

REPORT FOR CARRYING OUT EFFICACY TRIALS OF MOSQUITO BARRIER® AGAINST ADULT MOSQUITOES (Anopheles and culex sp)

The biological efficacy of above product has been carried out in two villages of Kirinyaga District, Kenya. The results, showed that Benles **Mosquito Barrier** is effective against both Anopheles and culex adult mosquitoes. Benles **Mosquito Barrier** achieved a mortality rate of over 90% after 24 hours of exposure.

Based on this information, Benles Mosquito Barrier was found to be useful in reduction of mosquito bites, thus reducing disease pathogens associated with mosquitoes.

P.I. Dr. Kiambo Njagi
Co-PI: Mr Eliud Njau
TECHNOLOGIST: Mwangi Muthee
INSTITUTION: **Division of Malaria Control, Ministry of Health**
P.O. Box 20750, Nairobi, Kenya

1.0 Introduction

Mosquito Barrier is an extract from garlic *Allium Sativum* which has insecticidal properties. The garlic extract contain natural sulphur which is toxic and a repellent to insects. Garlic juice also contains garlic oil which interferes with breathing system of insects including mosquitoes. All oils come to contact with the insects respiratory system destroys them leading to suffocation. Other details about the product are given below.

PRODUCT: MOSQUITO BARRIER
TRADE NAME: **BENLE'S MOSQUITO BARRIER**
ACTIVE INGREDIENT: NATURAL SULPHUR & GARLIC OIL
LOCAL AGENTS: BENLES INVESTMENT (K) LTD, P.O Box 69731- 00400
NAIROBI
SOURCE: Garlic Research Laboratories USA.
TARGET PESTS: Flying insects (Mosquitoes)

2.0 Objectives

The objective of the study was to conduct local biological efficacy trials of BENLE'S MOSQUITO BARRIER used as fogging/space spray against adult mosquitoes in Thiba village Kirinyaga District.

2.1 Specific Objectives

- To assess the biological efficacy of Mosquito Barrier on *An. gambiae* sl used as space spray on indoor resting mosquitoes.
- To assess the residual efficacy of Mosquito Barrier in the space sprayed sites
- To compare the performance of mosquito barrier with another product used for thermal fogging/space spray, Actellic 50% EC.

3.0 Materials and Methods

Schedule of Activities

NO.	SCHEDULED VISIT	ACTIVITY
1.	Field work /social mobilization and trial run	• Monitoring Efficacy
2.	Second field run and final observation	• Monitoring efficacy

Materials and Methods:

3.1 To assess the biological efficacy of Mosquito Barrier against *Anopheles'* and *Culex* adult mosquitoes.

The trial was carried out in two villages namely, Thiba north and Thiba south of Kirinyaga district. These two villages are located within Mwea rice irrigation scheme, an area where irrigation water supports mosquito breeding throughout the year. Malaria is therefore the leading cause of morbidity and mortality, accounting for 30% of all outpatients' attendance in the district.

In Thiba north the area was sprayed with garlic juice extract. Diluted garlic juice was applied using a motor vehicle mounted motorized fogging machine at round 4.00PM (16 Hours). The dilution was done in a ratio of 1:75 as per manufacturer's recommendation. Similarly the next village Thiba south which is separated by tarmac road from the first village was sprayed with Actellic 50 EC for comparison purposes.

In both villages, a bioassay was carried out by exposing 20-30 adult mosquitoes to the area during spraying. Bioassay mosquitoes were collected in human dwelling and animals shelters, kept in the laboratory for 24 hours. During these holding, all holding mosquitoes cage were supplied with enough sugar solution. Health surviving mosquitoes were sorted out after 24 hours, placed in test cage and place in houses, nearby vegetation and animals structures.

After fogging, all mosquito cages were removed and taken to laboratory for further observation. The fogging was done, ensuring that all dwelling paces and nearby bush received the fog. The mosquitoes were then transferred into paper cups covered by a netting material and kept in a recovery room, supplied with glucose solution. The mortality rate was determined after 24 hours.

3.2 Control Test.

A control test was set up as described, where caged mosquitoes were similarly kept indoor, in bush and animal shelters in un-fogged area, in adjust village of Mbui-Njeru village. This was to ensure, that the mortality was not due to laboratory contamination or any other conditions during holding.

4.0 RESULTS

The table 1: shows the percentage mortality of mosquitoes hanged on different sites, namely outdoor (vegetations), indoor (human dwellings and animal shelters) during fogging. As showed on table Actellic 50 EC and garlic extract/ garlic juice archived over 90% mortality on adult anopheles mosquitoes.

Table 1: the percentage mortality of Anopheles' mosquitoes placed various site during fogging/space spray.

S/NO	Environment/site	Garlic extract (juice)	Actellic 50 EC.
1	Vegetation/bushes	97.7% n=131	98.6% n=152
2	Human dwellings/indoor	100.0% n=89	100.0% n=86
3	Animals' shelters.	99.0 n=97	100.0% n=100

Table 2; show the percentage mortality of culex spp, place in different sites during space spraying. As showed on table 2, the mortality rates in all the three sites were over 90%. However the 24 hour mortality of culex spp was lower than those of Anopheles though the difference was not significant. The number of culex tested were lower than those Anopheles, this reflected the composition of species during the trial.

Table 2: the percentage mortality of Culex Spp. placed various site during fogging/space spray.

S/NO	Environment/site	Garlic extract (juice)	Actellic 50 EC.
1	Vegetation/bushes	98.6% n=68	97.6% n=49
2	Human dwellings/indoor	95.30% n=56	96.0% n=68
3	Animals shelters.	98.0 n=45	97.4% n=57

5.0 DISCUSSIONS

The Products, garlic juice and Actellic 50 EC had a high mortality rates on both Anopheles and Culex mosquitoes 24 hour post spraying. Such high performance may keep mosquitoes population lower thus lowing the diseases incidence and mosquito biting nuisances. Fogging/space spraying is the only means of targeting outdoor resting mosquitoes; however the products which can be used are limited. Currently, Actellic 50 EC which is organophosphorous is used; it has retained good performance as indicated on table 1 and table 2 above. Organophosphorous are however, known to irritate eyes skin and respiratory system. Indeed, using motorized sprayer like the one

used for this trial, the machine operator had to have good protective gear, which include nose masks; but even then after only two hours of operation, he was always complain of thirst.

On the other hand, garlic juice is natural, with acceptable smell. The machine operator and even the member of the community could withstand it smell, but not that one of Actellic 50 EC.

In both cases the mortality rates complied with KBS specifications (>90% mortality in 24 hours) and EAC protocol for evaluating insecticides (80% mortality and above) are acceptable.

6.0 CONCLUSIONS

Garlic Juice maybe considered as suitable product for mosquitoes control. It natural products with nice smell and therefore it acceptability to members of Kenyan community is expected to be high. The product should be taken very seriously for urban mosquito control where Indoor residual spray is not possible due to social organization and majority of mosquitoes are culex species which rest outdoor.

DR PHILIP GICHOHI (BVM)
MOSQUITO BARRIER AFRICA LTD
NAIROBI, KENYA

philip.gichohi@gmail.com