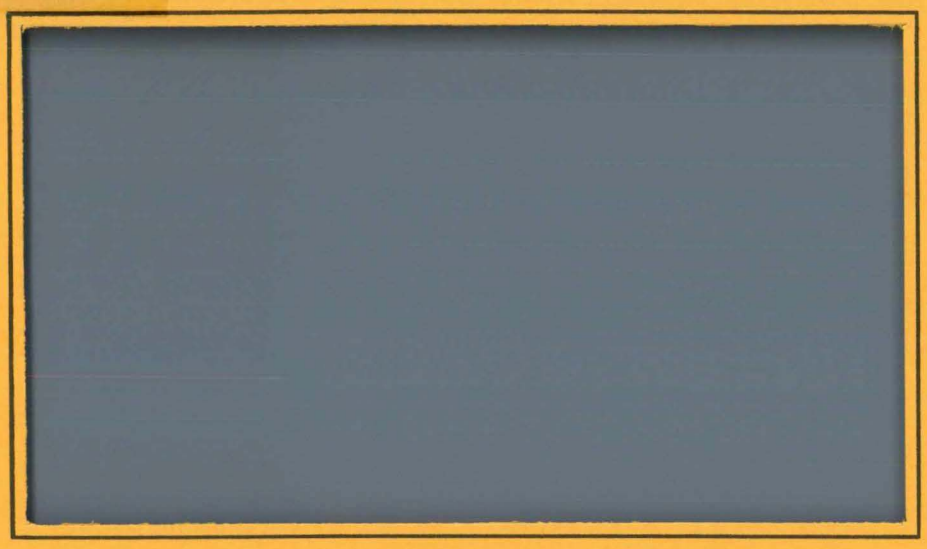

A REPORT FROM

# *The State Hygienic Laboratory*

MEDICAL LABORATORIES BUILDING

THE UNIVERSITY OF IOWA

IOWA CITY, IOWA 52240

# PESTICIDE LEVELS IN FISH FROM IOWA STREAMS

#71-23

9 November 1970

Submitted to the State Conservation Commission November 10, 1970 by the
State Hygienic Laboratory
University of Iowa
Iowa City, Iowa

# PESTICIDE LEVELS IN FISH FROM IOWA STREAMS

The State Hygienic Laboratory in conjunction with the State Conservation Commission undertook a study of the concentrations of pesticides in the edible portions of fish in Iowa streams.

Several varieties of fish have been assayed to determine the levels of dieldrin and other pesticides in the edible portion of their flesh. It is felt that the pesticides used for row crop treatment in Iowa have washed off the soil as erosion silt and settled to the bottom in streams across the state.

The Food and Drug Administration (FDA) action guideline for the maximum permissible concentration of dieldrin in the edible portion of fish is 300 parts per billion (ppb). The Food and Drug Administration has recommended that fish containing dieldrin above this level not be eaten.

Species of fish feeding on the bottom area appear to have aggregated larger amounts of dieldrin, a degradation product of aldrin used for corn rootworm treatment, than have species whose feeding habits are less directly related to the bottom silts.

Catfish have evidenced the highest dieldrin levels (up to 1600 ppb) as shown in Table I and other rough fish such as buffalo, carp and carp suckers have been somewhat lower (see Table 2).

There is a definite relationship between the dieldrin content of catfish and their age or size, with catfish under 15 inches in length being generally below maximum acceptable dieldrin concentrations essentially everywhere. This is probably due to increased oil content in older, larger catfish and of course longer exposure to their contaminated environment.

A distinct relationship between latitude and dieldrin content in catfish exists probably due to accumulated siltation as row crop draining streams proceed southward. Impounding of a given stream tends to produce conditions conducive to dieldrin buildup

