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The Effectiveness Test Atung Methanol Extract (*Parinarium Glaberimum* Hassk) as a Fly Repellent for Salted Skipjack Tuna

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Abstract: House flies (*Musca domestica*) and green flies (*Calliphora vomitoria*) are members of the Muscidae family which are commonly found in residential areas in Indonesia. The habit of houseflies and greenflies in searching for food in wet household waste has the potential to make them vectors of pathogens that cause dysentery, cholera, typhoid, diarrhea and worms. Atung (*Parinarium glaberimum* Hassk) contains secondary metabolites, namely: alkaloids, flavonoids, terpenoids, phenol, saponins and tannins. The phytochemical compounds in Atung have the potential to act as a fly repellent (Repellent). The aim of this research was to determine the landing power of fly repellent on Atung methanol extract. This research was designed using a simple RAL experimental method with 4 treatments and 3 repetitions. Concentration variations 0% (control), 1%, 2%, from 4%. Data analysis used the Anova statistical test analysis version SPSS 24 at a significance level of 0.05. The results of the research showed that the higher the concentration of Atung methanol extract used in the fly repellent, the less the fly's ability to land on salted skipjack tuna. The protective ability of *the repellent* against house flies and green flies is 83% for a methanol extract concentration of 1%, 88% for a methanol extract concentration of 2%, and 100% for a methanol extract concentration of 4%. Atung methanol extract has the potential to be used as an active ingredient. Effective repellent against houseflies and greenflies.

Keywords: *Calliphora vomitoria,* Effectiveness, *Musca domestica, Parinarium glaberimu* Hassk, *Repellent*

I. INTRODUCTION

Fish is a source of food whose safety *must* be maintained because of its use in meeting the need for protein nutrients. Fish is also recognized as a *functional food* which is important for health because it contains long chain unsaturated fatty acids, vitamins, and macro and micro minerals (Heruwati, 2002).

Flies can cause physical damage and also act as intermediaries for contamination of putrefactive, pathogenic and toxin-forming bacteria, such as: *Acinetobacter, Staphylococcus,* and *Vibrionaceae* and can transmit diseases, such as: *Shigella, E coli, Salmonella spp, Vibrio cholera, Helicobacteri pylori,* Sinusitis Virus and Hepatitis Virus.

Synthetic insecticides are often used to reduce and overcome damage caused by flies and contamination from flies during drying, salted fish processors directly spray on fish products (Ariyani et al., 2007). Insecticides that come from nature and whose use is safe for the environment and society need to be developed to reduce the use of synthetic insecticides. Botanical insecticides have a molecular composition that easily breaks down into harmless compounds. Plants that are classified as aromatic plants, such as: Citronella, eucalyptus, galangal, geranium, zodia, turmeric, and others are believed to have the property of repelling flies (Kardinan, 2007). Compounds

contained in plants and which function as insecticides include *cyanide, saponin, tannin, flavonoids, alkaloids, steroids* and oils. essential oils (Naria, 2005).

Research conducted by Risniati Bili et al (2021) shows that the higher the concentration of clove leaf extract used in spray *repellent*, the more flies will stay away. The repellent ability of the spray *repellent* against house flies was 83.7% for an extract concentration of 10%, 88.88% for an extract concentration of 15%, 91.10% for an extract concentration of 20% and 95.55% for an extract concentration of 25%.

Research conducted by Yulia Hartini, (2020), showed that there was a difference in the effect of variations in the concentration of basil leaf filtrate as a fruit fly *repellent on the number of fruit flies that landed on the bait.* The 75% concentration is the concentration that has the fewest number of flies landing. Based on the repellency scale, a concentration of 75% has a percentage of 56% so it is classified as weak.

Research conducted by Wiwit Aditama, (2023), found that the number of houseflies that refused turmeric extract was 28, based on concentrations of 10gram/100ml, 15gram, 100ml and control (without the addition of extract). One natural ingredient that can be used as a vegetable insecticide is a plant with a repellent *aroma*. (Kardinan, 2007). Some of these aromatic plants are citronella, cloves, eucalyptus, geranium, zodia, and others (Kardinan, 2007).

