

Effect of Coffee Grounds as Cockroach Repellent

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ABSTRACT

Cockroach is one of the insects that acts as a disease vector generally found in homes and buildings including restaurants or food stalls. Cockroaches can contaminate human food by becoming the agents of various digestive-related diseases such as diarrhea, typhoid fever, dysentery, hepatitis A virus, polio and cholera. Coffee is cultivated in Indonesia which in general consists of two types namely Arabica coffee and Robusta coffee. Arabica coffee is coffee which has a better flavor than Robusta coffee since Robusta coffee tastes bitterer, less acidic and contains higher caffeine than Arabica coffee. This study aims to determine the effect of coffee grounds as a natural insecticide for cockroach (*Periplaneta americana*) repellent 2019. This was an experimental study conducted in the laboratory and workshop of environmental health department in May 2019. The objects of this study were cockroach (*Periplaneta americana*) and coffee grounds to observe which dose is the best for cockroach repellent, and analyzes the people's acceptance of the coffee grounds products produced. Test results on the effectiveness of coffee grounds as a cockroach (*Periplaneta americana*) repellent at a dose of 10 gr, 15 gr and 20 gr for repetition of the first, second and third, showed that the rejection of cockroaches (*Periplaneta americana*) in large quantities was achieved at a dose of 15 grams of coffee grounds namely 25 cockroaches with a mean of 8.3. The results of two-way ANOVA test showed that there was no significant difference on the effectiveness of coffee grounds as a cockroach (*Periplaneta americana*) repellent. The duration variable obtained a p value of $0.539 > 0.05$ which indicated that there was no difference. Meanwhile, the dose variable obtained a p value $0.074 > 0.05$ which indicated that there was no

difference and the interaction between duration and dose (duration * dose) was 1.522 with a probability of $0.214 > 0.05$. Thus, it can be said that there was no difference between the duration and the number of cockroaches that refused. It can be concluded that there was no effect of the dose of 10 grams of coffee grounds on cockroach (*Periplaneta americana*) repellent activity which obtained 16 cockroaches with a mean of 5.3. Furthermore, there was no effect of the dose of 15 grams of coffee grounds on cockroach (*Periplaneta americana*) repellent activity which obtained 25 cockroaches with a mean of 8.3. Further researchers are expected to be able to conduct a study on coffee grounds with more varied doses.

Keywords: Coffee grounds, Repellent, Cockroach

INTRODUCTION

Realizing the degree of public health is an effort to improve the better state of health. The highest degree of health may be achieved at any time in accordance with the conditions and situations and the real capabilities of each person or community. Continuous health efforts must always be strived so that a healthy community can live productively socially and economically as an investment in development.¹

It has long been recognized that environment has an effect in causing human illness. The significant role of the environment in improving the degree of public health also has been long suspected. Conversely, poor public health conditions, including the emergence of infectious diseases indicate that environmental factors have a very large share.²

One of the vectors is arthropod in the environment that can transmit disease agents to humans both mechanically and biologically. Insect is a class of phylum arthropod that many act as the vector of disease.³

Cockroach is one of the insects that acts as a disease vector found in homes and buildings including restaurants or food stalls. Cockroaches can contaminate human food by becoming the agents of various digestive-related diseases such as diarrhea, typhoid fever, dysentery, hepatitis A virus, polio and cholera.³

One organic material believed to be used as a vegetable insecticide is coffee grounds. The United States Environmental Protection Agency socialized that coffee grounds could be used to repel mosquitoes. They conducted experiments in several states and also several countries and this organic anti-mosquito method was evidenced to repel mosquitoes and other insects. The experiments were carried out in a fairly easy and also inexpensive way. They just prepare fresh coffee grounds or coffee grounds waste (which must be dried first). Then it was placed in a container that had been pre-coated with aluminum foil. Then left the coffee grounds overnight and the coffee grounds waste should be completely dry. After that, the coffee grounds was burnt and placed in an open room or mosquito-infested room. The effect

of burnt coffee grounds was similar to incense that smelled good and was effective in repelling mosquitoes⁵.

