A PRELIMINARY STUDY OF THE EFFECTS OF CERTAIN INSECTICIDES UPON WILDLIFE IN NORTH CENTRAL OKLAHOMA

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INTRODUCTION

OBJECTIVES OF THE STUDY. In August, 1948 the Entomology Department of Oklahoma A. & M. College, the U. S. Bureau of Entomology and Plant Quarantine and the National Livestock Loss Prevention Board conducted insecticide tests for the control of horseflies on the Lake Carl Blackwell

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Area near Stillwater. The spraying of timbered areas with four insecticides presented an opportunity to study the effects of insecticides upon terrestrial and aquatic vertebrate animals.

METHODS OF STUDY. Plans for the spraying experiments were not announced until August 8, three days before the sprays were applied. In view of the limited time it was decided to determine the trends in vertebrate animal populations as accurately as possible before and after the spray applications by counting all of the animals seen or heard while cruising the area slowly. Four more or less isolated ravines covered with a growth of fringe forest trees and ranging in area from 7 to 13 acres were selected for the insecticide tests. On August 11 Areas I, II, III and IV were sprayed with Methoxychlor, DDT, Chlorinated Camphene and Chlordane respectively. Two pounds per acre of each insecticide were applied in an oil spray from a low-flying airplane. Each of the four areas was cruised over at approximately the same time of day on August 10, the day before spraying, and on August 12, 13 and 16, one to five days after spraying. In view of the fact that Area I was sprayed in the early morning, an additional count was made on this area on the afternoon of August 11, approximately 8 hours after the Methoxychlor had been applied.

All of the animals seen or heard were counted on each visit to each area and notes were made on their activities and condition. Animals observed within 300 feet of the boundaries of the sprayed areas were also recorded to allow for minimum shifts in location.

DISCUSSION OF RESULTS

TRENDS IN ANIMAL POPULATIONS. As shown in Table I no marked changes in bird populations occurred on any of the sprayed areas. Wide-ranging species, such as the crow and great horned owl or species difficult to flush, such as the bobwhite, cannot be found with any degree of regularity on such small areas and marked fluctuations in the counts on these species were to be expected. No dead or distressed birds were noted. The fact that DDT applied at the rate of 2 pounds per acre did not appear to have any detrimental effects upon bird life agrees with the observations of Stewart *et al* (1946) and Hotchkiss and Pough (1946). The numbers of mammals, reptiles and amphibians counted were too low to show significant trends. No distressed or dead individuals were observed.

Among the groups of vertebrate animals, fish alone were definitely affected by the insecticides. Eight hours after spraying with Methoxychlor, green sunfish in a small rock-bound pool in Area I showed evidence of distress by swimming at the top and working the edges of the pool. Twenty-four hours later all sunfish observed were dead and a number had been washed out of the pool. Five days after the spraying no evidence of either dead or live sunfish was found. The black bullhead showed greater resistance to the Methoxychlor. Catfish in distress were not noted until more than 24 hours after the application of this spray. However, 3 dead fish were found the next day and 8 on the fifth day. Some catfish may have withstood the effects of the poison and continued to live in Area I, although no live fish were caught when the pool was seined on the fifth day. Green sunfish in the area sprayed with Chlordane were apparantly not affected adversely by the poison. No fish were seen in the small seep holes in the ravine bottom until the sixth day when about 10 small sunfish were counted. There is the possibility that these fish came up from Lake Carl Blackwell following a fairly heavy rain on the night of August 11. Unfortunately, no suitable fish habitats were present in the areas sprayed with DDT and Chlorinated Camphene. The effects of DDT upon fish life have been reported by several investigators, particularly Surber (1946).

Apparently all crayfish were killed by the Methoxychlor, DDT and Chlordane. At least no live crayfish could be found by the fifth day after

TABLE I

Animal Populations on Areas Sprayed for Horsefly Control

AREA I

Methoxychlor — 2 lbs. per acre, August 11

Species	Dates of Counts Aug. 10	Aug. 11	Aug. 12	Aug. 13	Aug. 16
Bobwhite	4	4	0	2	0
Great Horned Owl	1	0	1	0	0
Red-bellied Woodpecker	1	0	0	1	0
Yellow-billed Cuckoo	1	2	3	2	1
Crow	3	0	3	3	0
Plumbeous Chickadee	8	7	4	7	6
Tufted Titmouse	2	2	2	2	0
Cardinal	2	3	4	2	2
Field Sparrow	4	3	3	4	3
Blue Grosbeak	1	0	0	1	0
Eastern Kingbird	0	0	1	1	1
Eastern Phoebe	0	0	2	0	1
Texas Wren	0	0	1	1	0
Arkansas Kingbird	0	0	1	1	0
Totals	27	21	25	27	14
Fox Squirrel	0	2	0	0	1
Leopard Frog	0	1	1	0	0
Cricket Frog	0	2	0	3	4
Common Box Turtle	1	0	0	1	1
Green Sunfish	0	6+[1]	40+[2]	50+[2]	0
Black Bullhead	0	0	1[1]	3[2]	8[2]
Crayfish	4	6+[1]	10+[2]	25+[2]	25+[2]

