

Abstract

Residues of some organochlorine insecticides used for crop protection in the Rio Cobre Basin, Jamaica, were detected in water, sediments and shrimp fauna of the adjacent Rio Cobre. Residues recovered most frequently were DDE, ranging from 0.01 to 0.2 ppb; 2.0 to 18.10 ppb and 1.15 to 14.7 ppb, and dieldrin ranging from 0.002 to 0.08 ppb; 0.12 to 1.96 ppb and 1.0 to 2.9 ppb in water, shrimp and sediment samples respectively. Lindane and endosulfan residues were recovered only from sediment and shrimp samples and ranged from traces to 6.0 ppb and 3.6 ppb respectively in the basin.

There was no relationship between physical characteristics of the waterway (temperature, pH, flow rate and turbidity) and the residue distribution. The pattern of input reflects contamination via run-off from nearby large estates and not from small farms on hill slopes which largely cause erosion.

In laboratory studies, the shrimp Macrobrachium faustinum De Saussure, showed acute toxicity symptoms of agitation, uncoordinated movement, hyperactivity, leaping - believed to be an expression of avoidance - and eventually death, on exposure to 1, 5 and 10 ppm of dieldrin; chronic symptoms of sluggishness leading to death was observed at 1 ppb. Treated animals were found to form clusters, probably for support, and many of them failed to moult, especially at higher concentrations.

The 96 hr LC50 to dieldrin was 0.148 ± 0.019 ppb. The uptake of residues from water containing dieldrin at 0.001 ppb was relatively faster for the first four days reaching a level of 0.014 ppm and levelling off somewhat for the next three days. The uptake by dead shrimps exposed to 0.1 and 0.01 ppb was dose dependent, and as much as 0.30 ppm and 0.06 ppm were recorded for exposures to the respective concentrations during 24 hr exposure. Uptake from contaminated food was significantly higher than that from contaminated water.

The major site of residue accumulation, after 24 hr exposure to 0.01 ppb, was the hepatopancreas (0.069 to 0.104 ppm) followed by gonads, gills, large claw, exoskeleton and muscle, where collectively, levels ranged from 0.072 to 0.003 ppm. The pattern of residue distribution paralleled fat

content of the tissues.

Shrimps exposed to 0.01 ppb of dieldrin for 24 hr eliminated 50% of the residues within eight days, after a return to uncontaminated water. Elimination occurred in two compartments, a rapid initial phase followed by a slower phase. The consequence of laboratory results to field populations is discussed.