

# **A Study on the Effectiveness of Red Ginger on Termites as Organic Control**

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## **Abstract**

This study was conducted to determine the effectiveness of red ginger on termites as organic control. The objective of this study is to produce termites organic control by using red ginger and to determine the effectiveness of red ginger on termites as organic control by counting the number of survival termites after sprayed with pure red ginger. The effectiveness of red ginger on termites was determined by placing the termites into a container, then was sprayed with pure red ginger solution and the data on survival rate was recorded with interval of 5 minutes until 30 minutes. The result shows, all 100% of termites was killed in minutes of 25 at nymph stages and at minutes 30 for adult stages. As a conclusion, red ginger could be a new alternative for non-chemical product in controlling termites.

**Keywords:** Red ginger, Termites, Effectiveness

## **1. Introduction**

In Malaysia, termites infestation have caused several losses to important agriculture crops such as sugar-cane, rubber trees, oil palm and forest plantations trees. Termites usually cause more damage to woody and ligno-cellulosic material compared to any other tropical insects group (Tho & Kirton, 1990). Termites also can cause huge damage to human life. Their main eating habits is cellulose, thus they can injure and destroy the wood work of houses, timbers, furniture's, railway sleepers, wooden bridges, boats, telegraph poles, books, large orchard trees like mango, apple, coconut, citrus, guava, chiku and many field crops like sugarcane, groundnut, tea, coffee, cotton and potato plants are badly damaged by them (Mill, 1992).

Red ginger, *Alpinia purpurata* is a tall, upright, herbaceous and evergreen plant from South Pacific, which is bright red floral bracts and inconspicuous white flower. It was introduced in Hawai'i as an ornamental plant in 1930s and it is naturalized in valley and on the windward side of island. It grows well in rich soil and wet habitat but it can also grow in dry area as well (Hamirah, et al, 2010). Red ginger is quite popular as an ornamental cut flower includes red and pink ginger. Red ginger give benefits to humans in traditional medicine and was widely used in increasing food and cooking taste. Generally it was able to increase appetite, keep body warm and also can influence people by increasing sexual passion (Kobayashi, 2007). A pesticide was widely used by farmers in order to solve termites attack problems because it was easier to buy and more effective to kill termites. However, the use of chemical pesticide in large quantities was lead to lots of negative impact on human and environment. Therefore, this study was aim to find a better solution in controlling termite's infectious by producing termites organic control based on red ginger and determine the effectiveness of red ginger on

termites as organic control in order to minimizing the uses of chemical pesticides. This study was only focused on the number of termites survive when sprayed with red ginger, and was only tested in Polytechnic Jeli Kelantan laboratory which is involve in- vivo study only.

## 2. Materials & methods

### 2.1 Termites sampling

Termites were sampled from rubber estate at Jeli and the red ginger was bought at the nearest plant nursery.

