

FINAL STUDY REPORT

LABORATORY EVALUATION OF REPELLENT PRODUCT, AGAINST *Aedes aegypti* MOSQUITOES USING THE BIOASSAY METHOD FOR MOSQUITO REPELLENT ON HUMAN SKIN.

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1.0 TITLE

A LABORATORY EVALUATION OF REPELLENT PRODUCT, AGAINST *Aedes aegypti* MOSQUITOES USING THE BIOASSAY METHOD FOR MOSQUITO REPELLENT ON HUMAN SKIN

2.0 OBJECTIVE

2.1 To evaluate the bio efficacy of repellent product, INSECT REPELLENT A against *Aedes aegypti* mosquitoes using the Bioassay Method for Mosquito Repellent on Human Skin.

3.0 MATERIALS & METHOD

3.1 Test Samples

Three (3) units of sample were provided by the company.

Insecticides	Active Ingredient
INSECT REPELLENT A BN : 22011RSP11 (NAC/001/2022-A)	Natural Australian Tea Tree oil & Eucalyptus Lavender Extract

3.2 Test Method

The test was conducted essentially following Malaysian Standards (MS 1911: Part 2:2006) with necessary amendment. The following were the test chambers and methodologies used:

Experiments were conducted in screened, aluminium cages measuring 60 x 60 x 60 cm with two 15 cm diameter circular openings fitted with cloth sleeves. A batch of 25 laboratory-cultured, sucrose-fed female *Aedes aegypti* mosquitoes (aged 5 to 7 days old) were introduced into the cage.

The right arms of human volunteers were left untreated whilst the left arms were treated with the test sample. An amount of 0.5 g of test sample was applied. Application was left to dry before covering it with a rubber sleeve within 30 minutes after treatment. For each arm, a surface area of 24 cm² (3 cm x 8 cm) was exposed to mosquito landing/biting activities through an opening on the rubber sleeves. Both hands (up to the wrists) were covered with thick rubber gloves to prevent from unwanted bites. The arms were exposed simultaneously for 5 minutes **every hour** and the number of mosquitoes landing/biting was recorded. **The assessment period was continued up to 4 hours post-application of the test sample.**

A fresh batch of mosquitoes was introduced to replace the exposed mosquitoes at each assessment period. The experiment was done in **triplicates**. All test were conducted at temperature of 26 °C ± 2 °C. The effectiveness of a repellent product was assessed by determining the percentage reduction of mosquito biting/landing on treated arm when compared with the untreated arm.

$$\% \text{ reduction} = \frac{\text{No. mosq. on untreated arm} - \text{No. mosq. on treated arm}}{\text{No. mosq. on untreated hand}} \times 100\%$$

4.0 RESULTS

TABLE 1: The repellency effects of INSECT REPELLENT tested against *Aedes aegypti*

	INSECT REPELLENT A (NAC/011/2021-A)	
	No of mosquito landed on untreated arm	No of mosquito landed on treated arm
0'30"	9.00±3.06	0.00±0.00
% Reduction	100.00±0.00	
1'00" hours	5.67±1.33	0.33±0.33
% Reduction	88.89±11.11	
1'30" hours	11.33±4.37	2.00±0.00
% Reduction	77.22±6.83	
2'00" hours	12.67±2.03	4.67±2.60
% Reduction	68.43±16.60	
2'30" hours	11.67±1.20	2.33±1.45
% Reduction	78.18±13.15	
3'00" hours	12.67±2.33	5.33±3.18
% Reduction	64.44±21.20	
3'30" hours	8.00±1.00	5.33±1.76
% Reduction	35.24±18.17	
4'00" hours	11.33±1.76	3.33±1.45
% Reduction	72.02±11.31	
TOTAL	82.33±5.24	23.33±9.17
% Reduction	72.57±10.48	

5.0 DISCUSSION

Table 1 showed that **INSECT REPELLENT A** provide complete protection against mosquito landing/ biting up at first interval (0'30" hours). The protection starts to decrease slightly at 1'00" hours (88.89%), 1'30" hours (77.22%) and 2'00" hours (68.43%). At 2'30" hours the protection was found to increase to 78.18% before it starts to drop drastically at 3'00" hours (64.44%) and 3'30" hours (35.24%). At 4'00" hours, it showed sudden increase in protection rate (72.02%).

6.0 CONCLUSION

A product is considered as effective if it is able to achieve 80% reduction rate or above. The mosquito repellency of "INSECT REPELLENT A" product is observed to be significant to last for 1 hour, with a reduction percentage more than 80% when tested *Aedes aegypti* mosquitoes. From 1'30 hours onwards, the protection rate started to fluctuate throughout the testing period.

Reported and Verified by



Ling Jia Yi
 Assistant General Manager

Appendix 1:

REPELLENT RECORDING FORM

Time	Number of Mosquitoes Landing on					
	Replicate 1		Replicate 2		Replicate 3	
	Untreated Arm	Treated Arm	Untreated Arm	Treated Arm	Untreated Arm	Treated Arm
30 minutes (9.30 am)	5	0	15	0	7	0
1 hours (10.00 am)	7	0	7	0	3	1
1'30" hours (10.30 am)	20	2	6	2	8	2
2 hours (11.00 am)	13	5	9	0	16	9
2'30" hours (11.30 am)	11	5	14	0	10	2
3 hours (12.00 pm)	15	11	8	0	15	5
3'30" hours (12.30 pm)	7	6	7	2	10	8
4 hours (1.00 pm)	14	3	8	1	12	6