

TESTS WITH GRANULATED AND SYSTEMIC INSECTICIDES AGAINST *MANSONIA* LARVAE¹

H. C. CHAPMAN

Entomology Research Branch, Agr. Res. Serv., U.S.D.A.

The immature stages of *Mansonia* attach to and obtain air from the roots of plants and thus differ from mosquitoes that obtain air by rising to the water surface. Since the plant roots are usually in a stratum of silt and debris, chemical control is difficult. Water management affords the best means of control, but often is impossible.

Little has been published on chemical control of *Mansonia* larvae. In New Jersey results of tests by Hagmann (1953) against *perturbans* (Wlkr.) on cattail indicate that satisfactory control was obtained from dieldrin pelleted dusts applied at 0.17 pound per acre. Aldrin and BHC at the same dosage and DDT at 1 pound per acre failed to give satisfactory reductions. These treatments were made in November and checked in January or February.

Field experiments near Boca Raton, Fla., in 1945 had shown that a DDT-xylene emulsion applied at 0.1 p.p.m., and stirred to give thorough dispersion, and a 1-percent DDT suspension at 2 p.p.m. gave excellent control in 24 hours. Poor initial reductions were obtained by surface applications of DDT-xylene emulsion at 1 pound per acre. These tests were conducted against populations that were predominantly *indubitans* D. and S., and the host plant was waterlettuce (*Pistia stratiotes*).

TESTS WITH GRANULATED INSECTICIDES.—In 1954 tests were conducted in the laboratory with 16/30-mesh granular bentonite containing 1 percent of various insecticides. The larvae were collected on waterlettuce at Boca Raton and Okeechobee, Fla., and were predominantly *in-*

dubitans, but a few *titillans* (Wlkr.) were present. After the larvae had been forced to detach by shaking the roots in water, the plant was placed in a battery jar containing 2 liters of water, and 25 fourth-instar larvae were introduced. After the larvae had reattached, the granules were added to the water and mortality counts were taken after 48 hours. The results with 15 insecticides are given in Table 1.

Complete mortality was obtained with parathion at 0.025 p.p.m. and with EPN at 0.1 p.p.m. At 0.25 p.p.m. endrin and DDVP also gave complete mortality; lindane and dieldrin, mortalities above 90 percent, and the remaining insecticides were less effective.

In January and April 1955 field tests with 16/30-mesh bentonite granules were conducted on 10- by 20-foot plots at Boca Raton. The predominant species of *Mansonia* was *indubitans*, but some *titillans* and a few *perturbans* were present. The plots were in a closed ditch with a profuse growth of waterlettuce, infested during the January tests with up to 329 larvae, and during the April tests with up to 57 larvae per plant. The granules contained 1 percent of an insecticide and were broadcast by hand.

The sampling procedure consisted of quickly transferring a waterlettuce plant from the plot to a white enamel pan about half full of water, dislodging the larvae from the roots by severe agitation, and then removing the water by means of a fine-mesh strainer. The debris and larvae were spread out in a small amount of clear water in a small white enamel pan, and the larvae were removed and counted. All instars were present, but the third and fourth predominated. The percent control was calculated from the difference between the total number collected from five plants before and at various intervals after

¹ This work was conducted at the Orlando, Fla., laboratory of the Entomology Research Branch under funds allotted to the Branch by the Department of the Army.

TABLE 1.—Percent mortality of *Mansonia* larvae after 48-hour exposure in water treated with various granulated insecticides, 1954. (2 to 5 replications.)

Insecticide	0.25 p.p.m.	0.1 p.p.m.	0.05 p.p.m.	0.025 p.p.m.	0.01 p.p.m.
Parathion	100	100	100	100	8
EPN	100	100	82	70	10
Endrin	100	88	56	22	..
DDVP	100	79	30	12	0
Lindane	97	92	79	42	..
Dieldrin	95	52	40	16	..
BHC (12% gamma)	88	50	24	4	..
Bayer L 13/59	88	..	..	..	..
Malathion	84	..	..	..	..
Shell OS 2046	80	..	..	..	..
Heptachlor	54	..	..	..	..
Chlordane	39	..	..	..	..
DDT	21	..	..	..	..
Aldrin	19	..	..	..	..
Toxaphene	7	..	..	..	..

treatment. The results are presented in Table 2.