### 2.2 Experimental design

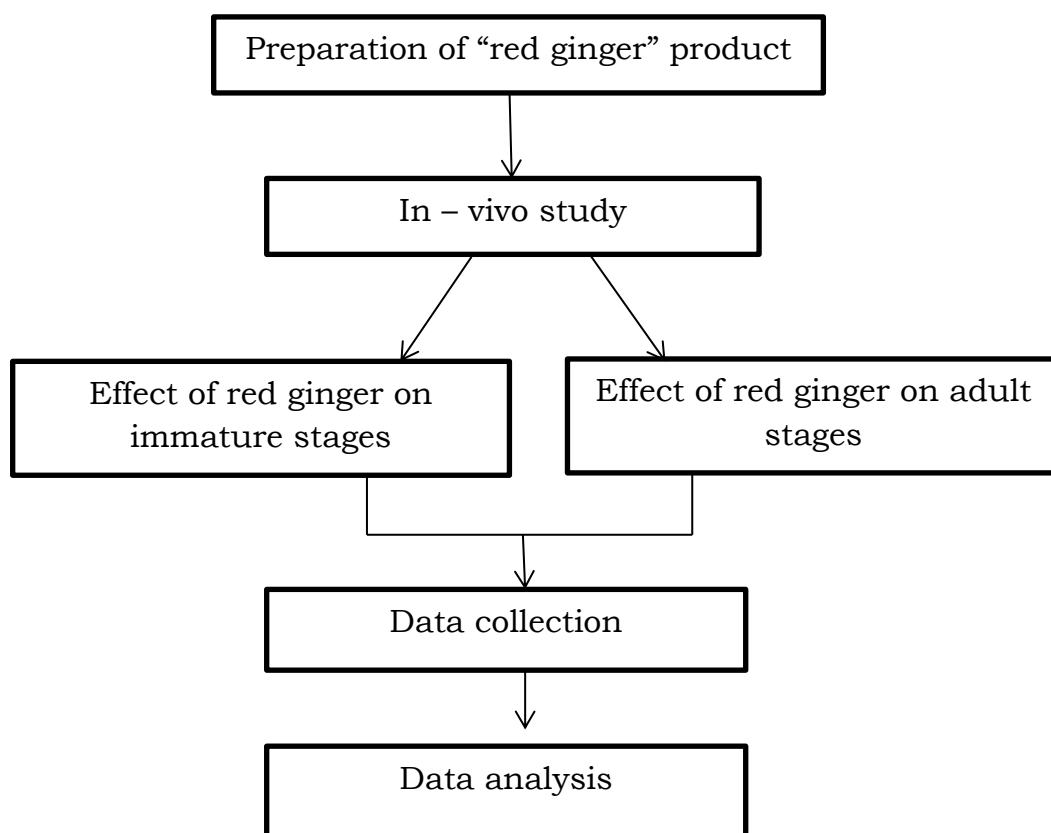


Figure 2.1 : Experimental design

### 2.3 Preparation of red ginger product

The red ginger was cut and clean with water. Then, 500g of red ginger were weight and was put into a blender before 300ml of water were added. The ingredient then was blend and the juices of red ginger were filtered. The red ginger juices were filtered twice because the red ginger are fibrous plant so that all fibrous from juice can be remove. The red ginger juice are then placed into a sprayer bottle and was used in this study .

## 2.4 Evaluation on the effect of red ginger on termites at immature stages

The effect of red ginger on termites at immature stages were done by place the immature termites sample in the container and then was spray with red ginger solution. The another container, also contains immature termites sample were do not spray with red ginger solution which is acted as control in this experiment. Then, all the containers were placed at the dark and the numbers of survival termites were counted for every 5 minutes until 30 minutes. This experiment were conducted with 5 replicates and consist of 10 immature termites for each replicate.

