

CERTIFICATE OF ANALYSIS

OPC RESOURCES
78 Tingkat Binjai 12,
Taman Sri Rambai,
14000 Bukit Mertajam, Penang
Tel : 04-5300918 Fax : 04-5300918
Attn : Mr Eric Ooi

Certificate No : CN/nOTS0042/1013
Sample Log Code : nOTS0027/1013
Sample Received Date : 16-Oct-2013
Complete Analysis Date : 04-Nov-2013
Date Issue : 04-Nov-2013

Title : Evaluation of bio-efficacy performance of NATMOS natural insect repellent spray against *Aedes aegypti* mosquitoes.

Objective : To obtain the repellency efficacy of natural repellent spray against mosquitoes up to 2 hours post-application.

Background :

A request was made to evaluate the performance efficacy of NATMOS natural insect repellent spray to observe for its repellency efficacy up to 2 hours post-application as stated on the product label. The evaluation made was based on the percentage of reduction of mosquito landing towards the treated and untreated limb of the human volunteer using the Screen Cage Chamber as the test chamber.

Materials :

Table 1: List of sample.

No.	Sample	Active Ingredients
1	NATMOS Natural Insect Repellent	Citronella Oil, Lemon Eucap Oil, Lemongrass Oil

Method :

a) Test method:

- i. For evaluation of mosquito repellent, two screen cages (measuring 60cm x 60cm x 60cm) with a circular opening fitted with cloth sleeves are used.
- ii. A square are of 3cm x 8cm (about 24cm²) is drawn on one forehead of the human volunteer. An amount of 0.5g of test sample is applied evenly on the designated area and left to dry for about 15 minutes. A rubber sleeve is than fitted onto both hands of the volunteer.
- iii. The volunteer is treated with test sample on one arm while the other arm is left untreated. Both hands are covered with thick rubber gloves up to wrists to confine the bites to only the exposed area.
- iv. A total of 25 female adult mosquitoes of *Aedes aegypti* (aged 5 – 7 days, starved overnight) are released into each compartment through the circular opening of the cage.
- v. Both forehands are inserted through the circular opening into the screen cage containing mosquitoes and are exposed simultaneously for a period up to 5 minutes. The number of mosquitoes landing is recorded.
- vi. At 5 minutes, both forehands are removed from the cage to stop the test.
- vii. The assessment period will be 0, 1 and 2 hours post-application of the test sample.
- viii. Only one replicate of test is conducted.
- ix. The efficacy of the sample is evaluated by determining the percentage of reduction (% reduction), which is calculated using the below mentioned equation:

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% Reduction: $\frac{\text{Total number of mosquito on (untreated arm - treated arm)}}{\text{Total number of mosquito on untreated arm}} \times 100$

- b) Test insect: *Aedes aegypti* female mosquitoes, aged 5 to 7 days, starved overnight
- c) Test condition: Room temperature at 22°C to 33°C and relative humidity at 40% to 82%.
- d) One replicate of test was conducted.

Analysis results:

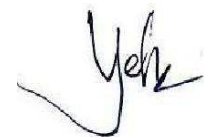
Table 2: Biological efficacy of NATMOS Natural Insect Repellent against *Aedes aegypti* mosquitoes.

No.	Sample	Declared Active Ingredient	Percentage of reduction, % at		
			Initial Hour	1 st Hour	2 nd Hour
1	NATMOS Natural Insect Repellent	Citronella Oil, Lemon Eucap Oil, Lemongrass Oil	100.0	100.0	95.8

Remark: 1. Results reported herein are based on the item tested only.
2. Results based on 1 replicate of test.

Comments :

Based on the results obtained from the biological efficacy assessment, the NATMOS natural insect repellent spray showed an above 95% reduction of mosquitoes landing on the treated limb of the human up to 2 hours post-application as claimed on the product label.



Yeow Liang Ming
General Manager
M.Sc., AMIC,
A/1737/4047/00