

# Distribution and Toxicity of Sediment-Associated Pesticides in Agriculture-Dominated Water Bodies of California's Central Valley

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The agricultural industry and urban pesticide users are increasingly relying upon pyrethroid insecticides and shifting to more potent members of the class, yet little information is available on residues of these substances in aquatic systems under conditions of actual use. Seventy sediment samples were collected over a 10-county area in the agriculture-dominated Central Valley of California, with most sites located in irrigation canals and small creeks dominated by agricultural effluent. The sediments were analyzed for 26 pesticides including five pyrethroids, 20 organochlorines, and one organophosphate. Ten-day sediment toxicity tests were conducted using the amphipod *Hyalella azteca* and, for some samples, the midge *Chironomus tentans*. Forty-two percent of the locations sampled caused significant mortality to one test species on at least one occasion. Fourteen percent of the sites (two creeks and four irrigation canals) showed extreme toxicity (>80% mortality) on at least one occasion. Pyrethroid pesticides were detected in 75% of the sediment samples, with permethrin detected most frequently, followed by esfenvalerate > bifenthrin > lambda-cyhalothrin. Based on a toxicity unit analysis, measured pyrethroid concentrations were sufficiently high to have contributed to the toxicity in 40% of samples toxic to *C. tentans* and nearly 70% of samples toxic to *H. azteca*. Organochlorine compounds (endrin, endosulfan) may have contributed to the toxicity at a few other sites. This study provides one of the first geographically broad assessments of pyrethroids in areas highly affected by agriculture, and it suggests there is a greater need to examine sediment-associated pesticide residues and their potential for uptake by and toxicity to benthic organisms.