

## INSECTICIDE SUSCEPTIBILITY-RESISTANCE STUDIES ON SOME COMMON MOSQUITOES FROM SOUTH COOK COUNTY, ILLINOIS

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**INTRODUCTION.** Chlorinated hydrocarbons, in various formulations, have been the insecticides of choice of The South Cook County Mosquito Abatement District since operations began eight seasons ago. The District comprises some 340 square miles in the south part of Cook County, Illinois, and is the only municipal, tax-supported program in the area that includes part of the city of Chicago. In 1960, a DDT-resistant strain of the mosquito *Culex pipiens* was found within the boundaries of the District (Hedeem and Allen, 1961) and since that time one of the major projects of the Entomology Section of the District has been to determine how extensive the resistance problem is throughout the area serviced.

The purpose of this paper is to report our findings to date and to provide baseline data for other workers in various parts of the country who may be concerned with this problem.

**METHODS.** In most of our tests the World Health Organization's kit for determining the resistance-susceptibility of mosquito larvae to DDT, gamma BHC, and dieldrin was employed. In three tests, however, it was necessary to use the method devised by agencies of the U. S. Department of Defense in 1956, because the chemicals we desired to test were not included in the WHO kit. Instructions for the use of the WHO kit are described in a paper by Brown (1958).

The larval specimens for most of the

tests to be described were collected in the field and returned to the laboratory. In three instances laboratory colonies were established, namely the Midlothian Creek, Palos Hills, and Robbins II strains of *C. pipiens*. Tests from these latter three locations were made with larvae obtained from the second or later generations of laboratory stock.

All of the geographical locations mentioned are in the southern part of Cook County with the exception of Crete. The Crete collecting site is located approximately one mile south of the Cook-Will County line in a "no control zone."

**THE PRESENT STUDY.** Table 1 indicates the LC-50 value (except as indicated) of several insecticides tested, during the period of 1960-1962, on the species listed.

The data presented above indicate all strains of *Culex restuans*, *Aedes vexans*, *Aedes stimulans*, and most *Culex pipiens* tested in this area are susceptible to DDT and other chlorinated hydrocarbons in dosages normally used in field larviciding operations. We regard the Midlothian Creek and Palos Hills strains of *pipiens* to be DDT-resistant, and this has been verified by control failure in the field. Likewise, the Robbins II strain of this species is considered to be DDT-tolerant, and during the past two seasons these populations have been controlled successfully with No. 2 fuel oil.

It is interesting to speculate as to why the Midlothian Creek strain of *C. restuans* is susceptible to DDT, and *C. pipiens* taken from the identical area is resistant. It is the opinion of the writer that this is due to the fact that *restuans* has only one or two generations per year in this area, whereas *pipiens*, by passing through four or more generations each year, has a greater exposure to the toxicant, thereb

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TABLE 1.—LC-50 values of insecticides tested.

Species	Location	Insecticide	No Replicates	LC-50 p.p.m.	History of prior exposure to insecticide indicated (last five years)
<i>Culex restuans</i>	Posen	DDT	4	0.023	Medium
" "	Midlothian Creek	DDT	4	0.014	Heavy
" "	Harvey I	DDT	4	0.005	Medium
" "	Flossmoor	DDT	4	0.007	Medium
" "	Harvey II	DDT	4	0.015	Medium
<i>Culex pipiens</i>	Midlothian Creek	DDT	12	0.28	Heavy
" "	Midlothian Creek	gamma BHC	4	0.056	Slight
" "	Midlothian Creek	DDD (TDE)	4	0.021	None
" "	Midlothian Creek	dieldrin	4	0.0056	None
" "	Midlothian Creek	"extracted DDD (TDE)"*	4	0.029	None
" "	Blue Island	DDT	4	0.04	Slight
" "	Tinley Park	DDT	4	0.037	Slight
" "	Butterfield Creek	DDT	4	0.024	Medium
" "	Robbins I	DDT	4	0.025	Medium
" "	Robbins II	DDT	8	0.16	Medium
" "	Palos Hills	DDT	12	0.245	Heavy
" "	Robbins II	Anti-resistant DDT	12	0.036	None
<i>Aedes vexans</i>	Crete	DDT	4	0.004 (LC-95)	None
" "	Crete	gamma BHC	4	0.006 (LC-95)	None
" "	Crete	dieldrin	4	0.009 (LC-99)	None
<i>Aedes stimulans</i>	Crete	DDT	8	0.007 (LC-50)	None

\* "Extracted DDD (TDE)" was supplied by the Pierce Chemical Company of Rockford, Illinois, and it was stated the ortho-para isomer had been extracted for another purpose.

accelerating the natural selection process of a resistant strain.

**SUMMARY.** Resistance-susceptibility data of four common midwestern mosquitoes to various insecticides are presented. Two strains of *C. pipiens* are considered to be DDT-resistant in the area encompassed by the South Cook County (Illinois) Mosquito Abatement District, and another strain of this species is DDT-tolerant. Tests with larvae of *C. restuans*, *Ae. vexans*, and *Ae. stimulans* also from the

same general area indicate susceptibility to DDT and other chlorinated hydrocarbons.

#### Literature Cited

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