Study finds pesticide effect in local creeks

Scientists say three Roseville streambeds show poisons that threaten tiny crustacean

By Chris Bowman -- Bee Staff Writer
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A group of insecticides that now dominate the home-and-garden market is poisoning urban creeks in California, including three tested in densely residential Roseville, according to several scientists.

Pyrethroid bug killers, commonly applied at the edges of homes and businesses to ward off ants, are hitchhiking on soil particles suspended in the runoff from lawn sprinklers, the researchers believe. The poisons settle in the muck of streambeds, not far from storm water outlets, they found.

Nearly all sediments collected from Roseville's Pleasant Grove Creek system contained enough pyrethroids to kill tiny crustaceans in laboratory tests, according to a study led by the University of California, Berkeley.

The researchers chose Roseville as their study area because the same crustacean - Hyalella azteca - used in labs to test for sediment toxicity also lives in the muddy bottom of Pleasant Grove Creek. In the past, it also lived in the sediments of the other two test streams: the South Branch of Pleasant Grove; and Kaseberg Creek, another tributary.

Those two tributaries had the most toxic sediments - strong evidence that pyrethroids had killed off the tiny shrimp-like creatures, said Donald Weston, a UC Berkeley environmental toxicologist who led the peer-reviewed research.

The study, posted in the Oct. 19 online issue of the journal Environmental Science & Technology, is the first published work to document the presence of pyrethroids in creeks within a residential neighborhood, Weston said.

Similar state-funded studies are under way, with preliminary results showing pyrethroid insecticides causing widespread toxicity to the crustacean in urban creeks draining into San Francisco and Newport bays and the Sacramento-San Joaquin Delta, according to Kelly Moran, president of TDC Environmental, a San Mateo consulting firm for state water-quality agencies. "I'm viewing the finding from Roseville as the first report of something that will get reported all over the place," Moran said. "I've seen quite a bit of unpublished data all in Northern California showing it is in the creeks there."

As for agricultural use of the insectides, the state Department of Pesticide Regulation recently began testing for pyrethroids in the San Joaquin and Salinas rivers and the Alamo River in Imperial County, said John Sanders, the agency's chief of environmental monitoring.

Weston and co-authors of the Roseville study said they instigated the research because so little is known about the environmental effects of residential pesticide use, compared to toxic chemicals used in agriculture and other industries.

The dearth of data on pyrethroids has scientists and California environmental regulators especially concerned because they are the active ingredients in most insecticides sold for residential use today in the United States.

"Despite the fact that they are on every store shelf in the country and in most homes, there has been no effort to look at them in creeks draining urban areas," Weston said.

Cities and counties are concerned about the environmental effects because they are legally responsible for stream and river pollution from stormwater drains - yet they have no control over the sale and use of pesticides.

"We're in kind of a tough position," said Geoff Brosseau, executive director of the California Stormwater Quality Association.

Pyrethroid insecticides are those with active ingredients that end in "thrin" - permethrin and cypermethrin mostly in household products, and the more potent bifenthrin and cyfluthrin used by pest-control professionals. The products are sold in sprays and in granules added to fertilizers spread on lawns.

Pyrethroids are manufactured derivatives of pyrethrins, which are natural insecticides produced by certain species of chrysanthemum. These synthesized chemicals are more toxic to insects and live longer in the environment than pyrethrins, the type of insecticide used last summer in aerial spraying to combat West Nile virus in Sacramento County.

Although they have been on the market since the 1950s, pyrethroids did not dominate the residential insecticide market until 2000. That coincided with the phasing out of pesticides more dangerous to humans and aquatic species, mainly the organophosphates diazinon and chlorpyrifos (Dursban).

At the same time, scientists noticed a sharp decline in episodes of toxicity plaguing the waters of the Delta and San Francisco Bay.

"We hypothesized that what we were seeing was a transition from organophosphates to pyrethroids," said Scott Ogle, owner of the Pacific EcoRisk laboratory in Martinez, which has analyzed fish and sediment samples from the estuary for more than a decade.

But some scientists worry that the U.S. Environmental Protection Agency unintentionally traded one environmental problem for another when it ordered the elimination of most uses of organophosphate pesticides.

"Diazinon and Dursban were causing widespread toxicity in urban creeks, and so now we are getting widespread toxicity in sediment," Moran said. "We really are not getting anywhere."

The good news, limited studies show, is that the pyrethroids appear to stay locked in mud and are not taken up by fish. Still unknown, however, is the extent to which the poisons might be diminishing the mud-dwelling crustacean and other species in the aquatic food chain. Some suspect pyrethroids have a role in the recently documented plunge in several Delta fish species.

The Roseville creeks study emerges as the EPA conducts its first review in decades of pyrethroid insecticides, which were approved when concerns focused mostly on human safety. The EPA could move to require new labeling on products to reduce the rate or frequency of application, though enforcement is problematic with homeowners, who need no license to spray.

Ultimately, Weston said, the solution rests in educating people on the pollution they instigate right at home.

"We are so used to thinking of pollution as coming from 'them,' " Weston said. "But this is not the petrochemical plant. It's basic suburban pesticide use. The source is 'us,' not 'them.' "