



# Green Bulletin

University of California  
Agriculture and Natural Resources

Vol. 1 • No. 2 • July 2010

## Efficacy of Argentine Ant Treatments

**D**uring the last several summers, UC Riverside entomologists John Klotz, Michael Rust, and Les Greenberg have tested several insecticide materials and methods to see which treatments most effectively control Argentine ants around homes.

Ant numbers and effectiveness of treatments were estimated by the ants' consumption of sucrose water put out in vials over 24 hours. Previous studies have shown that 1 milliliter of consumption corresponds to about 3,300 ant visits to the sucrose water. The vials are weighed before and after to determine ant consumption. Control vials that did not allow ants to enter corrected for evaporation.

One week, 2 weeks, 4 weeks, and 8 weeks after treatment, the vials were placed for 24 hours both around the house foundation and in the yard. Unless otherwise noted all treatments were sprays applied with a fan nozzle, which treats 1 foot up and 1 foot away from the house foundation (Fig. 1).

### Treatments, Efficacy and Water Quality Issues

Reduction of ants around the house foundation and in the yard after 8 weeks for each treatment is shown in Figure 2 below. All treatments achieved acceptable control of ants near the home. A combination treatment consisting of 3 gallons of fipronil spray plus bifenthrin granules (2.3 pounds per 1,000 square feet) scattered under bushes and trees gave the best

ant control of the methods tested here. Almost as good control was obtained with 0.03% thiamethoxam liquid ant bait in KM AntPro bait dispensers. (See the article on these bait dispensers in the June issue of *UC IPM Green Bulletin*). This treatment, which almost eliminates runoff of pesticide product, would be the best from a water-quality point of view. However, thiamethoxam bait is not currently registered for this use.

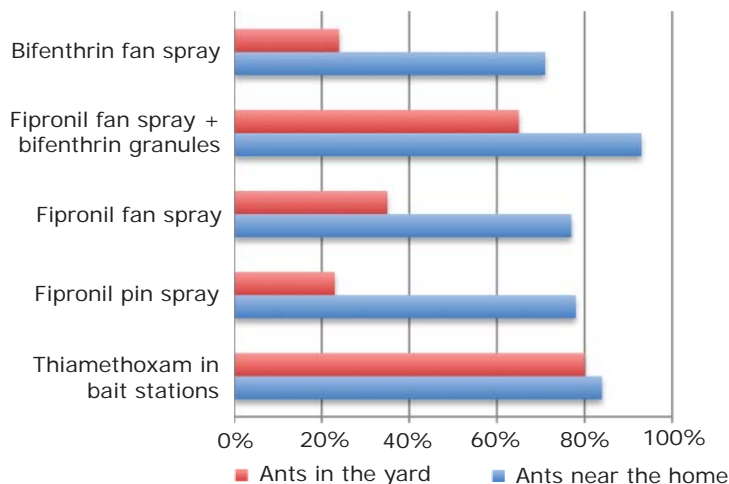


Figure 1. Applying a fan spray 1 foot up and 1 foot out from a house foundation.

Two treatments using fipronil alone applied at 0.06% were tested. These were a standard fan application treatment using 3 gallons of fipronil and a 1-gallon application of fipronil using a pin stream spray applied as a narrow band 2 inches up and 2 inches out from the house foundation. Although the pin stream used one-third as much fipronil as the fan spray, this treatment was almost as effective in controlling ants. Furthermore, with this treatment there was very little runoff of the fipronil into the street, as shown by analyzing the irrigation runoff. Therefore, we have shown that pest control operators can reduce their use of fipronil to 1 gallon if it is carefully applied in a narrow band to the house foundation.

—Les Greenberg, Specialist, Department of Entomology,  
UC Riverside, [les.greenberg@ucr.edu](mailto:les.greenberg@ucr.edu)

Figure 2. Percent Reduction in Ant Visits after 8 Weeks



### WHAT'S INSIDE ...

Insecticides in Runoff | Page 2

Just Released | Page 4

Ask the Expert | Page 4



# Insecticides in Runoff Water from California Homes

Monitoring studies during this decade have consistently shown an increase in contamination of urban waterways by insecticides. Earlier studies generally demonstrated the presence of insecticides, such as pyrethroids, in urban sediments and water columns and the potential acute toxicity to invertebrates. More recently, however, researchers have shifted their focus to understanding the sources of contamination as well as developing practical mitigation strategies.

## New California study

The most comprehensive study of this kind is probably the multiyear and statewide project led by Loren Oki and Darren Haver, with funding support from Cal Fed and the State Water Resources Control Board (SWRCB). One of the primary goals of this project was to generate a diagnostic snapshot of the “health” of runoff water from residential homes. To achieve this goal, a wide range of biological (i.e., pathogens) and chemical constituents were analyzed in runoff water draining from large neighborhoods in Northern and Southern California. In this article, we take an initial assessment on the occurrence of dominant insecticides in the runoff water.