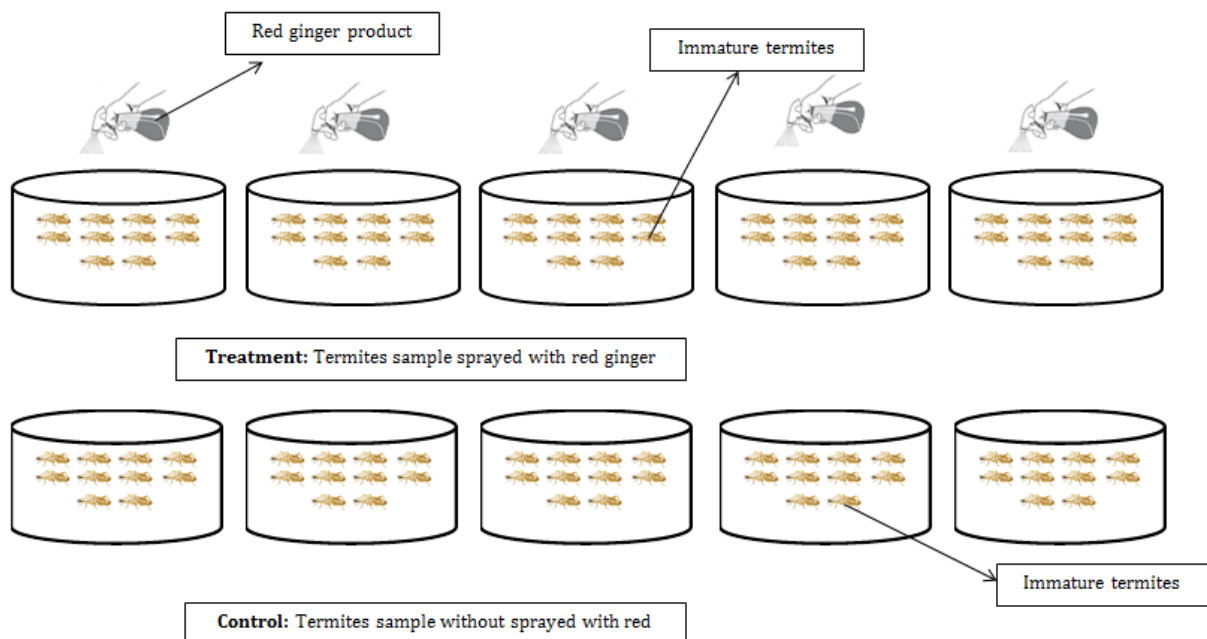


Figure 2.2 : Effect of red ginger on immature termites

## 2.5 Evaluation on the effect of red ginger on termites at adult stages

The effect of red ginger on termites at adult stages were done by place the adult termites sample in the container and then was spray with red ginger solution. The another container, also contains adult termites sample was do not spray with red ginger solution which acted as control. Then, all the containers were placed at the dark and the numbers of survival adult termites were counted for every 5 minutes until 30 minutes. This experiment were also conducted with 5 replicates and consist of 10 adults termites for each replicate.

