

REPELLENT ACTIVITY OF PLANTS EXTRACTION AGAINST COCKROACHES (PERIPLANETA AMERICANA, BLATELLA GERMANICA)

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ABSTRACT

Cockroaches have the potential to mechanically carry and transmit bacteria and viruses. Chemical control (such as Naphthalene) is commonly used against cockroaches. However, the use of chemical based product effects in human health and the environment. This study was conducted to evaluate the repellency of two plants extraction from commercial plant species *Citratrus flexuosus* (Lemongrass) and *Pandanus amaryllifolius* (Pandan Leaves), and naphthalene as a control, against two cockroach species *Periplaneta americana* and *Blatella germanica* under laboratory conditions using food as bait. The weight of the food is weighed and placed on the filter paper in the test container. 25 drops of plant extraction were drop surround the food. 20 cockroaches were released freely in the container and left for 24 hours. The weight of the food is weighed after the test ends and the weight differences is taken into account. The plant extraction derived from *Citratrus flexuosus* showed the best repellency over *Pandanus amaryllifolius*. It showed the higher repellency (among the extraction tested) of about 12.5% weight loss. However, *Pandanus amaryllifolius* showed the lower repellency with 32.5% of weight loss. An evident proved that Lemongrass (*Citratrus flexuosus*) is capable to repel the cockroach because it contain stringent substances such as Graminae.

Keywords: Plants Extraction, Repellency, Cockroaches

1. INTRODUCTION

Cockroaches are among the most common pests in many buildings and the most voracious species in Southeast Asia was *Periplaneta americana* and *Blatella germanica* [1]. Both species was known vector for many pathogens that threaten human livelihood [2].

Cockroaches may become pests in homes, schools, restaurants, hospitals, warehouses, offices and virtually in any structures that has food preparation or storage areas. They contaminate food and eating utensils, destroy fabric and paper products and impart stains and unpleasant odor to surface they contact [1]. They have the potential to mechanically carry and transmit many pathogens [2]. In one study, allergic reactions to cockroaches was second only to house dust mites in asthmatics [3]. Twenty percent of homes without visible evidence of cockroaches had detectable levels of cockroach allergens in dust samples [4]. Because of their economic or medical importance all three of these groups of insects are the targets of frequent pesticide applications.

Concern over health implications from the use of residual and broad insecticidal spray treatments has been impetus for research on alternative methods. Repellents may play a very important role in some situations or in some special space where the insecticides are not able to use [5]. Moreover, highly repellent insecticides, such as pyrethrum, can be useful when used to detect infestations in areas where visible inspection is limited [6] and one of the methods to assess relative abundance of cockroaches (flush and count) [7].

Many essential oils have been screened for repellent activity against cockroaches and some of them possess potential to be developed as natural repellents. In this study, an attempt has been made to evaluate the repellent activity of essential oils extracted from 2 plant *Citratrus flexuosus* (Lemongrass) and *Pandanus amaryllifolius* (Pandan Leaves) against American and German cockroaches.

Despite the potential substances for controlling both American and German cockroach population have been confirmed from essential oils, there is still lack of information regarding the efficiency in Malaysia. Hence, this study was carried out to determine the effectiveness of essential oil from Lemongrass and Pandan leaves against both (*Periplaneta americana* and *Blatella germanica*) cockroach population.

2. METHODOLOGY

2.1 Oil Extraction

Oil extractions from plants was carried out by mean of steam distillation methods. A bunsen burner with contain enough fully gas are required to heat the pressure cooker from below. The pressure cooker are filled with approximately 1kg of chopping *Citrus flexuosus* and *Pandanus amaryllifolius* and leaves to heat for approximately 2 h and 45 min which than produced of 853 grams of oils.

2.2 Cockroach Rearing Process

All cockroaches (*Periplaneta americana* and *Blatella germanica*) were reared in the Wood Laboratory, Civil Department, Polytechnic Premier Sultan Salahuddin Abdul Aziz Shah, Shah Alam, Selangor, Malaysia according to the established protocol. The rearing room was maintained at temperature and relative humidity of $26 \pm 2^\circ\text{C}$ and $70 \pm 5\%$, respectively with photoperiod of 12:12.

2.3 Repellence Test

Approximately 25 drops of plant extraction was drop surround the food. The cockroaches was released in the container and left for 24 hours. The food was then reweighed and recorded.