AREA II

DDT — 2 lbs. per acre, August 11

Species	Dates of Counts Aug. 10	Aug. 12	Aug. 13	Aug. 16
Bobwhite	0	0	0	2
Hairy Woodpecker	1	0	0	1
Blue-gray Gnatcatcher	1	0	1	0
Plumbeous Chickadee	5	8	6	5
Cardinal	2	3	2	4
Field Sparrow	4	9	8	6
Mourning Dove	0	1	1	0
Crow	0	1	3	0
Tufted Titmouse	2	2	2	1
Yellow-billed Cuckoo	0	2	1	2
Downy Woodpecker	0	1	1	0
Eastern Kingbird	0	1	0	0
Blue Grosbeak	0	1	0	0
Indigo Bunting	0	3	3	3
Totals	15	32	28	24
Common Box Turtle	0	0	0	1
Fish	0	0	0	0
Crayfish	0	25+[2]	25[2]	20+[2]

[1]Showing distress

[2]Dead

TABLE I (Cont'd.)

AREA III

CHLORINATED CAMPHENE — 2 LBS. PER ACRE, AUGUST 11

SPECIES	DATES OF COUNTS AUG. 10	AUG. 12	AUG. 13	AUG. 16
Crow	17	15	10	10
Plumbeous Chickadee	4	5	4	7
Tufted Titmouse	2	2	2	0
Cardinal	2	2	2	1
Dickcissel	2	1	0	0
Field Sparrow	8	10	7	12
Blue Grosbeak	1	4	4	2
Yellow-billed Cuckoo	0	2	1	1
Orchard Oriole	0	2	0	0
Downy Woodpecker	0	1	1	0
Eastern Kingbird	0	0	0	1
TOTALS	36	44	31	34
Common Box Turtle	0	1	0	1
Fish	0	0	0	0
Crayfish	0	0	0	0

AREA IV

CHLORDANE — 2 LBS. PER ACRE, AUGUST 11

SPECIES	DATES OF COUNTS AUG. 10	AUG. 12	AUG. 13	AUG. 16
Mourning Dove	3	1	2	2
Hairy Woodpecker	1	0	1	0
Yellow-billed Cuckoo	2	1	2	1
Crested Flycatcher	1	0	1	0
Brown Thrasher	1	0	0	0
Plumbeous Chickadee	8	6	6	6
Tufted Titmouse	2	2	2	2
Cardinal	4	2	4	2
Field Sparrow	10	10	10	12
Great Horned Owl	0	1	0	0
Blue Grosbeak	0	0	1	1
TOTALS	32	23	29	26
Green Sunfish	0	0	0	10+
Crayfish	4	10+[a]	6[b]	10+[a]

[a]Showing distress

[b]Dead

spraying. Since Area III did not reveal any suitable crayfish habitat, no check could be made on the effects of Chlorinated Camphene on this species.

RECOMMENDATIONS. The data suggest that the spraying of upland areas at the rates used in these experiments does not have an adverse effect upon terrestrial vertebrates. Fish and aquatic invertebrates such as crayfish present an entirely different problem. The limited volume of water in Area I may have led to a toxic concentration of Methoxychlor that would not occur where trees bordering large bodies of water were subjected to the same concentration of this insecticide. Until experimental work demonstrates that such concentrations do not have an adverse effect upon fish life in important fishing lakes and streams, extreme caution is recommended in the use of these insecticides.

CONCLUSIONS

Although the data were too limited to form the basis for definite conclusions, a study of the effects of four insecticides used in horsefly control experiments upon aquatic and terrestrial vertebrate animals suggests the following conclusions:

(1) Terrestrial vertebrate animals were not affected adversely.

(2) Green sunfish and black bullheads in a small intermittent stream were killed by Methoxychlor spray applied at the rate of 2 pounds per acre; Chlordane applied at the same rate did not have any visible effect upon green sunfish.

(3) Crayfish were killed by Methoxychlor, DDT and Chlordane applied at the rate of 2 pounds per acre.

(4) Spraying areas over water should be avoided until the effects of these insecticides upon fish and other aquatic life have been determined. Fish populations in lakes and streams important for fishing might be destroyed completely by large scale application of these insecticides.

LITERATURE CITED

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