

# **Preliminary Report on a Pesticide Monitoring Study in Louisiana**

by E. A. EPPS,<sup>1</sup> FRANCES L. BONNER,<sup>1</sup> L. D. NEWSOM,<sup>2</sup>  
RICHARD CARLTON,<sup>3</sup> and R. O. SMITHERMAN<sup>4</sup>

The controversy over use of pesticides is well known. Predictions of dire consequences from the use of chemicals have been common. Most of the criticism had been leveled at the chlorinated hydrocarbons because these are stored in the fat and are but slowly decomposed and excreted. The "persistent" nature of chlorinated hydrocarbons had led to claims that the environment is becoming contaminated to the extent that animal life may no longer be possible. Allegations that residues in runoff from

---

<sup>1</sup>Feed and Fertilizer Laboratory, Louisiana State University, Baton Rouge, Louisiana

<sup>2</sup>Entomology Department, Louisiana State University, Baton Rouge, Louisiana

<sup>3</sup>Division of Entomology, Louisiana Department of Agriculture, Baton Rouge, Louisiana

<sup>4</sup>Louisiana Cooperative Fishery Unit, School of Forestry and Wildlife Management, L.S.U., Baton Rouge, Louisiana

agricultural land is responsible for fish kills and contamination of public water supplies have become increasingly common.

Gross indicators such as vital statistics from the State Board of Health and fishing and hunting success had not indicated any detrimental contamination of the environment in Louisiana, but continued claims of ill effects from use of pesticides made it desirable to evaluate the extent of presence and/or buildup of pesticide residues in Louisiana. This decision was supported by a Legislative Resolution, and in the fall of 1964 a pesticide residue monitoring program was begun. A number of state agencies participated in the planning but most of the work has been done by personnel of the State Department of Agriculture, the Louisiana Agricultural Experiment Station, and the Louisiana Cooperative Fishery Unit.

The work plan called for extensive sampling in five areas each being the drainage basin of a particular stream and each distinguished by type of farming. The areas are: (1) Six Mile Creek Basin, a forested area that has never been cultivated, and which served as the control; (2) Tensas River Basin, a large cotton and soybean producing area of the Mississippi Delta; (3) Mermentau River Basin, a rice growing area in Southwest Louisiana; (4) Bayou Chevreuil Basin, an area where sugarcane is the only crop; (5) Bayou Courtableau Basin, an intensely farmed area in the south central part of the state where cotton,

sugarcane, and rice are grown. Although not regular sampling stations, series of samples were obtained from Lake Killarney and surrounding areas on the state prison farm at Angola, and from the Pass-a-Loutre area.

A wide variety of materials was sampled. Included were water from the principal stream, bottom sediments, soil, milk, fish, rabbit, raccoon, quail, aquatic insects and others as the occasion permitted.

A series of samples was taken three times a year: in the spring before planting, during the summer, and in the fall after harvest. Summer and fall are characterized by low stream flows.

Analyses were made by conventional methods using electron capture gas chromatography for quantitation. Confirmation was usually made by thin layer chromatography but sometimes it was possible to use chemical or infrared methods. Problems of cleanup and confirmation in relation to number of samples necessitated that detection levels be established. No attempt was made to realize the ultimate sensitivity of the analytical techniques. For water, the minimum detection objective was set at 0.001 ppm. For most other samples the target level was 0.01 ppm. In some cases interferences were so great that amounts less than 0.1 ppm could not be reported with confidence. As more experience was gained such occasions became infrequent.

In this survey only chlorinated hydrocarbon pesticides were considered. Although a number of compounds fall into this classification, only DDT, benzene hexachloride, aldrin, dieldrin, toxaphene, endrin and heptachlor have been used on a large scale in Louisiana. Other compounds of this group would be detected by the analytical procedures used.