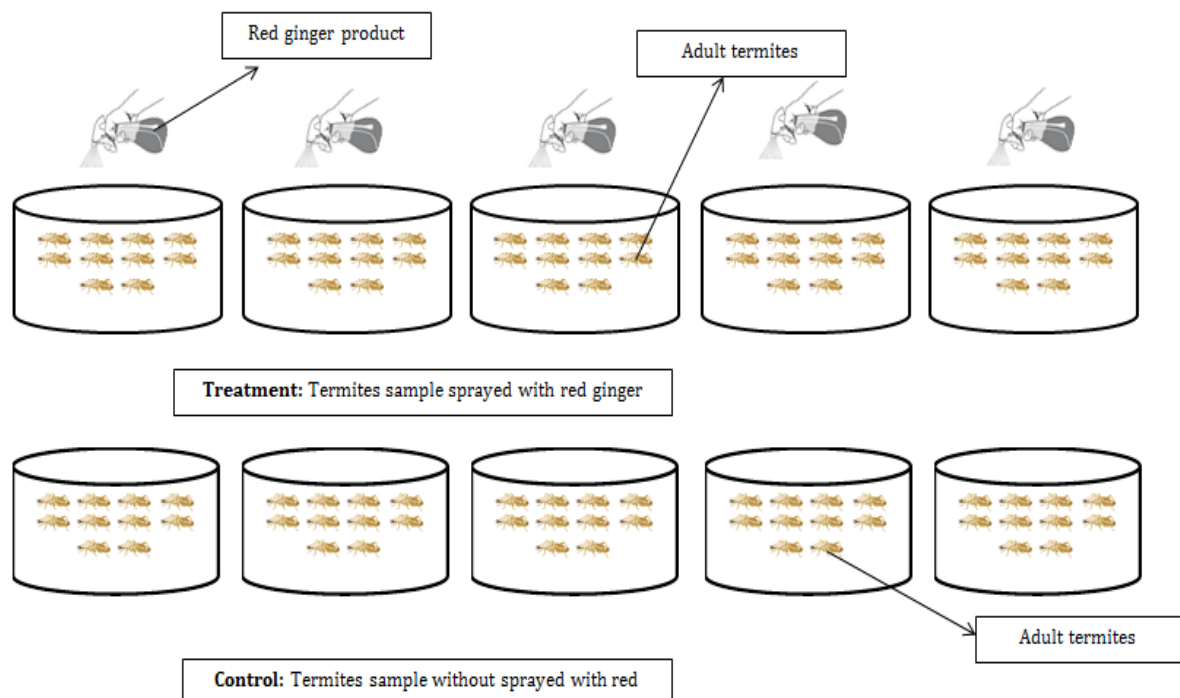
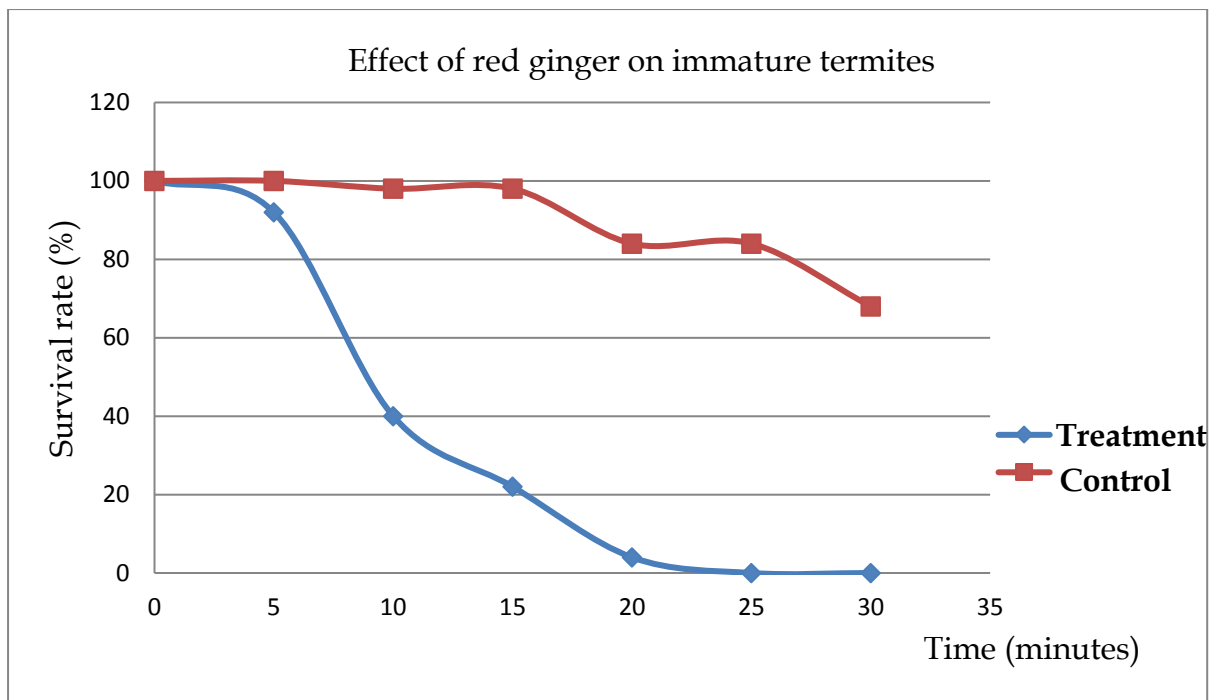


