	44	4.803		
Total	618.000	47			

Source: *Primary Data Year 2021*

Based on the ANOVA test, p-value < 0.05, it is known that the administration of pineapple peel extract has an effect on the number of mosquitoes that perch on hand bait (Table 5.3).

Table 1.4 LSD test results on differences in the effect of pineapple peel extract as a mosquito repellent *Aedes aegypti*

Concentration	Concentration/ Treatment	Average Difference	Std. error	P Value
Concentration 10%	Concentration 20%	1.33333	.89471	.143
	Concentration 30%	5.66667*	.89471	.000
Concentration 20%	Concentration 10%	-1.33333	.89471	.143
	Concentration 30%	4.33333*	.89471	.000
Concentration 30%	Concentration 10%	-5.66667*	.89471	.000
	Concentration 20%	-4.33333*	.89471	.000
Control	Concentration 10%	2.33333*	.89471	.012
	Concentration 20%	3.66667*	.89471	.000
	Concentration 30%	8.00000*	.89471	.000

Source: *Primary Data Year 2021*

Based on the results of the LSD test, it is known that the concentrations of 10% and 20% are significantly different from the concentration of 30%. Furthermore, the control was significantly different with a concentration of 20% and 30%.

Based on the results of the study, it can be seen that the pineapple peel extract (*Ananas comosus*) has a repulsive effect on the *Aedes aegypti* mosquito, this can be seen in the tests carried out with three treatments and three repetitions with each concentration of pineapple peel extract used, namely 10%, 20%, 30% and control (without using extract) caused differences in the average number of mosquitoes that perched on hand bait.

On average, the fewest mosquitoes perched after being sprayed with pineapple peel extract were at a concentration of 30% and had a repelling power of 40%. This is because the higher the concentration of the extract, the fewer mosquitoes that perch. This is in line with the research of Suharno Zen (2017) which states that the higher the concentration of the extract, the higher the repellent power obtained. The higher the concentration of the extract, the content of the active compounds contained in the extract will also be higher so that it affects mosquitoes to perch.

The results of the Anova statistic test showed that the p-value was < 0.05 , therefore H_0 was rejected so that it was known that there was an effect of using pineapple peel extract (*Ananas comosus*) on the number of *Aedes aegypti* mosquitoes that landed.

This test was conducted to determine the significant difference between concentrations. The results showed that the concentration of 10% was significantly different from the concentration of 30% where the number of mosquitoes perched differed by 18 and 12. Furthermore, the concentration of 20% was significantly different from the concentration of 30% where the number of mosquitoes perched differed by 16 and 12. Finally, the control treatment was significantly different from concentrations of 20% and 30% where the number of mosquitoes that landed differed by 20 with 16 and 12. The difference in the number of mosquitoes that landed from each concentration was influenced by the level of concentration used where the higher the concentration of the extract, the higher the content of active compounds contained in the extract, and the smell is getting stronger.

Conclusion

Based on the results of research that has been carried out from March 5 to May 24, 2021, it can be concluded as follows, The average mosquito perching at 10% concentration was 18 with repulsion (12%), the average mosquito perched at 20% concentration was 16 with repulsion (18.5%), and lastly the average mosquito perched at 20% concentration was perch at 30% concentration is 12 with repulsion (40%). Pineapple peel extract was effective as a repellent at a concentration of 30% with 40% repelling power against the *Aedes aegypti* mosquito. Based on the Anova test, shows that there is an effect of pineapple peel extract on the number of mosquitoes that perch. The results of the LSD test show that there is a significant difference between a concentration of 10% and 20% to a concentration of 30%.

References

1. Ashafil R, Nardin, Santri NF. Identifikasi Jentik Nyamuk *Aedes aegypti* pada bak mandi di toilet Kampus V Universitas Indonesia Timur. *Jurnal media laboran*. 9(2), 2019; 13-17.
2. Oroh MY, Pinontoan OR, Tuda JBS. Faktor Lingkungan, Manusia dan Pelayanan Kesehatan yang Berhubungan dengan Kejadian Demam Berdarah Dengue. *Jurnal Public Heal Community Medicine*. 1(3), 2020; 35-46.
3. Dr. Hj. Dwi Wahyuni MK. Toksisitas Ekstrak Tanaman Sebagai Bahan Dasar Biopestisida Baru Pembasmi Larva *Aedes Aegypti* (Ekstrak Daun Sirih Ekstrak Daun Pepaya, dan Ekstrak Biji Srikaya) Berdasarkan Hasil Penelitian. Edisi 1. *Media Nusa Kreative*; 2016.

4. Utami RW. Hubungan Faktor Predisposisi Dengan Keberadaan Jentik Nyamuk *Aedes aegypti*. *Jurnal Promkes*. 6(2), 2018; 227-241. Juariah S, Irawan MP. Biolarvasida Ekstrak Etanol Kulit Nanas terhadap larva nyamuk *Culex* sp. *Jurnal Public Health (Bangkok)*. 6(4), 2017; 232-236.