WORLD HEALTH ORGANIZATION

ORGANISATION MONDIALE DE LA SANTÉ

a 64 212

WHO/Mal/494.65
WHO/Vector Control/117.65

ENGLISH ONLY

FURTHER OBSERVATIONS ON THE USE OF DICHLORVOS IN NORTHERN NIGERIA

by

C. P. Pant[1] and C. V. Foll
WHO Malaria Eradication Insecticides Field Trials Team
Kankiya, Northern Nigeria

1. INTRODUCTION

In a preliminary report on a field trial using dichlorvos as a residual fumigant insecticide (Foll & Pant, 1964) the results of placing one dispenser per 500 ft^3 (15 m^3) were recorded. Although it was considered that for various reasons this insecticide would not be sufficiently efficient to achieve the interruption of malaria transmission in Northern Nigeria it was decided to treat one village experimentally with dispensers at a ratio of one dispenser per 150 ft^3 (4.5 m^3) and make a number of entomological investigations.

The village treated, Fakuwa, is situated in what had been the comparison or control (untreated) area in the earlier trial. Fakuwa has a population of about 400 persons living in 245 houses and was arbitrarily divided into two halves, one half to be treated with solid[2] dispensers, and the other with liquid[3] ones. Data collected concurrently at Bela, an untreated village in the same area, were used for comparison with the entomological indices at Fakuwa village.

2. METHODS

A. gambiae hut-resting density collections were made by fortnightly morning pyrethrum spraying of 12 huts in each half of the village. The mosquitos collected were identified for sex, species and abdominal stage. Since only very few A. funestus were collected (e.g., in the comparison area there were nine), these were excluded from the calculations.

---

[1] Now Project Leader, Insecticide Testing Unit, Lagos, Nigeria.

[2] Produced and supplied by the Shell Chemical Company, New York.

Bio-assays were done by exposing laboratory-bred A. gambiae (three days old and freshly fed) in mosquito netting cages from 18.00 hours to 6.00 hours. Mortality readings were taken after a 24-hour recovery period and corrected for control mortalities.

3. RESULTS

The apparent effects of the treatment (placed on 11 May 1964) on the resting-densities of A. gambiae are shown in Table 1. The season covered by the observation is that of maximum rainfall in the Kankiya district.

A study of this table confirms the conclusion we had reached in the earlier report that there is a basic difference in the mode of release of dichlorvos vapour from the two dispensers under trial. Solid dispensers start with maximal efficiency and show signs of exhaustion (as judged by the build-up of mosquito density) only four to six weeks after placement in the huts. Liquid dispensers are more uniform in their action when judged by the same criterion and at the higher dosage used in Fakuwa gave better results for a longer period (which was noted during the 1963 trial). Bio-assays, using a 12-hour exposure period, may be very misleading if used alone to determine dispenser efficacy, e.g., bio-assay mortality of 86.0% was found for solid dispensers after 68 days and 98.0% for liquid dispensers after 61 days.

A study of the abdominal stages of the mosquitos collected from the huts showed (Table 2) that in those treated with the solid dispenser, the percentage of unfed and fed mosquitos in the spray-catches during the 31-60 days after treatment was 86.1%, and 61-90 days after treatment it was 75.4%. During the same periods, in the comparison area the percentages of unfed and fed mosquitos were 59.1% (31-60 days) and 72.7% (61-90 days); thus during the latter period there was little difference between treated and untreated areas. In the huts treated with liquid dispensers a comparatively higher percentage of gravids was collected, but the over-all densities were much lower. The decline of densities in all huts, 60-70 days after treatment, must be attributed to a natural decrease of the vector populations (see densities in Bela, in the comparison area, Table 1).

In conclusion, it is considered that this small investigation confirms, particularly in the case of the solid dispensers, the view stated in the earlier report that it is impracticable to maintain a sufficient concentration of dichlorvos vapour (even at this higher dosage) to produce an adequate mosquito mortality in the type of huts prevalent in this area.