Figure 2.3 : Effect of red ginger on adult termites

### 3. Result and Discussion

#### 3.1 Effect of red ginger on immature termites

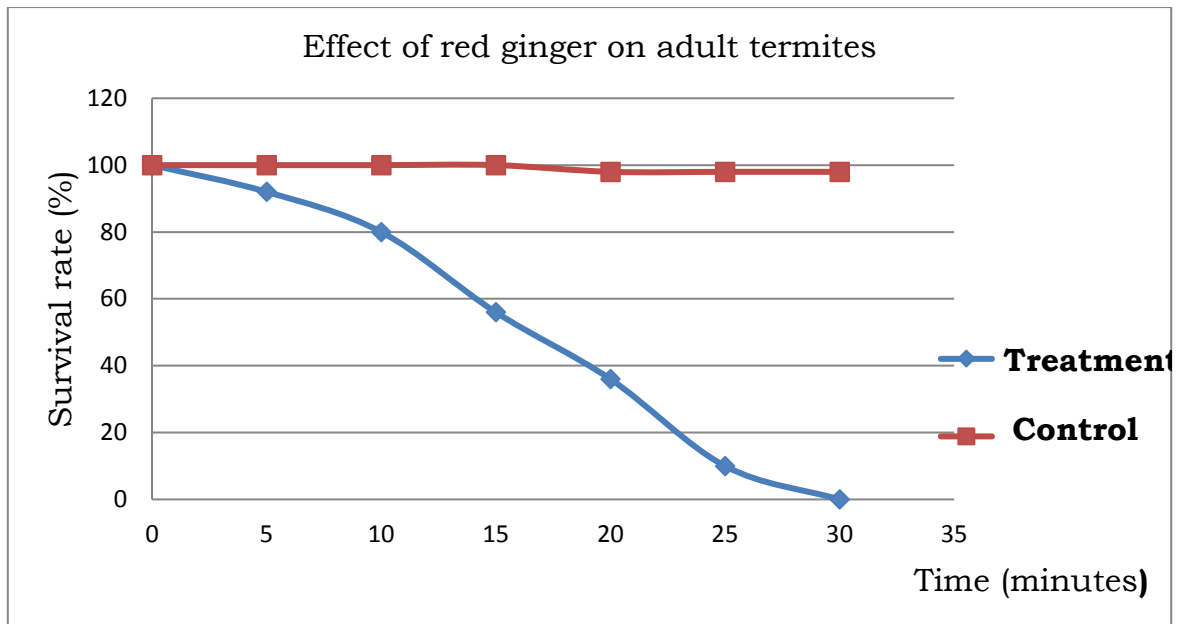
In-vivo study have been conduct in order to determine the effcet of red ginger on immature termites. The red ginger completely kill immature termites 100% at minutes of 25 and the control shows 68% of termites still survive until minutes 30 in this experiment. There are decreasing in survival number of termites according to times for the red ginger treatment which is 92% termites survive at 5 minutes, 40% at 10 minutes, 22% at 15 minutes and only 4% of termites were survive at 20 minutes and there are no termites survive in 25 minutes. Results shows, the red ginger solution which contained pure red ginger able to kill and inhibited the termites population at immature stages because it contain high antioxidant such as phenolic and flavonoid which react to the termites (Ajav & Ogunlade, 2014). The medicinal potential of the leaves and young rhizome of Red ginger (*Alpinia purpurata*) and the positive relationship between total phenolic content and antioxidant activities in *Alpinia purpurata* plant believe it can produce heat condition to kill termites (Paul, 2005).



Graph 3.1 : Effect of red ginger on immature stages

### 3.2 Effect of red ginger on adult termites

For treatment on adult stages, it shows the lower survival rates with all of adult termites were dying within 30 minutes. Data shows that, 92% of termites were survive in early 5 minutes, and decreasing to 80% at 10 minutes, 56% at 15 minutes, 36% at 20 minutes, 10% at 25 minutes and there were no termites survive at 30 minutes for red ginger treatment. However, the control shows all termites were still survive and their survival rate was 100% for 30 minutes. A studies shows, the accidental ingestion of red ginger can causes severe throat pain, a burning sensation in the mouth, abdominal pain, vomiting, blood stool or vomit, rapidly falling blood pressure and collapse (Khan, 2012). According to the National Institute of Health (2017), those types of harming also can cause blood pH too alkaline, which can lead to organs damage thus can kills the termites.