TABLE I

CATFISH COMPOSITES
Parts per Billion Dieldrin in Edible Portion

| RIVER | LOCATION | DATE SAMPLE COLLECTED | AVE LENGTH INCHES | PPb DIELDRIN |
|---|---|---|---|---|
| East Nishnabotna | Shenandoah | July 6, 1970 | 15.7 | 940 |
| | Shenandoah | July 6, 1970 | 11.5 | 400 |
| Nishnabotna | Hamburg | July 6, 1970 | 16.5 | 1600 |
| | Hamburg | July 6, 1970 | 11.7 | 820 |
| Iowa | LeGrande | Aug. 20, 1970 | 17.5 | 360 |
| | Marengo | Aug. 17, 1970 | 17.0 | 680 |
| | Marengo | Aug. 17, 1970 | 9.5 | 195 |
| | Coralville Reservoir | Aug. 10, 1970 | 24.0 | 1440 |
| | " | July 17, 1970 | 23.0 | 820 |
| | " | Oct. 14, 1970 | 21.5 | 920 |
| | " | July 13, 1970 | 16.1 | 720 |
| | " | July 8, 1970 | 15.5 | 480 |
| | " | July 8, 1970 | 10.0 | 370 |
| | (3/4 miles below Coralville Dam) | Aug. 17, 1970 | 20.0 | 1250 |
| | " | Aug. 21, 1970 | 20.2 | 885 |
| | " | Aug. 17, 1970 | 10.0 | 210 |
| | Fredonia | Aug. 17, 1970 | 18 | 730 |
| Nodaway | Clarinda | Aug. 20, 1970 | 16.7 | 1100 |
| Cedar | Mt. Vernon | Aug. 31, 1970 | 18.0 | 580 |
| | Rochester | Aug. 20, 1970 | 19.4 | 530 |
| Des Moines | Red Rock Reservoir | Aug. 24, 1970 | 16.6 | 570 |
| | Keosauqua | Aug. 27, 1970 | 16.6 | 270 |
| Mississippi | Dubuque, Pool 12 | Aug. 22, 1970 | 20 | 73 |
| | Sabula Pool 13 | June 15, 1970 | 18 | 52* |
| | Clinton, Pool 14 | June 15, 1970 | 14 | 79* |
| | Commanche, Pool 14 | June 15, 1970 | 14 | 360* |
| | Commanche, Pool 14 | June 15, 1970 | 14 | 110* |
| | Muscatine, Pool 17 | Aug. 22, 1970 | 12 | 230 |
| | Burlington, Pool 19 | Aug. 22, 1970 | 23 | 435 |
| | Pool 20, Below Keokuk | Oct. 19, 1970 | 14.6 | 380 |
| | Pool 20, Below Keokuk | Oct. 19, 1970 | 12.3 | 260 |
| Little Sioux | Correctionville | Aug. 22, 1970 | 16.9 | 340 |

*Single fish

TABLE I -- Page 2

| RIVER | LOCATION | DATE SAMPLE COLLECTED | AVE LENGTH INCHES | PPb DIELDRIN |
|---|---|---|---|---|
| Skunk | Oakland Mills | Sept. 9, 1970 | 10.8 | 325 |
| Wapsipinicon | Independence | Sept. 16, 1970 | 15.5 | 110 |
| | Wheatland | Aug. 27, 1970 | 15.7 | 325 |
| Lake MacBride | Lake MacBride | Sept. 18, 1970 | 17.6 | 240 |
| | Lake MacBride | Sept. 18, 1970 | 15.7 | 230 |
| Big Sioux | Sioux City (10 miles above) | Aug. 22, 1970 | 17.5 | 230 |
| Maquoketa | Maquoketa | Sept. 14, 1970 | 19.1 | 220 |
| East Grande | Davis | Aug. 20, 1970 | 16.3 | 200 |
| Boyer | West Leveland | Aug. 22, 1970 | 10.2 | 170 |
| Chariton | Rathbun Reservoir | Sept. 1, 1970 | 13.0 | 140 |
| Turkey | Elkader | Sept. 3, 1970 | 16.2 | 60 |
| | Millville | Aug. 27, 1970 | 16.5 | 78 |
| Lake Allerton | Lake Allerton | Aug. 19, 1970 | 15.8 | 39 |
| Missouri | Sioux City | Aug. 22, 1970 | 15.0 | 34 |