One of these types of plants that is often found on the coast is Atung (*Parinarium glaberimum* Hask). A lot of research has been done on Atung as an anti-microbial, Atung as an anti-insect (Repellent) has never been done. Based on the description above, the author is interested in conducting research entitled testing the effectiveness of methanol extract of atung (*Parinarium glaberimum* Hassk) as a fly repellent in salted skipjack tuna.

II. RESEARCH METHODS

Time and Place of Research

This research was carried out from May to August 2022 at the Taxonomy Laboratory, Biology Department. Pattimura University, Ambon.

Tools and materials

The tools used in this research include containers with a volume of 2000 ml, scissors, oven, blender, spatula, analytical balance, 1000 ml beaker glass, 1000 ml Erlenmeyer flask, rotary evaporator, mask, *gloves*, 1500 ml plastic bottle, plastic jar, thermometer, hygrometer, gauze, label paper, bait container, test cage with dimensions 27 x 30 x 27 cm and *counter*.

The materials used in this research were: 1000 g of physiologically mature *Atung, methanol solvent and skipjack tuna as bait for flies*. Extract testing was carried out on 360 individual flies captured from the wild.

Atung Extraction

Atung fruit comes from Hutumuri Hamlet. Ambon. The fruit taken is physiologically ripe fruit. Making Atung methanol extract begins by splitting the Atung fruit, removing the seeds, grating the Atung seeds, drying them in the air for 1 day, pounding and sieve, putting them in plastic and getting Atung seed powder. A total of 5 with clean running water and drained until the water does not drip. A total of 500 g of atung seed powder was weighed and soaked in methanol solvent.

Extraction done with using the maceration method. A total of 500 g of Atung powder was put into an Erlenmeyer flask as a maceration container with a spatula, then methanol was added until the entire sample was submerged. The samples were left for 2 x 24 hours in a closed container in a place protected from direct sunlight, while occasionally stirring using a spatula. After the incubation time, the sample was filtered using filter paper to separate the dregs and filtrate. The filtering results are saved. The dregs remaining from the filtering will then be macerated again with new methanol liquid to be filtered. This maceration was carried out three times until the solution was colorless. The filtering results obtained are then concentrated using *a rotary evaporator* until a thick extract is obtained which will be liberated from methanol through heating until all the solvent has evaporated (sample evaporation).

Preparation of Atung Extract Test Solutions in various Concentrations

The treatment concentrations tested in this research were: concentrations of 0%, 1%, 2% and 4%. The solution concentration was made after the Atung extraction process was complete and a solution was obtained. The concentration of the Atung extract solution is made based on concentration (Handayani, 2018).

Fly Retrieval

House flies *(M. domestica*) and green flies (*Callipora vomitoria*) were taken from household kitchens in places that smelled strong and were dirty. *M. domestica* and *Callipora vomitoria* and were caught using traps made from 1500 ml plastic bottles. Fresh fish as bait is put into a plastic bottle, then left for 30 minutes for the flies to enter the trap. The caught flies were put in a plastic jar and covered with gauze.

Repellent Testing on *Musca domestica and Callipora vomitoria*

This research was carried out using the Completely Randomized Design (CRD) method with 4 treatments and 3 replications so that 12 experimental units were obtained. The test was carried out by preparing 12 boxes with dimensions of 30 x 30 x 30 cm, as test cages that had been labeled, waiting for five minutes and then measuring the temperature and humidity. Each test cage contained 20 individual flies. Atung's methanol extract was soaked for 5 minutes, then removed and placed in a container and put in the treatment box... The container containing the bait was put into the test cage which already contained 20 individual flies. The number of flies landing on the bait was recorded during a 60 minute observation period. This test was carried out 3 times.

Data analysis

Data analysis to test the protective power of Atung methanol extract against *flies* used the Anova statistical test (*Analysis of variance*) SPSS 24 version at a significance level of 0.05. If there is a real difference or the calculated F is greater than the F table then continue with the Tukey test to see effectiveness Atung methanol extract as a *repellent* against house flies and green flies at various treatment concentrations.