MATERIALS AND STUDY METHODS

a. Tools

- 1) Tweezer 1 pair
- 2) Scales 1 piece
- 3) Stopwatch 1 piece
- 4) Stationery 1 set
- 5) Handy cam 1 piece, etc

b. Materials

1. Coffee powder

c. Procedures

- 1) Weigh as much as 10, 15 and 20 grams.
- 2) Put in porous paper for each dose

d. Stages of Experiment

- 1) Coffee beans were mashed into powder of 10 grams, 15 grams and 20 grams as a testing material as needed.
- 2) 120 adult cockroaches, 10 individuals for one test and they were tested 3 times for each dose plus control
- 3) Bread for cockroach (*Periplaneta americana*) during quarantine.
- 4) Prepared three treatment cages sized 25 cm x 80 cm.
 - Cage I for 10 grams of powder
 - Cage II for 15 grams of powder
 - Cage III for 20 grams of powder

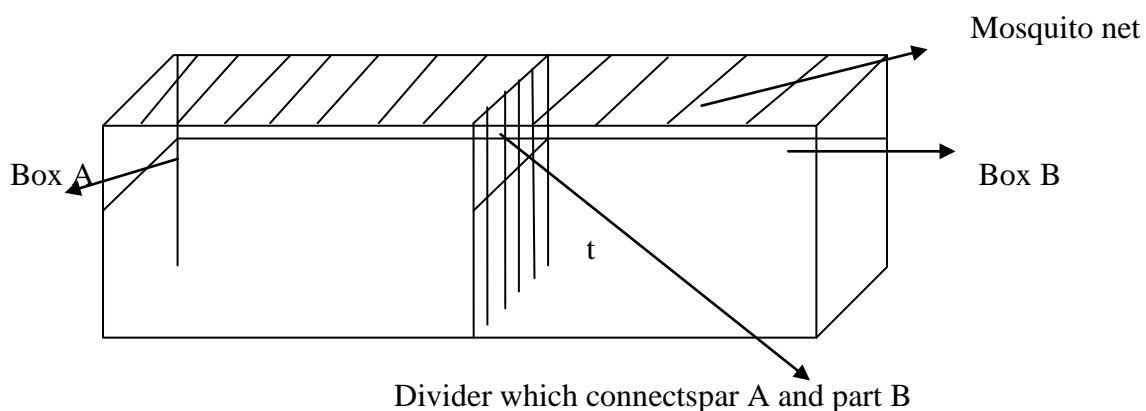


Figure 1. Test Box

- 5) Coffee grounds and bread were put in the box A.

- 6) 10 cockroaches were put into the box B and were let stand for 30 minutes to adapt themselves
- 7) The divider that connected part A and part B of the box was opened
- 8) The number of cockroaches that refused coffee grounds and bread baits that went to part A was observed
- 9) Observations were made every 15 minutes for 1 hour.
- 10) The results were recorded and analyzed

RESULTS

The study was conducted on September 1 to September 30, 2019 with the population of 120 cockroaches using coffee grounds as a cockroach (*Periplaneta americana*) repellent with an observation duration of 1 hour (15 minutes, 30 minutes, 45 minutes and 60 minutes).

The results of the effectiveness test of coffee grounds as a cockroach (*Periplaneta americana*) repellent at the doses of 10 gr, 15 gr and 20 gr for the first, second and third repetitions, the following results were obtained:

Table 1. Test Results on the Effect of coffee grounds on cockroach (*Periplaneta americana*) repellent activity on at the doses of 10 gr, 15 gr and 20 gr

NO	DOSE	Repetition			Total	Mean
		I	II	III		
1	10 gr	6	6	4	16	5.3
2	15 gr	7	10	8	25	8.3
3	20 gr	6	6	6	18	6

Table 3. The Results of Anova two-way test to observe the effectiveness of coffee groundson cockroach(*Periplanetaamericana*) repellentactivity

Source	Type III Sum of Squares	Df	Mean Squares	F	Sig.
Corrected Model	10.972 ^a	11	0.997	1.561	0.174
	96.694	1	96.694	151.348	0.000
Duration _Time	1.417	3	0.472	0.739	0.539
Dose	3.722	2	1.861	2.913	0.074
Duration _Time	5.833	6	0.972	1.522	0.214
Error	15.333	24	0.639		
Total	123.000	36			
Corrected Total	26.306	35			

The duration variable obtained a p value of $0.539 > 0.05$ which indicated that there was no difference. Meanwhile, the dose variable obtained a p value $0.074 > 0.05$ which indicated that there was no difference

Based on Table 1 above it was known that the rejection of cockroaches (*Periplaneta americana*) in large quantities was achieved at a dose of 15 grams of coffee grounds namely 25 cockroaches with a mean of 8.3.

