

Determination of Susceptibility of *Ornithodoros tholozani* to Gamma - B.H.C. by the use of Microloop¹

by

B. Djanbakhsh² and A. Zeini³

Institute of Parasitology & Malariology, Tehran, Iran.

In 1956 Ansari et al. reported on their preliminary study for assessing the susceptibility of ticks (*O. tholozani* and *O. lahorensis*) (by the exposing lots of ticks for 1 hour to impregnated filter papers with various concentrations of Insecticides and mortality readings 1, 2, 3, 5, 7 & 15 days later. The purpose of this paper is to present preliminary results for susceptibility determination of *O. tholozani*, vector of tick-borne relapsing fever in Iran, to B.H.C. by the use of Microloops.

Experiments are carried out at the Sabzewar Research Station of the WHO-assisted arthropod-borne Diseases Project of the Institute on ticks collected from permanent catching stations, (stables) of infested villages and without previous contact with BHC in regular intervals throughout the year from 1955 to 1957 and according to the following method.

(1) Presented at the WHO Seminar on the Resistance of Insects to Insecticides, New Delhi, 27. Feb.-March, 1958.

(2) Chief, Section of Applied Entomology.

(3) Entomologist.

MATERIALS AND METHOD

1- Materials

- a- Standardized Microloops with capacities of 0.20mm³ and 0.37mm³.
- b- Clean Petri-dishes for holding.
- c- Clean filter-paper to fit exactly the inside of Petri-dishes.
- d- Various concentrations of BHC in acetone (concentrations used: 0.25%, 0.5%, 1%, 2% and a pure acetone as control.
- e- Other equipment and instruments (pince, tweezers, scissors, pipettes, vials etc).

2- Method.

Ticks are divided into lots of blood-fed and not blood-fed adults: males and females, and nymphs, each tested separately. Only blood-fed specimens are tested. In each Petri-dish one piece of filter paper is introduced to cover the bottom completely.

Each tick is transferred with very soft pince on a clean sheet of filter-paper and with the help of Microloop, dipped into a small vial containing acetone or the Insecticide solution. The Insecticide is applied on the dorsum (Cephalothorax) of the tick. The ticks are then transferred into the clean holding Petri-dish labelled with the corresponding group of tick, the stage of tick, and the concentration and size of the Microloop. The Petri-dishes (holding dishes) are then placed in the stables from where ticks are collected or in the laboratory. Readings are made 1, 2, 3, 5 and 6th or 7th day after test. At the beginning a reading was also made after the 15th day with no great variation or difference from the 7th day reading, because most of mortalities appear during 24-48 hours after test.

During the test and at each reading, the maximum and minimum temperature and relative humidity were also recorded.

Care should be taken to start the dorsal applications first with acetone (control), then working from the lowest concentration up to the strongest and to close the vials after each dipping to prevent evaporation of acetone and change of concentration special attention should be paid during the separation of different stages of nymphs, adults:

males and females, and division into lots for tests, to that in each lot (if possible not smaller than 10 per Microloop size and per concentration) the same number of ticks with similar age and size be represented. Seriously affected ticks are counted as dead during mortality readings.

RESULT

From 16/11/55 to 20/12/57. 7812 *O. tholozani* (5085 nymphs, 1477 adult males and 1250 adult females) were tested in 13 sets of tests. Results are given in attached table. From the % mortalities and average LC 50, obtained graphically on arith-log-papers after plotting the corrected data according to Abbott's formula, it can be concluded that.

1 - The susceptibility of *O. tholozani* to BHC under the condition of these tests, is greater in nymphal stages and much lower in adult females. The adult males seem to be much more susceptible than the females, although the females have greater life span and stronger cuticles; this needs further study.

2 - Mortality obtained with Microloops 0.20mm³ and 0.37mm³ are in most cases consistent with the increases of concentration or higher amount of Insecticides applied.

It is suggested that future tests be conducted with only one Microloop but with a wider range of concentration.

Although separation of each phase of nymphal stage (I, II, III) is much more difficult under field conditions and also because of natural variation in size or strong action of complete or incomplete engorgement of ticks on their size and development, still studies should be conducted at least on a laboratory colony to determine the susceptibility of *O. tholozani* at each phase of nymphal stage, since younger nymphs are more susceptible.

CONCLUSION

1 - The aim has been to determine the susceptibility of *O. tholozani* to B.H.C. by dorsal application of various concentrations of B.H.C.

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in acetone (o. 25 o. 5,1 and 2 per 1000) with Microloops of o. 20mm³ and o. 37 mm³ capacity with mortality readings 1, 2, 3, 5, 7 th days later.

2 - According to the tests performed on *O. tholozani* the average Lc 50 obtained graphically are with the loop o. 20mm³ of the order of o.8‰ for nymphs, o. 9‰ for adult males, and 2‰ for adult females. These values are with the microloop o. 37mm³ respectively o. 45‰, o. 6‰ and 1. 1‰.

3 - It seems that the method described could be use in determining the susceptibility and supervision of possible appearance of resistance in the field. Standardization of Microloops, method of dipping and other variables such as size and age of ticks, season etc. should be further studies.

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Microloop	Stage	Concentration of γ -BHC in acetone			Acetone			LC 50%										
		No. tested	No. dead	% dead	No. tested	No. dead	% dead											
0.25%	0.20 mm ³	Nymphe	383	52	13.5	383	136	35.5	483	274	56.7	533	468	87.8	473	9.5	1.5	0.8
		Male	120	29	24	134	48	35.8	134	77	57.4	144	107	74.3	144	7	4.8	0.9
		Female	92	5	5.4	102	19	18.6	102	37	36.2	142	71	50	142	2	1.4	2
	0.37 mm ³	Nymphe	498	169	33.9	498	251	50.4	598	480	80.2	648	624	96.2	588	16	2.7	0.45
		Male	149	43	28.8	163	69	40.8	163	113	69.3	163	159	97.5	163	8	4.8	0.6
		Female	110	12	10.9	120	37	30.8	120	49	40.8	160	112	70	160	1	0.6	1.1
Control	Control																	
		No. tested	No. dead	% dead	No. tested	No. dead	% dead	No. tested	No. dead	% dead	No. tested	No. dead	% dead	No. tested	No. dead	% dead	No. tested	No. dead