Insecticide Residues in Starlings in Idaho

by W. W Benson and Joe Gabica

INTRODUCTION

Considerable concern has been voiced relative to the possibility of the chlorinated hydrocarbon insecticides being the cause for decline in avian populations, especially the raptors. Studies are being and have been conducted on various birds and eggs. Speculations have been made that lethal doses of pesticides do occur in various species (3,7) and that perhaps pesticides upset the sex hormones that regulate the mobilization of calcium which causes the birds to lay thin shelled or sterile eggs. (5,6)

The starling (Sturnus vulgaris) is one of the prey victims of the raptors and, because of the countless thousands of starlings available, they can be a large part of their diet. From observation by members of the Idaho Department of Fish & Game, the Bureau of Sports Fisheries & Wildlife, and the operators of the feeding lots involved, it is apparent that there is no significant decrease in the starling population which leads one to ask whether or not the birds are affected by pesticides and/or are they so selective in their feeding that they do not have a high pesticide residue level in their bodies. If they do contain high levels of pesticide residue, then the ingestion of a number of these birds could result in an increase in the level of residue in those birds who prey on them.

"The starling (in a personal conversation with Dr. Joseph J. Hickey, Professor of Wildlife Ecology at the University of Wisconsin) is in the food chain of large birds; a grown eagle may eat four or five of these birds a day."

COLLECTION OF SAMPLES

In the present survey, forty-seven starlings were live trapped in the area of a cattle feed lot. To avoid having the many thousand of birds befoul the cattle feed, the birds were offered food on a nearby forty acre plot. Numerous attempts have been made to discourage the starlings from feed lots by the use of firecrackers, noise makers, and by shooting.

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Bulletin of Environmental Contamination & Toxicology,
Vol. 5, No. 3, 1970, published by Springer-Verlag New York Inc.

TABLE I

Comparison and Frequency of Chlorinated Hydrocarbon Insecticides in 47 Starlings

LIVER						FAT				
Standard Deviation	Range	Number Samples Detected	Median PPM	Mean PPM	PESTICIDE	Mean PPM	Median PPM	Number Samples Detected	Range	Standard Deviation
0.068	.006 -.384	47	0.07	0.086	p,p'DDE	19.234	16.83	47	.286 - 66.970	13.022
0.080	.008 -.225	9	0.02	0.072	p,p'DDT	2.104	0.60	15	.086 - 16.780	4.213
	None Found <1 ppb				Heptachlor Epoxide	0.376	0.10	26	.015 - 1.717	0.624
0.050	.005 -.245	47	0.05	0.062	Dieldrin	1.475	0.90	17	.256 - 2.080	1.510
0.107	.003 -.358	11	0.10	0.144	o,p'DDT	1.099	0.53	15	.324 - 1.921	1.827
	None Found <1 ppb				α BHC	0.165	0.11	19	.027 - .591	0.151
0.059	.006 -.384	11	0.01	0.051	p,p'TDE	1.115	0.32	19	.073 - 4.030	1.592
	None Found <1 ppb				Heptachlor	0.074	0.06	4	.018 - .179	0.056

Thallium had been introduced on the feed in the baiting area and this would kill the birds, but the practice was stopped as numerous waterfowl were being poisoned after feeding on the same material. The noise making was determined to be a waste of time. Wastage from a potato processing plant was spread over the area daily which attracted the starlings away from the feed lot.

The collected birds were taken to the Laboratory where they were sacrificed. Livers were taken as well as subcutaneous fat samples from the abdominal areas.

ANALYTICAL METHODS

The method of extraction of the tissue and fat were essentially that of deFaubert, et al. (1)

Quantitative determinations of the residues were on a two-column system, Column 1 being the SE-30 4%, QF-1 6%, and Column 2, OV 17 1.5%, QF-1 (1.95%), with the solid support, Chromosorb W 100/120. A tritium parallel plate electron capture detector was used.

Confirmatory procedure was thin-layer chromatography by Kovac. (4) Confirmation was performed on four samples.

Standard mixtures containing the pesticides were run before and after each injection of a sample.

RESULTS AND DISCUSSION

Table I summarizes the results of the analyses. The table is designed so that the mean concentration of liver and fat can be read on each side of the pesticide in question. The pesticide Heptachlor Epoxide was found and confirmed in the fat. The liver concentration could not be confirmed at less than 1 ppb; so, it was considered as not found.

Heptachlor and Aldrin are converted to Heptachlor Epoxide and Dieldrin in animal tissue. They are, therefore, seldom found. Heptachlor was confirmed in four different fat samples by thin-layer chromatography; however, they are low.

The starling fat samples were very high in DDT, DDD, and DDE groups compared to other wildlife used as food by birds of prey, such as pheasants and grouse (Greichus, Greichus, and Reider). (2) Their averages were for pheasants, 0.37 and grouse, 0.28 ppm in fat. Compared to our combined average of 5 ppm in fat, their highest value was 4.22; ours was 66.0 ppm. Their Dieldrin levels for pheasant and grouse were 0.08 and 0.17 respectively; ours was 1.47 ppm in fat of starlings.

Eight pesticides were confirmed, as in Greichus' and Reider's work. This indicates that the starling can be another possible threat as a carrier of potentially dangerous pesticides to our birds of prey.

The present group of starlings appear to carry a significant amount of pesticides which may be endangering birds of prey, if as suggested, the build up of pesticides in birds of prey does cause damage to egg thickness.

Pesticides do not seem to be affecting the prolific efforts of the starling since they are not diminishing in numbers, and they apparently are not selective in their feeding as to pesticides.

The Idaho Community Studies Pesticide Project is supported by Contract No. PH 21-2008 with the Division of Community Studies, Office of Product Safety, Food and Drug Administration, Consumer Protection and Environmental Health Service, Public Health Service, Department of Health, Education and Welfare, Atlanta, Georgia.

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