

WORLD HEALTH
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ENGLISH ONLY *

The Secretary of the Expert Committee on Malaria has the honour to communicate hereunder a paper by S. DAVIDOVICI, Z. LEVINSON and S. REUTER, of the Malaria Research Station, Rosh Pina, Israel, on

THE TOXICITY OF DDT - LANOLINE RESIDUES TO FLIES AND MOSQUITOS

submitted by Professor G.G. MER,
Director of the Rosh Pina Station.

There seems to exist a certain correlation between the physical state of DDT in the residue and the residual insecticidal effect. Complete recrystallization of DDT from the solvent, which takes place in the residue some time after spraying, seems to coincide with a considerable reduction in toxicity. It is reasonable, therefore, to expect that the addition to the solvent of a substance which would prevent the rapid recrystallization of the DDT in the residue would also enhance the insecticidal effect and make it more durable. In order, however, that any improvement obtained will be of practical value, it is essential that such a substance be cheap, non-staining and easily mixable with DDT solvents.

Substances answering these requirements were added to kerosene solution and emulsions of DDT. The toxic effect of these mixtures on flies and mosquitos was measured by laboratory methods. The most promising results in this series of tests were obtained with DDT solutions and emulsions to which Lanoline and parent substances had been added. These results are reported below.

One field test was carried out with the best available insecticidal mixture, in a village heavily infested with houseflies in spite of regular bimonthly treatments with the usual 5% DDT solution in kerosene.

LABORATORY TESTS

The testing method used was that described by MER and DAVIDOVICI (Parasitology, Camb., Vol.40, No. 1-2, January 1950, p.87).

* For reasons of economy no translation made in French.

Tests were carried out with a DDT-resistant strain of housefly : Musca domestica (Var. vicina) and a local strain of Culex molestus, both bred in the laboratory. Females 2-3 days old were used in the tests.

Flies and mosquitos were brought into contact with glass plates sprayed with insecticidal solutions at the rate of 2 cub. mm. per 1 sq. cm., for 90 seconds and 5 minutes respectively.

In every test 10 flies or 10 mosquitos were used.

The sprayed glass plates were kept for 24 hours before the first test and then between the subsequent tests at 40°C. and R.H. 60-65.

SOLUTION AND EMULSIONS TESTED

1. Kerosene solution of 5% DDT + 5% Lanoline (anhydrous lanoline B.P. Inta Co. London, or anhydrous lanoline B.P. Croda Ltd, Goole, Yorks).
2. Kerosene solution of 5% DDT and 5% wool-wax phosphoric acid ester. (This was prepared by stirring phosphorous pentoxid at T. 70°C. with the melted wax alcohols and subsequent decantation of the ester layer.)
3. Kerosene solution of 2.5% DDT + 0.1% wool-wax steroid "Kathro" (the latter containing 75% cholesterol and cca. 2.5% of agnosterol and lanosterol. Croda Ltd).
4. Emulsion 5% DDT + 6% Lanoline anhydrous (as in 1.) dissolved in kerosene, emulsified in water with triethanol amineolate.

Kerosene was of initial boiling point 155°C. DDT "Cole Laboratories", New York, technical grade; melting point 92-93°C.

HOUSEFLIES

Solution 1. Tests A,B,C,D,E. - 10 flies each.

Age of deposit:	<u>24 hours</u>	<u>7 days</u>	<u>15 days</u>	<u>22 days</u>	<u>29 days</u>
Test No.	A	B	C	D	E
No. of flies surviving after					
1 hour	0	0	1	2	4
2 hours	-	-	0	2	4
3 hours	-	-	-	0	4
6 hours	-	-	-	-	4
24 hours	-	-	-	-	5

Solution No. 2, Test F - 10 flies.

Solution No. 3, Test G - 10 flies.

Solution of 5% DDT in kerosene, Tests H,I,J. - 10 flies each.

Age of deposit	<u>24 hours</u>				<u>7 days</u>
Test No.	F	G	H	I	J
No. of flies surviving after					
1 hour	0	1	10	10	10
2 hours	-	0	10	10	10
3 hours	-	-	10	10	10
6 hours	-	-	9	9	10
24 hours	-	-	8	9	10

Emulsion No. 4, Tests K,L,M. - 10 flies each.

Age of deposit	<u>24 hours</u>	<u>7 days</u>	<u>15 days</u>
Test No.	K	L	M
No. of flies surviving after			
1 hour	0	2	3
2 hours	-	2	3
3 hours	-	2	3
6 hours	-	2	3
24 hours	-	0	1

CULEX

Test A: Solution No. 1, 10 Culex females.

Test B: Solution No. 2, 10 Culex females.

Test C: Emulsion No. 4, 10 Culex females.

Test D: Kerosene DDT 5% solution, 10 Culex females.

Age of deposit	<u>24 hours</u>			
Test No.	A	B	C	D
No. of mosquitos surviving after				
1 hour	6	8	9	9
2 hours	4	7	9	9
3 hours	3	7	9	9
6 hours	3	7	9	9
24 hours	1	7	9	9
48 hours	1	4	8	8

FIELD TRIAL

This was carried out in a dining hall and kitchen of the agricultural settlement "M". This settlement had been given regular bimonthly treatment with DDT

5% solution, every summer since 1946.

From 1948 onwards, no reduction of the fly population was noted after DDT sprayings. The flies had proved to be DDT-resistant in laboratory tests in summer 1948.

The treated dining hall and kitchen were only 200 metres away from very prolific fly breeding sites, e.g. stables and barns.

On 31 August 1949, these premises were sprayed with Insecticidal solution No. 1. Total sprayed area: 1,200 sq. metres.

Deposit: 40 c.c. per 1 sq. metre = 2 gm. DDT per 1 sq. metre.

Number of flies were recorded at 1 p.m. Flies were killed by Pyrethrum Spray, the dead collected and counted.

Date	31.8	7.9	12.9	22.9	24.9
	<u>No. of flies before spraying</u>	<u>No. of flies after treatment</u>			
Dining room	110	30	60	45	144
Kitchen	600	60	100	90	500

SUMMARY:

The addition of Lanoline and parent substances to DDT kerosene solutions enhances the toxicity of the residue to DDT-resistant flies and Culex molestus in laboratory tests. It is evident that by treatment with a kerosene solution containing 5% DDT + 5% Lanoline a considerable reduction of flies can be obtained even in places where the flies are known to be DDT-resistant. This effect is only of three weeks' duration. It was noted that numerous crystals of DDT do appear on the sprayed surfaces approximately 3 weeks after the date of spraying.