FIELD STUDIES INVOLVING SOME OF THE EFFECTS OF PARATHION ON THE AGRICULTURAL AVIFAUNA IN LOVELOCK, NEVADA

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Comparatively few field studies involving the effects of parathion utilization on wildlife have been made to date and, to the knowledge of the author, no such investigation has ever been made in the state of Nevada. Recently, parathion has been one of the leading pesticides used in many of the agricultural areas in this state. Because of its widespread use and high toxicity, the impact this toxicant has on our wildlife should be better understood.

The Lovelock valley is located about 90 miles east of Reno on Highway 40. It is a fairly old agricultural community and at the present time consists of approximately 70 square miles of cultivated land. During the months of May and June of 1965, 7,295 pounds of pesticides were applied to 20.6 square miles of land in the Lovelock valley. Eighty-four per cent of all the land treated was treated with parathion (4,435 pounds on 17.4 square miles). Other pesticides used were sevin, malathion, diazinon, dylox and systox. Alfalfa is the principal crop in the Lovelock valley and parathion was used extensively to combat such pests as the alfalfa weevil and aphid. The standard dosage rate was eight ounces of parathion per acre of land. Aerial application was the standard treatment method.

Fifty-four species of birds were identified in the Lovelock valley during the summer of 1965. Generally, the summer avifauna in the Lovelock valley was abundant and diverse, composed of year long residents, summer residents, summer visitants, and transient visitants. The best bird habitat was found in the older portion of the valley located in upper (north) valley.

CENSUS TRANSECTS

Two driving transects were established in the Lovelock valley for the purpose of measuring population fluctuations before, during, and after the major portion of pesticide application in late May and early June.

The driving transect was favored over the walking transect method because the former was found to be more accurate and could cover greater distances in a shorter period of time. Running a control census simultaneously with the actual census was impossible in this situation because of the difficulty in finding an area with similar habitat features and bird populations that was not undergoing pesticide treatment.

Censusing was generally done by only one investigator employing a portable tape recorder to record birds sighted and identified while driving. Data from the tape recorder were transcribed onto form data sheets at the completion of each census run. Weather conditions, temperature, time of day, and the date were recorded on the data sheets at the commencement of each run.

Short Transect

The short transect was six miles long and was located in the upper valley. This census transect was designed to census all species of birds. The transect was divided into three segments or legs of equal length (two miles each), and a special habitat area was selected on each leg for the purpose of allowing a more detailed search of rather limited areas. Five minutes were allowed for censusing each of the three special habitat areas on the transect. These special habitat areas were censused by foot or by close observation with binoculars from the vehicle. Species and number of birds sighted in these special habitat areas were incorporated into the overall transect figures.

The censusing area along this six mile transect was restricted to the width spanning ten yards lateral of the fence lines on both sides of the road. All telephone wires and poles, bushes, fence wires and posts within this width were included in the censusing area. Heavy foliage of cottonwood trees was disregarded because of the difficulty of sighting birds under such conditions. Birds sighted flying directly over the census area, regardless of height, were counted and identified. If under unfavorable conditions birds could not be identified with certainty, they were counted and categorized as unidentified species.

The vehicle used in the shorter transect was held to a speed between ten and fifteen miles per hour. Consistency of speed was checked by recording time intervals between the start and finish of each leg. When other field work did not interfere with the censusing, the transect was run twice a day - once in the morning and once in the afternoon. The short transect was made on six separate days before spraying, eight days during spraying, and six separate days after the majority of spraying had been completed (20 days total).

Long Transect

The longer transect was 11.5 miles long, covering five miles of upper valley and 6.5 miles of lower valley. This transect differed from the short transect in that only seven species of birds were censused. The birds being censused represented a variety of feeding habits. There were two mainly insectivorous birds (Loggerhead Shrike and Sparrow Hawk); one entirely insectivorous bird (Western Kingbird); two omnivorous birds (Black-billed Magpie and Raven); and two ground feeders (Ring-necked Pheasant and California Quail). With only seven birds being considered, there were no census boundaries imposed upon the longer transect. All birds that could be accurately identified from the road were counted, regardless of distance.

The long transect was divided into six segments - four comparatively short legs in upper valley and two long legs in lower valley. There were no special habitat areas established on the long transect. Vehicle speed was slightly increased on the long transect because birds were generally more scarce and only seven species were being censused. The vehicle was held to a speed of about twenty miles per hour.

Time usually did not allow running the long transect more than once a day during the censusing period. It was generally run in late morning or early afternoon. It was run on three separate days before spraying, four days during spraying, and five days after the major portion of spraying had been completed (17 separate days total).

RESULTS

The results of both the short and long transect can be seen in Table 1 and Table 2, respectively. Although about thirty species were sighted at some time during the censusing of the short transect, many were transient visitants and were seen for only brief periods during the censusing. Others were not seen in sufficient abundance to warrant tabulation. Thus, only thirteen species are represented in Table 1. Only the data from the morning censuses were used in tabulating the results for the short transect because of the better consistency of weather conditions and number of runs during each of the three periods. Table 2 summarizes the results of the long transect that was designed to census only seven select species of birds. All censuses during each period were averaged together in Table 2.