III. RESULTS AND DISCUSSION

RESULTS

A. Skipjack tuna given Atung seed extract with methanol solvent

Table 1. Average Fly Repellent Power on Skipjack Fish treated with Methanol Solvent.

Group	Percentage (%) Repulsive Power
Control	0.00±0.00
1%	83 . 10 ± 3.91
2 %	88 . 18 ± 2 . 96
4 %	100 . 00 ± 0.00

Table 2. **ANOVA test**

		Sum of Squares	df	Mean Square	F	Sig.
NumberofFliesThatFly	Between Groups	1208.333	3	402,778	77,957	,000
	Within Groups	41,333	8	5,167		
	Total	1249.667	11			
ProtectionPower	Between Groups	18850.153	3	6283.384	1042.862	,000
	Within Groups	48.201	8	6,025		
	Total	18898.354	11			

Table 3. Tukey test for skipjack tuna

Dependent Variable	Treatment	Treatment	Thrust
ProtectionPower	Control	Concentration 1%	83 . 10 ± 0.00 [a]
		Concentration 2%	88 . 18 ± 0.00 [b]
		Concentration 4%	100 . 00 ± 0.00 [c]

From the statistical test results it can be seen that in the control there is no protective power but at a methanol concentration of 1%, 2 % , and 4 % has protective power. The higher the concentration of Atung methanol extract , the greater the protective power obtained. Based on the results of the Anova test (Table 2) , it can be seen that P. sig < 0.05, so it can be concluded that the administration of Atung methanol extract is significant. Judging from the Tukey test (Table 3) comparison of treatments between controls with concentrations of 1%, 2 %, and 4 % The difference is significant (< 0.05) .

