CONTROL OF *CULEX PIPIENS* IN A LAGOON HOLDING CANNING WASTES [1]

JERRY MALLACK, JAMES R. FOSTER, WILLIAM E. BICKLEY,[2] AND EDWIN C. WEBER [3]

In 1960 large quantities of various chlorinated hydrocarbons failed to control *Culex pipiens* in a lagoon containing cannery wastes at Westminster, Maryland (Bickley and Mallack, 1961). The work reported herein consisted of additional efforts to control the larvae in the pond by chemical means. This pond or lagoon differs radically from a sewage oxidation or stabilization lagoon. The concentration of organic wastes is much higher, and the Westminster lagoon, like most others built for cannery wastes, is filled in summer and drained the following spring.

Because leafy vegetation in ponds of this type seems to promote development of mosquito larvae the use of an herbicide was planned. On May 25 when the pond was drained to the point where water stood only in a few pot-holes the entire area of about 9 acres was treated with Simazine 80-W (2-chloro-4, 6-bis-(ethylamino)-s-triazine), a product of Geigy Agricultural Chemicals, at the rate of 20 pounds actual toxicant per acre. This preemergent treatment was made with a hydraulic sprayer at pressures up to 300 lbs. p.s.i. The mixture consisted of 225 lbs. of Simazine wettable powder in enough water to make about 250 gallons. The Simazine was very effective in preventing weeds and grasses. This conclusion was reached by observations on weed growth in some small areas inadvertently left unsprayed, and by comparing weed growth with that observed in previous years.

A few egg rafts and larvae were observed on June 22, and regular applications of malathion were made twice weekly beginning June 25. The formulation consisted of 2.5 gallons of 57 percent malathion emulsion concentrate in 12 gallons of water. A hydraulic sprayer with pressures up to 300 p.s.i. was used. The amount of actual toxicant per acre per application was estimated to be approximately 2.8 lbs. The first treatment was made before the pond was filled. A few egg rafts and larvae had been observed. Treatments as described (totalling 22) were made every 3 or 4 days until September 24 except that in 2 treatments during the middle of September malathion wettable powder and diazinon (1.4 lbs per acre) were substituted. For the most part the insecticidal treatments were made around the edges of the pond. Previous observations using a boat had shown that larvae were practically non-existent in open water or in mats of organic matter away from the shore.

The malathion treatments following Simazine gave excellent control of *Culex pipiens*. Weekly inspections showed pupae on only one occasion. Egg rafts and small larvae were occasionally dipped in small spots where weeds were inundated. These were the spots which had escaped treatment with Simazine. It is conjectured that female mosquitoes oviposited on where weeds were growing.

It appears that practically nothing has been published on the possible interference by insecticides with the decompositional processes occurring in lagoons of this type. Ten series of B.O.D. (biochemical oxygen demand) analyses were made on samples of water from three sampling points. The B.O.D. was consistently lower near the outlet of the lagoon than at the point where

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[2] University of Maryland, College Park.

[3] Maryland Water Pollution Control Commission, Annapolis.

ıe effluent left the factory or at the point here the effluent entered the pond. The ighest B.O.D. obtained was 3,590 p.p.m. n August 23 when corn was being canned. his sample was taken as the effluent was aving the factory. Simultaneously the .O.D. at the lagoon outlet was 622 p.p.m. he lowest figure obtained was 5 p.p.m. on ovember 28. These B.O.D. determinaons furnished evidence that stabilization the pond took place in a very satisfactory anner during 1961. The malathion treatents had no measurable effect on oxidaon processes, and the use of Simazine ıdoubtedly promoted stabilization.

In an attempt to control odors from the goon "Cloroben," a product consisting a mixture of ortho, para, and trilorobenzene (Cloroben Chemical Corıration) was introduced into the waste ıter at the cannery pumping station so to achieve a concentration of 15 p.p.m. the pumping station. The results of the loroben" treatments were unsatisfactory. lor control was not obtained. Small le laboratory tests showed that the maial was highly toxic to *Culex pipiens* vae at 20 p.p.m. At 10 p.p.m. mortality proximated 44 percent. Nevertheless it doubtful if this material affected larval velopment in the lagoon.

Residue analyses of 10 water samples en in May 1961 were negative for lorinated hydrocarbons in spite of the avy dosages in 1960. Simazine residues ıde from samples taken in 1961 were essentially negative. It was also found in laboratory tests that Simazine at 11.1 p.p.m. was not toxic to bluegills within 24 hours.

In Maryland the State Water Pollution Control Commission has issued a statement of "Policy and Procedure for the Approval of the Use of Chemicals or Chemical Compounds Containing Materials Toxic to Aquatic Life in Aquatic Life Management Projects." This statement explains regulations governing the use of chemicals which are toxic to aquatic life.

SUMMARY AND CONCLUSIONS. 1. A preemergence treatment of Simazine effectively inhibited weed growth in a 9-acre lagoon holding canning wastes.

2. Following Simazine treatment, 2 applications of malathion per week satisfactorily controlled development of *Culex pipiens*.

3. Experience in three years suggests that organophosphorus insecticides are more effective than chlorinated hydrocarbons for larval control in water where organic wastes are concentrated.

4. B.O.D. determinations showed that stabilization in the lagoon was satisfactory.

5. Some evidence is presented to show that malathion has no harmful effect on aerobic decomposition of organic matter.

References Cited

BICKLEY, W. E., and MALLACK, JERRY. 1961. Lagoons for sewage, other wastes—and mosquitoes. Proc. and Papers Ann. Conf. Calif. Mosq. Contr. Assoc. 29:152–153.