Spray adds creek effect

West Nile chemical boosted toxicity in 2005, study reports.

By Matt Weiser -- Bee Staff Writer

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A chemical sprayed over Sacramento County last summer to control West Nile virus doubled the toxicity of pesticides that had already accumulated in local creeks from urban runoff, a new study has found.

That chemical, piperonyl butoxide, or PBO, was added to a natural pyrethrin insecticide to increase its effectiveness. The chemical blocks the mosquito's ability to break down the pyrethrin, which means less pyrethrin is needed for the same effect.

The Sacramento-Yolo Mosquito and Vector Control District used aircraft to spray 110,000 acres in the Sacramento area with the chemical mix on seven nights in August 2005. The effort was declared a success, and subsequent testing showed local creeks were not harmed.

But that testing did not include creek sediments.

In the new study, researchers led by UC Berkeley professor Donald Weston report on water and sediment sampled in six Sacramento County creeks within 34 hours of the spraying.

The testing confirmed that water was not tainted by the chemicals, and that they were not toxic in sediment by themselves.

But it showed that PBO doubled the toxicity of pesticides that were already in the sediment.

Those pesticides were pyrethroids, more powerful manufactured versions of the natural pyrethrin used against mosquitoes. The synthetic pyrethroids most likely reached the creeks in storm-drain runoff in preceding weeks from household and commercial pest-control products used in lawns, parks and landscaping.

"It actually synergized the wrong thing," said Weston, an environmental toxicologist.

"It wasn't a dramatic and catastrophic event. But the fact that it's even close is remarkable, because nobody had even considered the possibility of a relatively nontoxic ingredient in a mosquito spray enhancing the toxicity of something in the sediment."

In lab tests, the boosted toxicity caused by PBO was enough to kill virtually all of the tiny shrimplike crustaceans that were exposed to it.

The peer-reviewed study was published Wednesday in the online edition of the journal Environmental Science & Technology.

It is the first study, Weston said, to document that one pesticide can combine with pyrethroids in the environment for a more toxic effect. It adds to recent alarm bells about pyrethroids, which have come to dominate the pesticide market as earlier organophosphates have been phased out.

Kim Glazzard, executive director of Organic Sacramento, said the study confirms that the risks of aerial mosquito spraying are worse than previously imagined.

"One of the things that has been a big concern of ours is the (mosquito) district keeps claiming that all the harmful effects of pesticides will go away, they'll evaporate, and that is obviously not true. It really is very, very concerning to us," she said.

But David Brown, general manager of the mosquito control district, said the study confirms that the aerial spraying itself was not harmful.

"Our treatment alone likely would not have created an issue," Brown said. "I think the biggest problem based on what we saw is that the creeks are polluted. I'd like to know how those products got in the water in the first place."

One likely way it got there is from overwatering of residential landscaping, which washes pesticides into storm drains, then creeks.

Both the U.S. Environmental Protection Agency and California Department of Pesticide Regulation are reassessing pyrethroid toxicity. Weston said these reviews should examine how pyrethroids interact with other chemicals.

The state plans to do so, said DPR spokesman Glenn Brank. But Weston said EPA has specifically stated it will not.

Weston said PBO use should not be restricted based on his research.

"I realize the public health issues involved here, and I'm certainly sensitive to that," he said. "If they didn't use PBO they'd have to use more of the pyrethrin, and that's not necessarily a good thing."

But he said the district should test creek sediments if it conducts aerial spraying again. And it should change the post-spraying advice it gives to residents.

Last summer, the district told residents to hose off outdoor furniture after aerial spraying. This may have helped move PBO into creeks in the first place.

Both PBO and natural pyrethrins degrade within a day or two with exposure to sunlight, making washing unnecessary, Weston said.

"I think we're going to re-evaluate our message," Brown said. "We had people washing it off to such an extent they were creating a mosquito problem all over again ."