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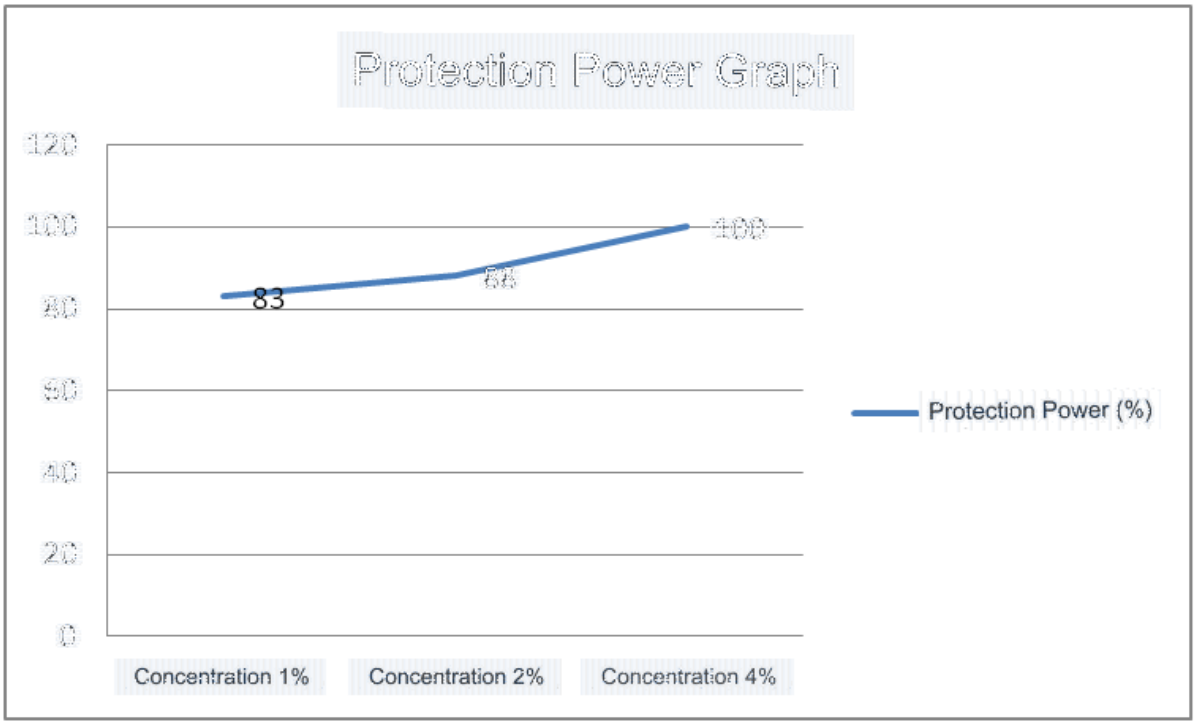
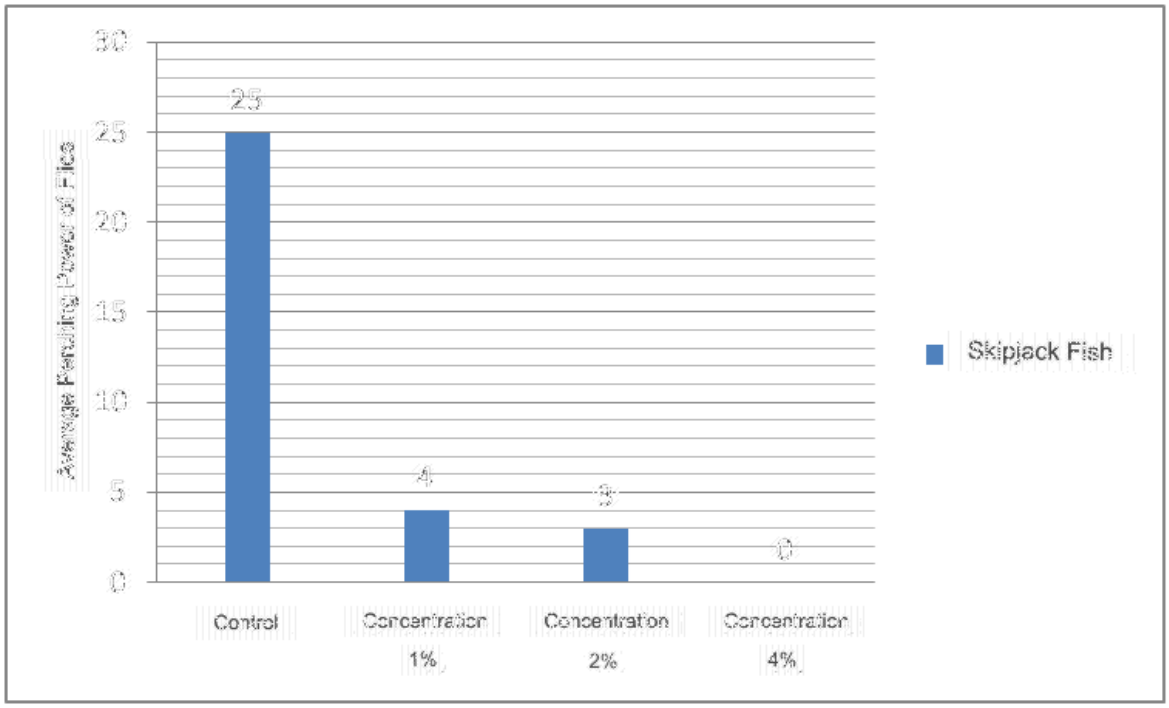
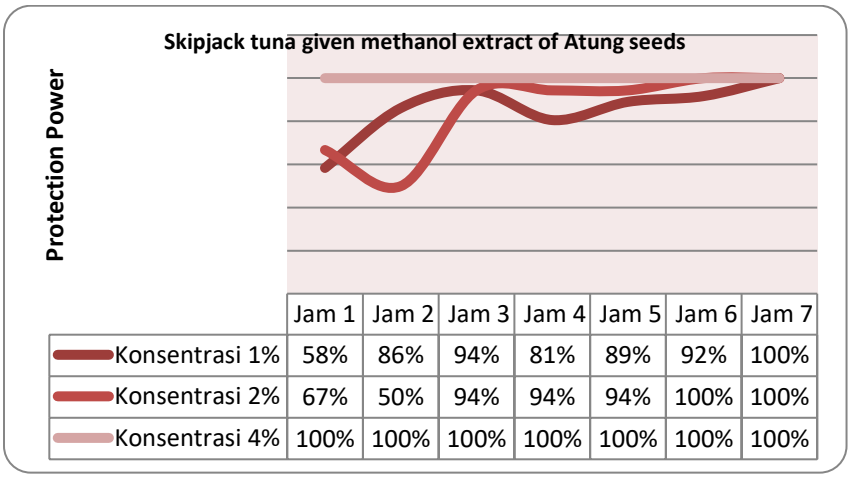


