

O. G. G. E. — O. R. S. T. O. M.
Centre Entomologique de l'Onchocercose — BOUAKE —

LUTTE CONTRE *Simulium damnosum* VECTEUR DE
L'ONCHOCERCOSE HUMAINE EN AFRIQUE
OCCIDENTALE .

INSECTICIDE TESTS ; KORHOGO , IVORY COAST .

by

G. CARLSSON (°)

N° 209 / Oncho / Tech / 74

(°) Professeur à l'Université de HELSINBORG (Suède).

- 3 AVR. 1975
O. R. S. T. O. M.

Collection de Référence

B 7476 Ent. Ped.
Cote d'Ivoire

Centre Entomologique de l'Onchocercose , BP: 1500 BOUAKE — Cote d'Ivoire —

INSECTICIDE TESTS, KORHOGO, IVORY COAST.

(October - November 1974)

by

G. CARLSSON

OCP, WHO-consultant

Investigations which I have taken a part in. These, completing researches and methodology will be published through the Centre Entomologique de l'Onchocercose, of Bouaké in a main report.

Methodology used in connection with insecticide treatments and area under investigation, see main report.

10.18/X (awaiting the helicopter) : investigations in water-courses directions Fetekro and Dimbokro and around Marabadiassa. No suitable localities for insecticide tests, mainly depending on considerable fluctuations in the discharge of water from one day to another one.

I. EFFECTS ON THE AQUATIC FAUNA.

20/X - 11/XI : Testing different insecticides.

Procida Standard.

Bandama, point 1. Prospection 21X, treatment 22/X (0,05 ppm), control 24/X. Results : all simuliids larvae disappeared 0 - 32 km; 33-35 km some few alive larvae, 5-7 instars; 36-46 km all stages but reduction in number; 47 km and more simuliids larvae intact. Non-target fauna: a slight increase in number, probably mainly due to intensified drift and colonization because of lowering water-level. No non-target group noticeably afflicted at all.

.../...

La Léraba. Prospection and treatment 28/X (0,05 ppm), control 29 and 30/X. Exactly the same results as in Bandama on some few km near. Here also increase in the non-target fauna. By watching the black fly larvae through a water-telescope before, during and after the insecticide wave the following observations were made: during the passing of the insecticide wave (10') no abnormal reaction; after 30' the 1-4 instar larvae made stereotypic, abnormal, slithering movings, trying to get hold for the pseudopod, failed and were gone. The same reactions started after 45' for 5-7 instars larvae - there were no significant differences of time between these stages, nor between different species (Simulium damnosum, S. adersi and S. unicornutum). There was a delay in these abnormal reactions in simuliids larvae, infected by microsporidians.

Abate lot 73.

Bandama point 2. Immediately downstream of a dam-construction which highly influence the benthic fauna negatively. Prospection 21/X, treatment 22/X (0,05 ppm), control 24/X. On 10 spots, considered as suitable substrata for simuliids larvae, altogether 6 larvae and 1 pupa, before treatment (not significant). After treatment: no simuliids larvae at all. Non-target fauna: insignificant, however, some few ephemeropteous larvae 1 km downstream of treatment point.

Bandama, point 3. Prospection 3/XI, treatment 4/XI (0,05 ppm), control 6/XI. No simuliids larvae 0 - 51 km, between 52 - 63 km, 5-7 instars (no significant differences between these different instars), after 64 km all stages. Non-target faune: completely intact.

Lahoro. Prospection and treatment 9/XI (0,03 ppm), control 9/XI after 1 hour, 50 m downstream of treatment point: only 4-7 instar larvae of black flies; non-target fauna intact. Control 11/XI: recolonisation of 1-3 instar larvae, depending of relatively rich organic drift (lowering waterlevel) and hatching of eggs. 4-7 instar larvae and non-target fauna intact.

Logahan. Prospection and treatment 9/XI (0,01 ppm), control 11/XI. No effect at all.

Abate lot 72.

Bandama, point 4. Prospection 22/X (Y. Sechan) and 23/X (partly, by me), treatment 23/X (0,05 ppm), control 25/X. simuliids larvae populations intact in 9 localities; at number 3 after treatment point a slight decrease (insignificant) in number. Non-target fauna intact. Water-telescope observations: no reactions at all up to 1 hour and 45' after the insecticide wave.

OMS 1424.

Logahan and Lahoro. Prospection 25/X, comparatively rich and comprehensive fauna. Treatment 25/X (0,1 resp 0,06 ppm), control up to 45' after the passing of the insecticide wave : no reactions at all. Control 26/X and 27/X : no noticeable effects at all.

Prospection 2/XI, fauna as 25/X. Treatment 2/XI (0,2 respect 0,3 ppm). Control up to 45' after the passing of the insecticide wave : no reactions. Control 4/XI and 5/XI : a slight reduction in the number of simuliidae larvae, estimated to 20% in both rivers, and similar to all instars. Non-target fauna eradicated with exception of some very few coleoptera and coleopterous larvae + 1 trichopterous larva, which usually represent some few percentages only of the benthic fauna.

Bromophos.

Bou. Prospection 23/X (Brunhes), treatment 24/X (0,05 ppm). Control 26/X and 27/X : no effects at all. Treatment 30/X (0,1 ppm). Control 2/XI : 500 m downstream of treatment point no simuliids larvae, some very few ephemeropterous larvae only; 2 km downstream simuliids larvae present but to a lesser degree than before; 5 km downstream fauna intact.