The results of the effectiveness test of coffee grounds as a natural insecticide for cockroach (*Periplaneta americana*) repellent at 15 minutes, 30 minutes, 45 minutes and 60 minutes for the first, second and third repetitions, obtained the following results:

Table 2 The results of the effectiveness test of coffee grounds as a natural insecticide for cockroach (*Periplaneta americana*) repellent at 15 minutes, 30 minutes, 45 minutes and 60 minutes

Table 2 Hasil Uji Efektivitas Serbuk Kopi Sebagai Repellent KecoA (*Periplaneta americana*) at 15, 30, 45 dan 60 Minutes

NO	DURATION	Repetition			Total	Mean
		I	II	III		
1	15 MINUTES	4	7	6	17	5.6
2	30 MINUTES	7	5	3	15	5
3	45 MINUTES	5	4	6	15	5
4	60 MINUTES	3	6	3	12	4

Based on Table 2 above it was known that the rejection of cockroaches (*Periplaneta americana*) in large quantities was achieved at a duration of 15 minutes namely 17 cockroaches with a mean of 5.6.

Anova two-way test to observe the effectiveness of coffee groundson cockroach (*Periplaneta americana*) repellent activity obtained the following results:

and the interaction between duration and dose (duration * dose) was 1.522 with a probability of 0.214 $p > 0.05$. Thus, it can be said that there was no difference between

the duration and the number of cockroaches that refused.

DISCUSSION

Based on the results of the study on the effectiveness of coffee grounds as cockroaches (*Periplaneta americana*) repellent, it was indicated that there was the power to resist cockroaches (*Periplaneta americana*). After tests were performed in 3 repetitions and observations were conducted every 15 minutes, it appeared that the cockroaches moved from a box sown with coffee grounds (box A) to a box that was not sown with coffee grounds (box B). 15 minute interval showed a difference in the number of cockroaches that rejected the coffee grounds sown in box A for every 3 repetitions. This evidenced that coffee grounds had the power to resist cockroaches. However, the administration of coffee grounds doses had not been effective yet in resisting cockroaches (*Periplaneta americana*).

It is known that the rejection of cockroaches (*Periplaneta americana*) in large quantities was achieved at a dose of 15 grams of coffee grounds namely 25 cockroaches with a mean of 8.3 the rejection of cockroaches (*Periplaneta americana*) in large quantities was achieved at a duration of 15 minutes namely 17 cockroaches with a mean of 5.6

The results of two-way ANOVA test showed that there was no significant difference on the effectiveness of coffee grounds as a cockroach (*Periplaneta americana*) repellent. The duration variable obtained a p value of $0.539 > 0.05$ which indicated that there was no difference. Meanwhile, the dose variable obtained a p value $0.074 > 0.05$ which indicated that there was no difference and the interaction between duration and dose (duration * dose) was 1.522 with a probability of $0.214 > 0.05$. Thus, it can be said that there was no difference between the duration and the number of cockroaches that refused.

There was no difference due to the use of less doses or less pungent powder

scents so that it could not resist cockroaches. It was based on the theory that the aroma of coffee grounds can be resistant to cockroaches. In this study, it was evidenced that coffee grounds were not effective and it should be prepared in another form.

Therefore, in this study the use of coffee grounds as a cockroach (*Periplaneta americana*) repellent showed that there was no effect on cockroaches (*Periplaneta americana*) rejection due to ineffective dose used.

CONCLUSIONS

Based on the observations on the effect of coffee grounds on Cockroach (*Periplaneta americana*) Repellent, on it can be concluded that:

1. There was no effect of the dose of 10 grams of coffee grounds on cockroach (*Periplaneta americana*) repellent activity which obtained 16 cockroaches with a mean of 5.3.
2. There was no effect of the dose of 15 grams of coffee grounds on cockroach (*Periplaneta americana*) repellent activity which obtained 25 cockroaches with a mean of 8.3.
3. There was no effect of the dose of 20 grams of coffee grounds on cockroach (*Periplaneta americana*) repellent activity which obtained 18 cockroaches with a mean of 6.
4. Coffee grounds as a cockroach (*Periplaneta americana*) repellent showed a rejection rate but for the administration of doses that had not been varied yet.

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