REFERENCE

Foll, C. V. & Pant, C. P. (1964) WHO/Mal/451 (mimeographed document)

RESUME

A la suite d'un essai de dichlorvos comme insecticide fumigant à effet rémanent, employé sur le terrain dans la lutte contre le paludisme au moyen d'un diffuseur pour 15 m^3, qui s'était révélé inefficace dans la région choisie (Kankiya, Province de Katsina, Nigéria septentrional), on a entrepris avec le même insecticide et dans la même région un essai dans un village en utilisant les diffuseurs à raison de 1 pour 4,5 m^3 uniquement dans un but d'évaluation entomologique.

On a choisi le village de Fakuwa, qui n'avait pas été traité auparavant, et qui compte 245 habitations et 400 habitants. On a placé des diffuseurs de produit solide dans la moitié des habitations et des diffuseurs de produit liquide dans l'autre moitié. On a utilisé comme témoin le village de Bela dans la même région.

Les investigations entomologiques comprenaient, d'une part, l'étude de la densité des Anopheles gambiae se reposant dans les cases, avec identification du stade abdominal, et, d'autre part, des essais biologiques sur des A. gambiae éclos au laboratoire. Les essais ont été faits pendant la période de pluviosité maximum dans la région.

L'étude a confirmé la différence entre les deux types de diffuseurs : le type "solide" libère rapidement une grande quantité de vapeur et s'épuise rapidement, tandis que le type "liquide" donne une diffusion plus uniforme.

Les essais biologiques, avec une exposition de douze heures, ont montré une mortalité élevée jusqu'à 60 jours, pour les deux types de diffuseurs, mais l'étude des stades abdominaux des A. gambiae récoltés a montré qu'il y avait peu de différence de pourcentage des femelles gorgées et des non gorgées entre le village traité et le village témoin 60 jours après la mise en place des diffuseurs.

La conclusion est qu'il n'est pas possible de maintenir une concentration suffisante de vapeur de dichlorvos (même à dosage élevé) pour obtenir une mortalité suffisante dans les habitations de cette région.

TABLE 1. HUT DENSITIES OF A. GAMBIAE FOR PERIODS 0-30, 31-60, 61-90 DAYS POST-TREATMENT

Days post-treatment	Solid dispenser area		Liquid dispenser area		Comparison area (Bela)	
	Density	No. huts	Density	No. huts	Density	No. huts
0-30	0.2	12	0.2	24	8.1	24
31-60	2.8	48	0.6	48	33.3	33
61-90	3.5	48	0.2	36	16.4	15

TABLE 2. ANALYSIS OF ABDOMINAL STAGES OF A. GAMBIAE COLLECTED IN FAKUWA VILLAGE TREATED WITH DICHLORVOS DISPENSERS AT A RATIO OF ONE DISPENSER PER 150 CUBIC FEET

Areas	Days after treatment		
	0-30	31-60	61-90
Solid area			
No. huts	12	48	48
Total A. gambiae collected	2	137	171
Unfed	1	5	7
Fed	1	113	122
Gravid	-	19	42
% unfed + fed	-	86.1%	75.4%
Liquid area			
No. huts	24	48	36
Total A. gambiae collected	4	32	8
Unfed	-	0	1
Fed	2	20	6
Gravid	2	12	1
% unfed + fed	-	62.5%	-
Comparison area			
No. huts	24	33	15
Total A. gambiae collected	195	1 090	246
Unfed	1	31	2
Fed	148	613	177
Gravid	46	446	67
% unfed + fed	76.4%	59.1%	72.7%

The purpose of the WHO/Mal series of documents is threefold:

(a) to acquaint WHO staff, national institutes and individual research or public health workers with the changing trends of malaria research and the progress of malaria eradication by means of summaries of some relevant problems;

(b) to distribute to the groups mentioned above those field reports and other communications which are of particular interest but which would not normally be printed in any WHO publications;

(c) to make available to interested readers some papers which will eventually appear in print but which, on account of their immediate interest or importance, deserve to be known without undue delay.

It should be noted that the summaries of unpublished work often represent preliminary reports of investigations and therefore such findings are subject to possible revision at a later date.

The issue of a paper in this series does not therefore constitute formal publication and a paper so issued may, with the agreement of the author and WHO, be published in a WHO periodical or elsewhere.

Authors alone are responsible for views expressed in signed articles. The mention of manufacturing companies or of their proprietary products does not imply that they are recommended or endorsed by the World Health Organization.