Graph 1. Graph of Fly Protection Power for skipjack tuna given Atung methanol extract



Graph 2. Fly Perching Power Graph for skipjack tuna given Atung methanol extract



	Jam 1	Jam 2	Jam 3	Jam 4	Jam 5	Jam 6	Jam 7
Konsentrasi 1%	58%	86%	94%	81%	89%	92%	100%
Konsentrasi 2%	67%	50%	94%	94%	94%	100%	100%
Konsentrasi 4%	100%	100%	100%	100%	100%	100%	100%

Graph 3. Time-protective power graph for skipjack tuna given Atung methanol extract

DISCUSSION

Effect of concentration of methanol extract of Atung (*Parinarium glaberimum* Hassk) on Skipjack Fish

In the control, the average fly perch was 76, with a 1% concentration the average fly perched was 13, the 2% concentration had an average of 8 flies and the 4% concentration had an average of 0 flies. The calculation of the fly protection power of the Atung methanol extract for skipjack tuna fish commodities is as follows: at a concentration of 1%, the average protection power is 84%, 2%, the protection power is 87% and 4%, the average protection power is 100%. It can be said that the Atung methanol extract has an influence because the descriptive statistical results show that the average protective power has a high effect on the treatment of fly repulsion in skipjack tuna in the Atung methanol extract with a concentration of 4% which has an average of 100% (Graph 2)

The effect on flies of treatment in the form of a concentration of Atung methanol extract soaked in skipjack tuna with the highest average protective power at a concentration of 4% (100%), and the lowest at 1% (84%) (Graph 1)

Based on Graph 2 and Graph 1, it shows that the number of flies landing is inversely proportional to the concentration of Atung methanol extract. The number of flies that land will tend to decrease as the concentration of Atung methanol extract given increases. Laying the pieces skipjack tuna those measuring 2x2 cm in the control treatment tended to be preferred by flies to land on when compared to skipjack tuna soaked in Atung methanol extract at various concentrations. This is thought to be due to the presence of the aroma of Atung in skipjack tuna due to the soaking process which can cover the smell of skipjack tuna which is liked by flies.

In the process of placing methanol extract on skipjack tuna, it was seen that the group given Atung methanol extract with concentrations of 1%, 2%, and 4% had better repulsion values when compared to the control group or in other words, placing salted skipjack tuna fish with methanol extract. Atung was more influential compared to the control group. However, if we look at the average value of repulsion (Graph 1), then among the groups given Atung methanol extract concentrations of 1%, 2% and 4%, the average value of repulsion is different. The high reduction

in the number of flies that landed on the 4% Atung methanol concentration compared to the 1%, 2% concentration and the control group shows that the Atung methanol extract with a higher concentration will be more effective or has the potential to control flies.

During the research, the flies included in the treatment box were house flies (*Musca domestica*) and green flies (*Chrysomya megachepal a)*. This is in accordance with research conducted by Hidayat (2000) and research by Kismiyati in Ariyani (2007), where the types of flies that land on fish during the drying process are house flies and green flies.

The characteristics of house flies (*Musca domestica*) are medium size (6-9 mm), gray in color and have four longitudinal bands on the surface of the thorax (Sembel, 2009). Meanwhile, the characteristics of green flies (*Chrysomya megachepala*) are metallic, shiny, bluish in color and about 1.5 times the size of house flies (Fardaniyah, 2007).

The activity and behavior of flies can be observed before landing on what they perceive to be food while foraging. From observations, if a fly wants to land on an object to eat or lay eggs, the fly will adapt first to ensure that the object contains materials that can harm it. Flies only land for a moment and immediately fly away from an object if the object contains substances that are detrimental to them.

