EXECUTIVE SUMMARY

"Temporal Distribution of Insecticide Residues in Four California Rivers"

Environmental Monitoring and Pest Management Branch
Department of Pesticide Regulation

PURPOSE

Since 1988, scientists from the Central Valley Regional Water Quality Control Board (CVRWQCB) have tested water quality in the San Joaquin River watershed using toxicity tests. They found that water samples from certain areas of the watershed caused mortality in a species of water flea *(Ceriodaphnia dubia). Ceriodaphnia dubia* represents aquatic arthropods (one of the components of the U.S. Environmental Protection Agency's three-species toxicity tests). Based on these results, CVRWQCB suggested the insecticides chlorpyrifos and diazinon as a possible cause of the toxicity identified in the water samples.

The Department of Pesticide Regulation (DPR), which is responsible for preventing pesticide contamination of surface water and ground water, conducted this study on the Sacramento, Merced, Salinas, and Russian Rivers to characterize the incidence of pesticide residues in each of the rivers. This report summarizes data collected from each of these four rivers for a one-year period.

STUDY METHOD

This study was a cooperative effort between DPR and the California Department of Fish and Game (CDFG). Monitoring began on the Sacramento River in November 1993, followed by the Merced River in June 1994, and by the Salinas and the Russian Rivers in August 1994. Water was collected weekly from one sampling site along each of the four rivers for a one-year period. DPR collected water samples and analyzed them for pesticide residues. CDFG tested split samples for acute toxicity to fathead minnows, *Pimephales promelas,* and the cladoceran, *Ceriodaphnia dubia, every two* weeks.

RESULTS

Rainfall amounts during the winters included in the study were atypical. The winter of 1993-94 was fairly dry resulting in below normal discharge in the Sacramento River. In the winter of 1994-95, we experienced a tremendous amount of rainfall that produced flooding on the Merced, Russian, and Salinas Rivers.

Pesticides were detected two or more times on each river. Diazinon was detected twice on the Sacramento River during periods of increased river flows. Dimethoate was detected twice; methidathion and diazinon were detected three times; and 3-hydroxy carbofuran was detected in samples collected from the Merced River. Each detection came during increased flows and, with the exception of the dimethoate detections, the detections occurred during the rainy season. Chlorpyrifos was detected during the first major runoff event of the rainy season along the Salinas River. Samples were also collected monthly at the Salinas River Lagoon. Diazinon and dimethoate were detected in one sample collected in early summer. Samples collected from the Russian River yielded two detections: diazinon during the first runoff event in the fall and dimethoate during a winter rain event.

Thirteen of 224 samples (5.8 percent) taken from the four rivers were found positive for pesticides. Five pesticides were detected: diazinon was detected in seven samples; dimethoate was detected in four samples; methidathion was detected four times; and chlorpyrifos and 3-hydroxy carbofuran were each detected once.

Two of the 52 samples (3.8 percent) collected from the Sacramento River had a pesticide detection. Seven of the 57 samples (12.3 percent) collected from the Merced River had pesticide detections. Of 64 samples collected from the Salinas River and Salinas River Lagoon, two (3.1 percent) had a pesticide detection. There were two pesticide detections in the 5 1 samples (3.9 percent) taken from the Russian River.

CDFG Aquatic Toxicology Laboratory tested 107 of the 2 12 samples collected from the four rivers for toxicity. Three samples caused significant mortality to either fathead minnows or cladocerans. No pesticides were detected in these samples.

CONCLUSIONS

There was not a simultaneous occurrence of pesticide residues and toxicity during the period of this study. Those samples exhibiting toxicity did not contain pesticides and, conversely, those samples that contained residues did not produce toxicity on the tested species. Since the rainfalls for both winters included in the study period were atypical, the fairly low number of pesticide detections from samples from the Sacramento and Russian Rivers and the middle reach of the Salinas River should not preclude further sampling of these rivers. Monitoring during storms when the discharge is increasing, especially in periods after increased applications of pesticides, may lead to an increase in detections. The sampling procedure was developed to survey each of the rivers for a whole year. Sampling dates were predetermined and, therefore, may not have coincided with peak residue levels in the rivers.

The Merced River had the highest percent of samples with pesticide detections (12.3 percent). The highest number of specific pesticides was also found in samples from this river, dimethoate, methidathion, diazinon, and 3-hydroxy carbofuran. Further monitoring of the Merced River is recommended based on these sample results.

Since the Salinas River Lagoon is a recognized wildlife habitat area, more monitoring for pesticide residues there would be beneficial. Sampling for the most frequently used pesticides (herbicides and fungicides rather than insecticides) in the Russian River and chlorthal-dimethyl in the Salinas River may be considered in future studies.

CDFG found no apparent relationship between the presence of pesticide residues and mortality observed in the samples tested for toxicity.

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