TABLE II

ROUGH FISH COMPOSITES
PARTS PER BILLION DIELDRIN IN EDIBLE PORTION

| RIVER | LOCATION | SPECIES | DATE SAMPLE COLLECTED | AVE LENGTH INCHES | DIELDRIN (ppb) |
|---|---|---|---|---|---|
| Iowa | Coralville Reservoir | Big Mouth Buffalo | 11/7/69 | 18.0 | 840 |
| | | Carp | 11/7/69 | 20.4 | 214 |
| | | Carp Sucker | 11/7/69 | 14.4 | 313 |
| | | Big Mouth Buffalo | 6/24/70 | 17.5 | 782* |
| Lake MacBride | Lake MacBride | Big Mouth Buffalo | 11/7/69 | 22.2 | 720 |
| | | Carp | 11/7/69 | 22.0 | 135 |
| Des Moines | Red Rock Reservoir | Big Mouth Buffalo | 6/10/70 | 17 | 520 |
| | | Carp | 6/10/70 | 18 | 560 |
| Mississippi | Guttenberg, Pool II | Big Mouth Buffalo | 11/3/69 | 18.5 | 28 |
| | Guttenberg, Pool II | Carp | 11/3/69 | 17.5 | 15 |

*Composite of 333 fish

in bottom feeders as silt settles out over broader areas of feeding habitat.

Steams in northeast Iowa draining non-row crop areas and which carry far less silt load apparently are not producing elevated pesticide levels in catfish or other species.

The Mississippi, which receives drainage from the interior streams such as the Iowa-Cedar, Skunk and Des Moines rivers, indicate levels slightly above acceptability in its lower Iowa reaches, but catfish caught above the Muscatine-Davenport area are well below the level of significance.

Predator game fish with their different feeding habits have been uniformly well below the dieldrin limits even in areas where catfish dieldrin levels have been high (see Table 3). The dieldrin levels demonstrated in river waters correlate well with the areas where catfish levels have been the highest.

Therefore, it seems fair to say that larger catfish over the entire state have accumulated abnormally high dieldrin levels in the edible portion with the exceptions of the upper Mississippi, the northeast Iowa streams and the northern reaches of the interior streams. Predator game fish show no evidence of pesticide concentrations approaching significance to date. The Missouri River also does not appear to have this problem in catfish.

Since turbidity correlates with pesticide levels in streams, it is felt that better soil conservation practice , holding the agricultural chemicals on the fields where they belong, is the most logical method of improving the problem. Reduction of pesticide use to a minimum level consistent with farm product economics should also be immediately instigated.

R L Morris PhD
Associate Director

Lauren Johnson
Senior Chemist

mrw

TABLE III

PAN AND PREDATOR GAME FISH
PARTS PER BILLION DIELDRIN IN EDIBLE PORTION

| RIVER | LOCATION | SPECIES | DATE SAMPLE COLLECTED | AVE LENGTH INCHES | DIELDRIN (ppb) |
|---|---|---|---|---|---|
| Iowa | Coralville Res. | Large mouth bass | 11/7/69 | 14.6 | 35 |
| | | Black Crappie | 11/7/69 | 9.2 | 12 |
| | | Large mouth bass | 9/28/70 | 15.6 | 80 |
| | | White crappie | 9/29/70 | 11.8 | 59 |
| | | Black Bullhead | 9/29/70 | 12.3 | 98 |
| | | Bluegill | 9/28/70 | 6.1 | 34 |
| | | Walleye | 9/29/70 | 13.3 | 24 |
| | | Northern Pike | 9/29/70 | 22.0 | 54 |
| Lake MacBride | Lake MacBride | Large mouth bass | 11/7/69 | 10.6 | 18 |
| | | Bluegill | 11/7/69 | 9.6 | 14 |
| Mississippi | Guttenberg Pool II | Walleye | 11/3/69 | 25 | 41 |
| | Guttenberg Pool II | Walleye | 11/3/69 | 25.2 | 20 |
| | Guttenberg Pool II | Walleye | 11/3/69 | 27 | 33 |
| | Sabula, Pool 13 | Large mouth bass | 10/12/70 | 15.0 | 11 |
| | Montpelier, Pool 16 | Large mouth bass | 10/13/70 | 13.4 | 39 |
| | Burlington, Pool 19 | Large mouth bass | 10/15/70 | 15.3 | 41 |
| | Sabula, Pool 13 | White bass | 10/15/70 | 13.6 | 91 |
| | Montpelier, Pool 16 | White Bass | 10/13/70 | 13.7 | 175 |
| | Burlington, Pool 19 | White Bass | 10/15/70 | 9.8 | 110 |
| | Burlington, Pool 19 | Walleye | 10/15/70 | 16.5 | 60 |