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Pyrethroids in southern California coastal sediments

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ABSTRACT

Several studies have documented the potential impacts of synthetic pyrethroid pesticides in freshwater systems; however, little is known about their fate and effects in estuarine and marine environments. The goal of this study was to assess the extent and magnitude of pyrethroids in coastal embayments of the southern California Bight (SCB), USA. Using a stratified probabilistic design, 155 sediment samples were collected from 4 embayment habitats (estuaries, marinas, open bays, and ports) and analyzed for 8 common-use pyrethroids. Total pyrethroid concentrations ranged from less than 0.5 to 230 $\mu\text{g/kg}$ dry weight (area-weighted mean concentration = $5.1 \pm 3.1 \mu\text{g/kg}$) and were detected in 35% of the total SCB embayment area. Estuaries and marinas had the greatest areal extent of detectable concentrations (up to 65%) and the greatest area-weighted mean concentrations ($22.1 \pm 26.5 \mu\text{g/kg}$). Furthermore, sites with the greatest pyrethroid concentrations were located near sources of runoff from urban watersheds. Bifenthrin and cyfluthrin were detected in 32 and 15% of all samples, respectively, whereas the other 6 pyrethroids were detected in <5% of samples. Permethrin and bifenthrin had the highest concentrations at 132 and 65 $\mu\text{g/kg}$. Toxic units (TUs) estimated for the marine amphipod *Eohaustorius estuarius* ranged from 0 to 5.8, exceeding unity in 9 and 32% of the total and estuary habitat area, respectively. Although increased mortality of *E. estuarius* was most frequently observed in toxicity tests run on split samples from estuaries compared with other strata, there was no clear correlation between pyrethroid TUs and amphipod mortality. This suggests other mitigating factors may affect the predictive capability of the TU approach resulting from a single test species.

Full Text

ftp://ftp.sccwrp.org/pub/download/DOCUMENTS/AnnualReports/2011AnnualReport/ar11_249_260.pdf