This is in accordance with Tarumingeng's opinion in Haryati (2006), before laying eggs, flies often orient themselves first by looking for a suitable environment to lay eggs for the sake of their survival. Flies have very sensitive organs, namely the tarsi which are located on the head and thorax, because they have chemical receptors or rubbery olfactory organs so they can detect odors they don't like. In general, insects have dendrites, or parts of nerve branches whose function is to receive stimulation in the head, which are not protected.

Based on Anova test (Table 2) For Atung methanol extract in skipjack fish commodities, it can be seen that the 4% concentration is the lowest for perch power (Graph 2) and the 4% concentration is the highest for fly protection power (Graph 1). Phytochemical tests were carried out, it was found that Atung contains secondary metabolites in the form of *alkaloids*, *flavonoids*, triterpenoids, *phenolics*, *saponins* and *tannins*. This is in line with research by H ehanussa (2019) that Atung able to inhibit bacterial growth of *E*, *coli*, *Salmonella* sp, *S. pullorum*, *S. aureus*, and *B. befidum*. Phytochemical tests carried out by Hehanussa (2019) showed that Atung contains phenol, flavonoids, tannins, saponins and alkaloids.

Saponin is a glycoside in plants that resembles soap and can dissolve in water. Saponins can reduce digestive enzyme activity and food absorption (Dinata, 2008 in Haditomo 2010). The effect of saponins can be seen in the physical damage to the outer part of the insect (cuticle), namely washing away the wax layer that protects the insect's body and causing death due to loss of a lot of body fluids. Saponins also enter through the respiratory organs and cause cell membranes to be damaged or metabolic processes to be disrupted (Haditomo, 2010).

Flavonoids are a type of compound that is toxic, they are compounds made from sugars bound to flavones. Flavonoids have distinctive properties, namely a very sharp odor, bitter taste, soluble in water and organic solvents, and easily decomposed at temperature (Dinata, 2009 in Haditomo, 2010).

According to Yasi and Harsanti (2018) alkaloid compounds have the ability to act as stomach poisons. If tannins come into contact with the tongue, the protein deposition reaction is characterized by an astringent or astringent taste.

Tannins can reduce the ability to digest food by reducing the activity of digestive enzymes (protease and amylase) and disrupt intestinal protein activity. Insects that eat plants with high tannin content will get little food, as a result there will be a decrease in growth.

The attraction of flies to land on an object comes from conduction sensory nerve stimulation. Therefore, the most effective way to prevent flies from landing on an object is to block their sensory nerves. From the results of observations, the distinctive aroma of Atung extract can block sensory nerves in flies. Thus, the use of Atung extract is effective as a repellent or deterrent when drying salted skipjack tuna.

The time protection power of Atung methanol extract on skipjack tuna fish commodities (Graph 3) shows that a concentration of 4% at 6 hours has an average protective power of still above 90%, thus a 4% concentration is an effective repellent for reducing the landing of flies on salted skipjack tuna. According to the Department of Agriculture in the 1995 Standard Method for Pesticide Efficacy Testing, *repellent* is considered effective if it lasts until the 6th hour. the protection power is still above 90%. The effect of the *repellent* effect in inhibiting the ability of flies to land on salted fish, but for each type and concentration of extract from the 1st to the 6th hour, the protective power experienced significant fluctuations, this is in line with research conducted (Erik Budi et al, 2016) that the average protective power of each type and dose of *repellent* up to the 6th hour of the 3% dose of Kencur extract has a protective power of 64.2222%, a 6% dose of 73.3532%, and a 12% dose of protective power of 62.6777 % and a dose of 24% was 70.1131%. The 3% dose of Lemongrass Extract has a protective power of 48.75%, a 6% dose of 61.7882%, and a 12% dose of protective power of 56.5194% and a 24% dose of 48.5981%. A 3% dose of turmeric extract has a protective power of 65.3517%, a 6% dose of 44.0940%, and a 12% dose of protective power of 50.1235% and a 24% dose of 56.5194%.

IV. CONCLUSION

Atung methanol extract has the potential to be used as a natural *repellent* for *M. domestica* and *Callipora vomitoria*. The concentration of Atung extract of 4% as a *repellent* produces the highest average protection against flies, namely 100%.

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