Graph 3.2 : Effect of red ginger on adult stages

#### 4 Conclusion

As a conclusion, the red ginger could effectively used in controlling termites during their immature and adult stages because it contain a combination of good substances such as phenolic and flavonoids. Red ginger (*Alpinia purpurata*) also contains higher antioxidant activities as well as total contents of phenolic and flavonoid in comparison with “*Halia Bentong*” (Ajav & Ogunlade, 2014). It can be summarize that the treatment using Red ginger (*Alpinia purpurata*) were effective in order to control termite populations without using any chemicals substance. Besides, these natural ingredients do not give any negative impacts to the consumers and environment. However, this study can be improved for better result by adding on another ingredients such as cinimon, lemon grass, chilli and other spicy ingredients.

#### 5 Acknowledgement

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## Appendix

**TABLE 1.0** : Immature Stages Data

| <i>Time /<br/>Replication</i> | <i>5<br/>minutes</i> | <i>10<br/>minutes</i> | <i>15<br/>minutes</i> | <i>20<br/>minutes</i> | <i>25<br/>minutes</i> | <i>30<br/>minutes</i> |
|-------------------------------|----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| R1                            | 10                   | 4                     | 2                     | 1                     | 0                     | 0                     |
| R2                            | 10                   | 3                     | 2                     | 1                     | 0                     | 0                     |
| R3                            | 9                    | 4                     | 3                     | 0                     | 0                     | 0                     |
| R4                            | 9                    | 4                     | 2                     | 0                     | 0                     | 0                     |
| R5                            | 8                    | 5                     | 2                     | 0                     | 0                     | 0                     |

**TABLE 1.1** : Control data at immature stages

| <i>Time /<br/>Replication</i> | <i>5<br/>minutes</i> | <i>10<br/>minutes</i> | <i>15<br/>minutes</i> | <i>20<br/>minutes</i> | <i>25<br/>minutes</i> | <i>30<br/>minutes</i> |
|-------------------------------|----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| R1                            | 10                   | 10                    | 10                    | 10                    | 9                     | 8                     |
| R2                            | 10                   | 10                    | 10                    | 10                    | 8                     | 7                     |
| R3                            | 10                   | 10                    | 10                    | 10                    | 9                     | 6                     |
| R4                            | 10                   | 10                    | 10                    | 9                     | 9                     | 8                     |
| R5                            | 10                   | 10                    | 9                     | 7                     | 7                     | 5                     |



**TABLE 1.2 : Adult Stages Data**

| <i>Time /<br/>Replication</i> | <i>5<br/>minutes</i> | <i>10<br/>minutes</i> | <i>15<br/>minutes</i> | <i>20<br/>minutes</i> | <i>25<br/>minutes</i> | <i>30<br/>minutes</i> |
|-------------------------------|----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| R1                            | 9                    | 8                     | 5                     | 2                     | 0                     | 0                     |
| R2                            | 9                    | 8                     | 6                     | 4                     | 0                     | 0                     |
| R3                            | 9                    | 8                     | 6                     | 4                     | 1                     | 0                     |
| R4                            | 10                   | 8                     | 4                     | 5                     | 3                     | 0                     |
| R5                            | 9                    | 8                     | 7                     | 3                     | 1                     | 0                     |

**TABLE 1.3 : Control data at adult stages**

| <i>Time /<br/>Replication</i> | <i>5<br/>minutes</i> | <i>10<br/>minutes</i> | <i>15<br/>minutes</i> | <i>20<br/>minutes</i> | <i>25<br/>minutes</i> | <i>30<br/>minutes</i> |
|-------------------------------|----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| R1                            | 10                   | 10                    | 10                    | 10                    | 10                    | 10                    |
| R2                            | 10                   | 10                    | 10                    | 10                    | 10                    | 10                    |
| R3                            | 10                   | 10                    | 10                    | 10                    | 10                    | 10                    |
| R4                            | 10                   | 10                    | 10                    | 10                    | 10                    | 10                    |
| R5                            | 10                   | 10                    | 10                    | 9                     | 9                     | 9                     |