In the January tests EPN granules at 0.25 and 0.1 pound per acre caused excellent reductions after 24 hours and almost eliminated breeding for at least 3 weeks. The 0.05-pound dosage gave poor initial kill but was highly effective after 1 week and moderately effective after 3 weeks. Dieldrin granules at 0.1 pound per acre also gave low initial kill but were over 90 percent effective after 1 and 3 weeks. Breeding was still at an extremely low ebb after 10 weeks in these plots, but also in adjacent untreated areas. The larval

populations remained unchanged at the opposite end of the ditch.

In the April treatments none of the materials gave good control in 24 hours. The best reductions after 1 and 3 weeks were obtained with endrin at 0.1 pound per acre. Lindane, DDVP, and parathion at this dosage did not give satisfactory control.

TESTS WITH SYSTEMIC INSECTICIDES.—In conjunction with the January tests of granulated insecticides, field tests were conducted with schradan and Systox to determine their systemic and direct action. The materials were applied in 1-percent

TABLE 2.—Field tests with granulated larvicides against *Mansonia* larvae, 1955

Insecticide and dosage (pound/acre)	Pretreatment count on 5 plants	Percent control after—		
		24 hours	1 week	3 weeks
January treatment				
EPN 0.25	589	99	99	99
.1	393	97	96	99
.05	407	32	98	84
Dieldrin 0.1	443	38	92	95
April treatment				
Parathion 0.25	131	35	53	76
.1	103	0	23	22
.05	48	6	2	21
Lindane 0.1	65	54	39	71
Endrin 0.1	105	14	88	90
DDVP 0.1	63	25	64	49

TABLE 3.—Field tests with emulsions of two systemic insecticides against *Mansonia* larvae, 1955

Insecticide and dosage (pound/acre)	Pretreatment count on 5 plants	Percent control after—		
		24 hours	1 week	3 weeks
Schradan 0.25	426	0	0	21
.1	216	51	0	0
.05	408	0	1	..
Systox 0.25	210	1	0	0
.1	163	0	0	0
.05	157	0	0	..

emulsions with a hand atomizer at three dosages. The results are given in Table 3.

Neither schradan nor Systox was effective initially, and no systemic action was noted at 1 or 3 weeks.

SUMMARY.—Of 15 granulated insecticides tested in the laboratory against *Mansonia* mosquito larvae, only 6 gave more than 90 percent mortality at 0.25 p.p.m. These were parathion, EPN, endrin, lindane, DDVP, and dieldrin, in order of decreasing toxicity. When these materials were tested in the field, EPN at 0.25 and

0.1 pound per acre gave excellent control after 24 hours to 3 weeks, and dieldrin and endrin at 0.1 pound gave poor control initially but good control after 1 and 3 weeks. Lindane, DDVP, and parathion were not satisfactory at this dosage.

No direct or systemic action after 3 weeks was noted from Systox or schradan when applied at 0.25 pound per acre.

References Cited

- HAGMANN, L. E. 1953. Biology of *Mansonia perturbans* (Walker). N. J. Mosquito Extermin. Assoc. Proc., 40:141-7.

IMPORTANT NEW INFORMATION of interest to all mosquito control workers will be presented at the AMCA meetings in Beaumont, Texas in February. See pages 239 and 240 for partial list of papers to be presented.

The Ninth Annual Conference of the Utah Mosquito Abatement Association will be held on March 16 and 17, 1956, at Midvale, Utah. The South Salt Lake County Mosquito Abatement District will serve as hosts. This is your invitation to attend.