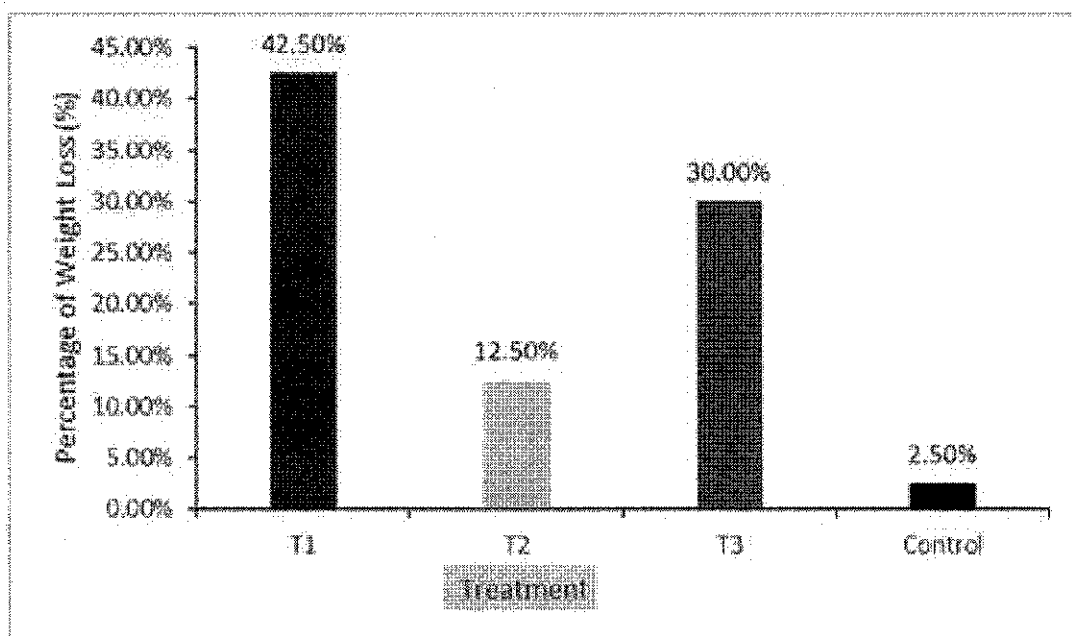
2.4 Analysis of Data

Analysis of variance (ANOVA) at 95% confident level ($P \leq 0.05$) were used to analyse the collected data by using Statistical Package for the Social Sciences (SPSS) software.

3. RESULTS AND DISCUSSION

The percentage of weight loss was showed in Figure 1. Percentage of weight loss for control test (2.50%) is lower than T2 and T3 tests. It clearly shows that the efficiency of good mothballs cannot be denied. Instead, T2 as extractive from pandanus (*Pandanus amaryllifolius*) leaves shown its effectiveness through the diagram which is least effective compared to T2 and control.

Figure 1: Percentage of Weight Loss



This is because the percentage of weight loss for *Pandanus amaryllifolius* (30.00%) is higher than lemongrass (*Citrus flexuosus*) extraction (12.50%) and naphthalene (2.50%), so it is caused by the insufficient repellent smell produced from pandan (*Pandanus amaryllifolius*) against cockroach or can be material.

Based from the experiments, it has been shown that control is the most effective repellents against cockroaches compared to T2 and T3. This has been shown by the results contents. Between from the two plants extraction, lemongrass (*Citrus flexuosus*) is more efficiencies on repel the cockroach than pandan (*Pandanus amaryllifolius*).

4. CONCLUSIONS

Based from our result, we can conclude that the extraction plant (PE) from lemongrass (*Citrus flexuosus*) are more affective for cockroach repellent compare to the Pandan leaves (*Pandanus amaryllifolius*) because of the such thing as lemongrass contain substance as gerania and especially Citronella as insects spray. As we can see that plant extraction from organic material able to be a great rival as well that has been previously commercialized chemical repellent, a mothball, to be an affective repellent agent to the cockroaches.

REFERENCES

- [1] Rejitha TP, Reshma JK, Mathew A. Study of Repellent Activity of Different Plant Powders against Cockroach (*Periplaneta americana*). *International Journal of Pure & Applied Bioscience*. 2014; 2(6):185-194.
- [2] Bell WJ. *The laboratory cockroach*. London: Chapman & Hall, 1981: 161 pp. Cochran DG. *Cockroach: biology and control*. WHO/VBC/1982; 52(82):856.
- [3] Kang B, Morgan C. Incidence of allergic skin reactivities of asthmatics to inhalant allergens. *Clinical Research* 1980; 28:426.
- [4] Chapman MD, Vailes LD, DE Mullins, Squillace SM, Gelber LE, Platts-Mills TAE. Cockroach allergens in urban environments are a major risk factor for acute asthma attacks. In: Robinson, W.H (ed.): *Proceedings of the National Conference on Urban Entomology 1992*, 161.
- [5] G. Nalyanya, C.B. Moore and C. Schal (2000). Integration of repellents, attractants, and insecticides in a "Push-pull" strategy for managing German cockroach (*Dictyoptera: Blattellidae*) populations, *J. Med. Entomol.* 37, 427-434.
- [6] C.L. Wang and G.W. Bennett (2006). Study of integrated pest management and baiting for German cockroach management in public housing, *J. Econ. Entomol.* 99, 879-883.
- [7] F.F. Dong, Y.D. Dong, R.W. Dong, C.Y. Li, F.G. Pan and X.Y. Wang (1998). Studies on new formulation of repellent, *Chin. J. Vector Biol. Contr.* 9, 198-201(in Chinese with English abstract).

