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THE PRESENT SUSCEPTIBILIY STATUS OF *ARMIGERES SUBALBATUS* TO HYDROCHLORIN AND DIFFERENT ORGANOPHOSPHORUS INSECTICIDES

SARBANI BHATTACHARYA (MUKHERJEE)

Zoological Survey of India, Calcutta

ABSTRACT

The *Armigeres subalbatus* mosquitoes both adults and larvae from Calcutta and its suburbs were tested against DDT and organophosphorus insecticides respectively according to standard WHO techniques and both the adults and larvae were found to be resistant against those insecticides.

INTRODUCTION

After introduction of potent synthetic insecticides into public health programmes at the close of Second World War, the main technical problem was the development of resistance to them by the insects they formally collected. Upto 1956, it was by no means accepted by all workers that the increasing failures of control was due to the development of resistance. In 1947 resistance to DDT was first discovered in house fly and in *Culex molestus* in Italy.

Armigeres mosquitoes are not only painful biters but also they occupy the second position among the man biting mosquitoes in Calcutta and suburbs (Das, Hati and Chawdhury—1971). Adult *Armigeres obturbans* is resistant to DDT, Dieldrin/HCH and organophosphorus insecticides in Srilanka, that of *Armigeres subalbatus* to DDT, Dieldrin/HCH and organophosphorus in Japan and DDT and organophosphorus insecticides in Malayasia (WHO Te : Rep : Ser : 585 ; 1976). Lc_{50} of larvae of *A. obturbans* was recorded to be 0.028 ppm with Fenthion by Kurihara in 1966. The insecticidal resistance study was also carried out by Suzuki *et al.*, (1962) in Japan. Macdonald in 1972 studied the susceptibility status of this mosquitoes against Abate. In the present note the results of our study on the present susceptibility status of *Armigeres subalbatus* against DDT and organophosphrous insecticides (Fenthion, Malathion Dursban and Abate) in Calcutta is recorded.

MATERIALS AND METHODS

(1) *Adults :*

Armigeres subalbatus larvae were collected from the natural breeding places in and around Calcutta with the help of laddles. They were reared into adults in the Laboratory and batches of resin fed 2-5 days old female *A. subalbatus* were exposed at different times to 4% DDT impregnated papers supplied by WHO, following instructions of WHO test kits manual (1970). Ten mosquitoes were tested at a time for each timing. Appropriate controls were set up. Death amongst the mosquitoes 24 hours after

exposure was noted. Twelve such observations were recorded for each exposure (*i.e.*, 15 minutes exposure, one hour exposure, etc.) in 4% DDT.

(2) *Larvae :*

Armigeres subalbatus larvae were collected from different natural breeding places in Calcutta and suburbs. They were maintained in the laboratory, all living in water collected from the source.

Batches of 3rd or 4th instar healthy larvae were kept in beakers (100 ml capacity), each containing 25 ml water. 44 beakers, 500 ml capacity, were taken. Ten beakers were allotted for Abate and same numbers for Malathion and Dursban while 14 for Fenthion. The beakers were labelled indicating the name and concentration of the insecticides. Into each breaker, 224 ml tap water was added. The concentration of test solutions in the beakers was adjusted by adding 1 ml of appropriate insecticides solution obtained from WHO. Two replicates of each concentrations were prepared. Ethanol was used as controls. The larvae with water from small beakers were then added to test solutions in large labelled beakers. The results were noted after 24 hours according to the standard WHO techniques following instructions given with WHO Tests kits mannual (1970).

Results

The results were noted in tabular forms :

Thus it will be seen that

(1) One hour exposure to 4% DDT kills 50.8% and two hours exposure kills 83.3% of adult *Armigeres subalbatus*. Thus Lt_{50} (lethal time) value calculated one hour.

(2) With Abate (organophosphorus larvaecide) 66% larvae were knocked down after 24 hours at .025 ppm of Abate and 4% were knocked down at 0.005 ppm. Thus Lc_{50} value was calculated 0.014 ppm.

(3) With Malathion 50% *A. subalbatus* larvae were knocked down after 24 hours at 0.625 ppm of Malathion and 90% were knocked down at 3.155 ppm. Thus Lc_{50} value was 0.625 ppm.

(4) 36% of the *A. subalbatus* larvae were knocked down at 0.005 ppm of Dursban and in 0.025 ppm 100% mortality was observed. Thus Lc_{50} value of *A. subalbatus* larvae against Dursban was greater than 0.005 ppm.

(5) With Fenthion 96% mortality occurs in 0.1 ppm and 16% mortality found at 0.02 ppm of Fenthion. Thus Lc_{50} value was calculated at 0.035 ppm.

Conclusion

LT_{50} in case of adult *Armigeres subalbatus* being one hour is a sufficiently long time. Thus it is presumed that *Armigeres subalbatus* adults are resistant to 4% DDT in and around Calcutta. It is accepted that if an insecticide at a concentration above .002 ppm fails to knock down larvae in 24 hours, it is regarded as resistant. So in our experiments all organophosphorus compounds showed resistance to the larvae of *A. subalbatus* at concentration above .002 ppm. Thus it may be concluded that *Armigeres subalbatus* of Calcutta and suburbs are resistant to DDT and Organophosphorus insecticides mentioned previously.

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(1) *Adults*

TABLE I - Susceptibility status of *Armigeres subalbatus* adults against DDT

Time of exposure.	Knock down after 24 hours.	Percentage of knock down after 24 hours.	LT_{50}
15 minutes	10/120	8.3%	
30 minutes	31/120	25.9%	*One hour.*
1 hour	61/120	50.8%	
2 hours	100/120	83.3%	

(2) *Larvae*

TABLE II—Susceptibiliy of *Armigeres subalbatus* larvae to Abate.

Concentration of Abate.	Knock down after 24 hours	LC_{50} ppm
0.0002 ppm	0/100	
0 001 ppm	1/100	
0.005 ppm	4/100	0.014 ppm
0.025 ppm	66/100	
Control	1/100	

TABLE III—Susceptibility of *A. subalbatus* larvae to Malathion.

Concentration of Malathion.	Knock down after 24 hours	LC_{50} ppm
0.025 ppm	1/100	
0.125 ppm	3/100	
0.625 ppm	50/100	0.625 ppm
3.155 ppm	90/100	
Control	0/100	

TABLE IV—Susceptibility of *A. subalbatus* larvae to Dursban.

Concentration of Dursban.	Knock down after 24 hours	LC_{50} (ppm)
0.0002 ppm	0/100	
0.001 ppm	4/100	
0.005 ppm	36/100	Greater than
0.025 ppm	100/100	0.005 ppm
Control	0/100	

Table V—Susceptibllity of *A. subalbatus* Larvae to Fenthion.

Concentration of Fenthion	Knock down after 24 hours	LC_{50} (ppm)
0.0008 ppm	0/100	
0.004 ppm	1/100	
0 02 ppm	16/100	
0.1 ppm	96/100	.035 ppm
0.5 ppm	100/100	
2.5 ppm	100/100	
Control	1/100	

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