#### Discussion and Summary

A comprehensive list of materials to be sampled was set up but it was not possible to obtain all samples in all areas during each sample period. In the course of work additional samples in other areas were taken. Table 1 shows ranges of pesticide residues found in selected materials. DDT and its metabolites, DDD and DDE, were the compounds most commonly found and were usually present in greatest amounts. Not all materials examined are included and the sampling program is continuing. No effort is made at this time to give a breakdown according to area. The results agree reasonably well with findings expected on the basis of the amount of insecticide used in a given area. Residues were quite low in the control area (Six Mile Creek) and higher in areas of heavy pesticide usage.

Use of ranges greatly simplifies presentation of data but it should be kept in mind that the highest value often represents a single sample with other samples being much lower. For example, of the 23 milk samples, 12 were within present FDA tolerances.

The highest amount of total residues of chlorinated hydrocarbon insecticides found in milk was 3.37 ppm while the next highest amount was but 0.57 ppm.

TABLE 1

Residues of Chlorinated Hydrocarbon Pesticides in Various Materials and Organisms from Selected Environments in Louisiana

Material Sampled	Number of Samples	Areas Sampled	Range of ppb of Chlorinated Hydrocarbon Pesticides	
			DDT & Metabolites	Others
Stream Water	34	6	0	0
Bottom Mud	25	5	0-320	0
Soil	39	6	0-3,800	0-35
Milk	23	5	0-3,370	0-100
Honey	10	4	0	0
Sweet Potato	15	5	0-300	0-70
Rabbit	33	7	0-220	0-30
Raccoon	5	4	0-210	0
Quail	7	4	0-1,090	0-30
Honey Bees	7	4	0-1,900	0-100
Aquatic Insects	33	5	0-31,000	0-1,990

The data summarized in Table 1 do not indicate extensive buildup of pesticide residues in the Louisiana environment. The only animals sampled that showed consistently high residues were fish. For this reason, fish were not included in Table 1 but are given more detailed treatment in Table 2. Twenty-two samples of bluegill, seventeen samples of shad and 27 samples of catfish were analyzed. Simple average residue levels are reported. In

a given stream the variation of residue levels in fish was not wide. Residue levels were found to be related to pesticide usage.

TABLE 2  
Pesticide Residues in Fresh Water Fish From Louisiana

Angola Chevreuil Courtableau Mermentau Six Tensas							Av.
Mile							
Residue in parts per million							
<u>DDT &amp; Metabolites</u>							
BG	0.75	0.96	5.88	0.35	0.03	2.68	1.77
Shad	0.41	0.05	9.47	0.48	0.13	4.14	2.44
Cat	1.26	0.14	10.06	0.48	0.24	6.28	3.08
<u>Toxaphene</u>							
BG	0.50	N	P	0.35	N	2.06	0.48
Shad	N	N	4.75	1.00	N	3.17	1.49
Cat	1.33	N	6.60	0.40	N	5.05	2.23
<u>Dieldrin</u>							
BG	P	N	0.33	0.05	N	0.03	0.07
Shad	P	P	0.50	0.08	0.01	0.02	0.10
Cat	0.01	N	0.14	0.04	N	0.08	0.05
<u>Endrin</u>							
BG	P	P	0.03	N	N	P	P
Shad	N	0.87	0.04	N	N	P	0.15
Cat	0.05	0.31	0.06	N	N	0.01	0.07
BG	Bluegill, <u>Lepomis macrochirus</u>						
Shad	Gizzard Shad, <u>Dorsoma cepedianum</u>						
Cat	Channel Catfish, <u>Ictalurus punctatus</u>						
P	Present at minimum level of detection						
N	Not detected						

No pesticides are used in the Six Mile area. Usage is heavy in the Tensas and Courtableau areas. Endrin is used more extensively in the Chevreuil area and consequently levels in fish are relatively higher. DDT and toxaphene have been used in larger amounts and over a longer period of time than other chlorinated hydrocarbon pesticides. For example, about thirty times more toxaphene is used than endrin. Data from Courtableau and Tensas in this study reflect the greater usage of toxaphene. Other species of fish have been sampled and provision has been made to obtain data according to species, season, age and edible tissue vs. whole fish. So far, data do not support any conclusions as to the effect of these variables.

Work on the project is continuing and will be published in detail. This preliminary account of the work in Louisiana is being published with the hope that it will be of value to others engaged in similar work.