The most significant depression in population during the censusing occurred among the western kingbirds. Part of this depression could be attributed to the fact that the number of kingbirds seen per any given transect run was directly influenced by weather conditions. Cold temperatures and/or rainy days were found to produce very few kingbirds. The post treatment period had a few rainy days and several cold mornings. Also, there was some evidence that the kingbirds were leaving

the area during July and August, because by the end of August a follow-up census indicated that very few kingbirds were left in the area.

The data in Tables 1 and 2 suggest that there were a few normal breeding season population recruitments during the two month censusing period, especially in the case of the blackbirds (see Table 1). Many species, however, maintained their population levels or demonstrated a slight increase or decrease in number during the censusing. Broods of young pheasants and quail were not observed by the end of the censusing period (July 15th) but were seen in considerable abundance in August.

Table 1. Short transect.

Species:	Average number of birds seen per morning census		
	Pre-treatment May 15-May 27	During Treatment May 28-June 11	Post Treatment June 15-July 15
Total Number	223	223	234
Blackbirds	64	60	81
Cowbird, B-H	5	10	10
Dove, Mourning	3	4	6
Flicker, R-S	3	2	4
Hawk, Sparrow	1	1	3
Kingbird, West.	35	38	29
Magpie, B-B	11	10	9
Meadowlark, W	4	3	3
Pheasant, R-N	2	2	1
Quail, California	6	7	6
Raven	2	1	4
Sparrow, English	33	39	35
Starling	8	9	10

Table 2. Long transect.

Species:	Average number of birds seen per census		
	Pre-treatment May 15-May 27	During Treatment May 28-June 11	Post Treatment June 15-July 15
Total Number	77	72	76
Hawk, Sparrow	4	4	11
Kingbird, West.	42	39	28
Magpie, B-B	10	10	14
Pheasant, R-N	4	3	3
Quail, California	11	8	10
Raven	7	10	8
Shrike L-H	1	1	2

Another purpose of the census transects was to look for bird mortality along the roadsides during and after the spraying period. If significant mortality was occurring as a result of parathion in the environment, it could be expected that some of the dead or dying birds would be spotted along the fence lines, etc. However, no sick birds were observed and very few dead birds were found during the censusing from May 28th through July 15th. Natural mortality could account for the occurrence of only a few dead birds.

PINIONED BIRDS

This phase of the investigation was designed to determine the effects of direct application of parathion spray on birds accidentally caught under spray swaths in the field. Two series of experiments were carried out using birds contained in small 1' x 1½' cages constructed out of one inch mesh chicken wire and strips of pine lumber. The first series employed three species of different sized birds (magpies, blackbirds, and cowbirds). The second series employed only blackbirds as did the control group. The birds were placed in the alfalfa fields in advance of spraying. After being coated, the birds were allowed to remain in the fields for a few hours and were then retrieved and transported back to the University for further observation. The results are summarized in Table 3.

Table 3. Coating results.

Experimental Birds	Ave. Body Wt.	No. sick	Mortality
Control:			
18 Red-winged Blackbirds	60.3	1	1
Series 1:			
18 Red-winged Blackbirds	61.4	0	0
2 Black-billed Magpies	173.8	0	0
2 Brown-headed Cowbirds	36.3	2	1
Series 2:			
20 Red-winged Blackbirds	63.9	0	0

The figures in Table 3 demonstrate the consequences of a single coating of parathion applied at the dosage rate of eight ounces per acre. The larger birds such as the magpies and blackbirds experienced no overt effects from a single coating. However, the small cowbirds appeared to be much more susceptible to a single swath at this dosage rate. The cause of the one death in the control group was unknown.

FIELD CONTAMINATED FEED

Layeration chick feed was exposed to parathion spray under actual field conditions and then given to experimental birds being held in captivity. The feed was contaminated by sprinkling a thin layer in shallow 13" x 18" pans and placing the pans out in the field in advance of spraying. The pans were situated in open areas and were fully exposed. After the feed had been contaminated in the field it was collected and frozen until further use.

Four test groups of five red-winged blackbirds each were held on diets of feed that had been contaminated at various positions in the field. The control group of five birds was given clean feed. The test period was eight days - five days with the birds on contaminated feed, and three days of observation with the birds on clean feed. Grams of feed consumed by each group was measured and recorded each day of the test. Bird weights were also determined at the start of the testing period and again at the end of the five day period on contaminated feed.

Only one bird out of the twenty held on contaminated feed died during the testing period. All remaining birds held on contaminated feed showed a pronounced loss of body weight and a greater than fifty percent decrease in feed consumption. The presence of parathion in the feed had a repelling effect on the birds causing them to resist ingesting lethal quantities.

CONCLUSIONS

The results from the censusing, coating experiment, and contaminated feed experiment suggest that no significant bird mortality resulted from the pesticide utilization program in the Lovelock valley last summer. It cannot be assumed that no mortality resulted from the pesticide program because a more intensified investigation might have revealed a small amount of mortality and replacement. Future plans are to carry the censusing through another spraying season this coming spring.