Prospection and treatment 7/XI (0,3 ppm), control directly afterwards : total fauna intact for 30' though 1-4 instar larvae began stereotypic movings, trying to use the pseudopod. This failed and the larvae disappeared, apparently without having spun the thread to which they usually are attached during drifting. The

.../...

same behaviour followed after 45' by all stages of simuliids larvae; 15' later all were gone or dead with exception of one 7 instar larvae infected by microsporidians and one 6 instar larva. Control 10/XI: all simuliids larvae disappeared for 23 km, all instars appeared after 28 km. Non-target fauna reduced, especially ephemeropterous larvae.

Monongo. Prospection and treatment 9/XI (0,2 ppm), control after 2 hours : 1-3 instar larvae were gone, all other fauna intact. Control 11/XI : simuliids larvae reduced, estimated to 20%; all stages present. Observations : there had been a recolonization of 1-3 instar larvae since 9/XI. Non-target fauna : intact with exception of chironomous larvae, which had disappeared.

II. CHEMICAL AND PHYSICAL CHARACTERIZATION OF THE WATERCOURSES UNDER INVESTIGATION.

Within brackets are values from the extremely dry February 1974.

- Temperature °C: 25, 5-30, 1, usually 27 (24-28)
- pH: 7,0 -- 7,2, usually 7,1 (7,1 - 7,2)
- O₂ saturation 75% - 95%, usually 85% (77% - 98%)
- dH (total hardness): 0,7 - 1,0 (1,1 - 1,4)
- Phosphorous ppm: 0,15 in Léraba, otherwise 0,2 - 0,3 (0,05 - 0,15)
- NO₂, ppm: 0,01 (0,01)
- Cl ions, ppm: 12-15 (- -)

All factors above have been rather stable throughout the period.

- Colour, Pt standard, and turbidity, respectively :
Bandama, point 1 : 110 and 60 (21/X); 90 and 70 (24/X).
point 2 : (after dam-construction): 150 and 25 (21/X); 130 and 30 (24/X).
point 3 : 125 and 30 (22/X); 125 and 30 (3/XI); 110 and 40 (6/XI).
point 4 : 160 and 25 (22/X); 140 and 30 (25/XI).
Marabadiassa : 160 and 30 (15/X).

Logahan : 100 and 45 (25/X, 2/XI and 5/XI).
Lahoro : 100 and 45 (25/X and 5/XI).
Bou : 90 and 85 (26/X and 2/XI); 80 and 90
(9/XI).
Léraba : 100 and 45 (28/X); 100 and 50 (8/XI).
Monongo : 110 and 45 (9/XI)

Discharge of water : see main report.

Chemical and physical methodology according to pH Tamm Laboratory, Uppsala, Sweden.

III. ORGANIC DRIFT.

(Plankton gauze, only microdrift. Macrodrift: see main report).

Poor or very poor microorganic drift throughout the period.

- Phytoplankton: some few diatoms and desmidieer.
- Zooplankton: very poor indeed; sparsely some watermites and copepods.
- Detritus : rather considerable.
- Inorganic compounds (ilt, etc) rather considerable, especially, downstream of point 2, damconstruction.

During the extremely dry season (Febr. 1974) the amount of phyto - and zooplankton was rather considerable.

There were no noticable differences in the microdrift before, during and after the treatments.

IV. GENERAL REMARKS.

1. On nearly all spots of investigation black fly females attacked and eggs were found which guarantee recolonisation of black fly larvae.

2. Indications are given that the two effective insecticides, Abate 139 and Abate lot 73, act not as an immediate contact-poison, it rather seems probable that effect achieves after digestion.

3. In a short time view the above two insecticides do not seem to afflict the non-target fauna, which occupy similar substrata as simuliids larvae (those under investigation). However, we do not know what happens to the non-target fauna, living in cavities on the bottom of the rivers. These animals might be afflicted as will be indicated in the main report (macrofrift).

4. There have been no noticeable differences in the effect of the above mentioned insecticides versus the different black fly species under observation : S.damnosum (dominating), S.unicornutum, S.cervicornutum, S.adersi, S.alcocki, S.griseicolle tridens and S.schoutedeni.

5. From some localities there are indications, that black fly larvae, parasitized by microsporidians, react slower for or even survive the insecticide wave than do healthy larvae.

6. Instars 1-4 react faster, usually in 75% of time than do 5-7 instar larvae. No noticeable differences between these stages have been observed.

7. The effect of the insecticides in clear water has not been investigated (no clear-water rivers were abundant in the area under investigation).

V. RECOMMENDATIONS.

1. Although Abate lot 139 and Abate lot 73 for the moment must be considered to be good insecticides against black fly larvae urgent researches should be undertaken to find new insecticides as complements (the other insecticides under investigation are not usable in the types of tunneling waters, which have been studied). Desirable is an insecticide with still narrower spectrum than the above mentioned - idealic one which afflicts S.damnosum only.

2. Urgent investigations are necessary, to my mind, to find and develop alternative methods to insecticides, such as cultural and biological control methods. This must be much more discussed and forced to much broader researches immediately.

3. The Bouaké laboratory should be provided with all necessary facilities for the extremely important work carried out there - for the moment it is urgently desirable with new Land-Rovers and boats with equipments.

4. The importance of a helicopter can not be overestimated - provided the crew knows how to face not only the helicopter but also all other problems which arise. (This has really been the case with the Air Lloyd crew).

5. In all future planning and work for a successful result of the Onchocerciasis campaign it is of greatest importance that people who work in the bush and know the conditions in the field determine what to do.

VI. THANKS.

My sincere thanks to the personal of the Bouaké laboratory. It has been educating, stimulating and always a pleasure to work together with these extraordinarily clever field workers. The same is true also for the helicopter crew.

=====

=====

====