## Sample sites

The sampling sites included four neighborhoods in Sacramento and four in Orange County, with the sizes of these neighborhoods ranging from 150 to 500 single-family homes. At each site, grab

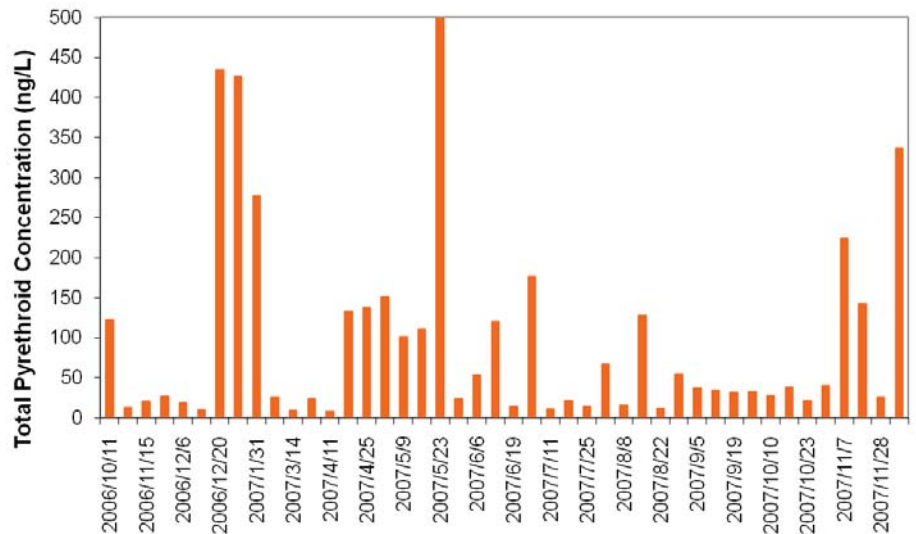


Figure 1. Total pyrethroid concentrations (ppt or ng/L) in runoff water from a neighborhood in Orange County.

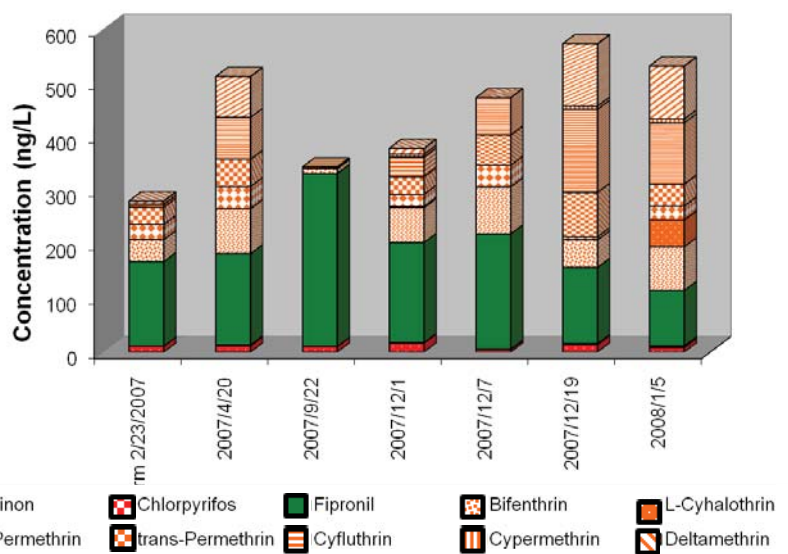


Figure 2. Relative makeup of insecticides in storm runoff samples from a neighborhood in Orange County.

samples were taken directly at the storm drain outfall points, assuring that only the runoff water from these homes was collected. Sampling started in mid-2006

and continued through the end of 2008. Sampling occurred on a weekly, biweekly, or monthly basis. Whole water samples (including  
... continued on Page 3

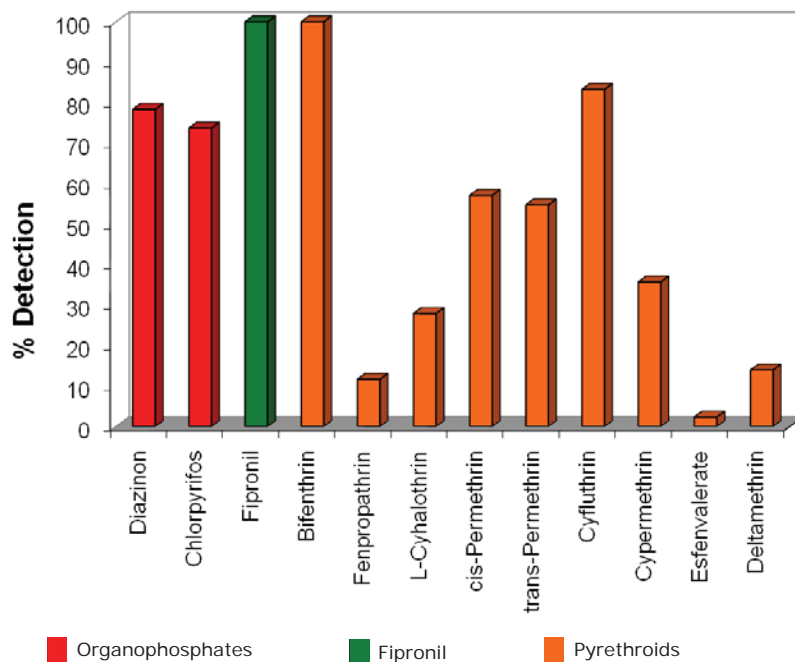


Figure 3. Frequency of detection in runoff from a neighborhood in Orange County.

... continued from Page 2

suspended solids) were extracted and analyzed to obtain total concentrations. A total of 69 to 98 samples per site were analyzed over more than two years, yielding unprecedentedly large data sets on pesticide contamination in urban watersheds.

### The dominant insecticides

Based on preliminary data assessment, the following observations or conclusions can be made:

- Both pyrethroid and fipronil insecticides were regularly found at both Northern and Southern California sites.

- Southern vs. Northern California. In general, higher levels of pyrethroids and fipronil were consistently found at the Orange County sites than at the Sacramento sites. The differences were often severalfold, depending on the specific compounds, sites, and sampling time.

- High levels of pyrethroids in

*Southern California runoff.* The total levels of pyrethroids in runoff from Orange County were typically in the several hundreds of parts per trillion (ppt) (ng/L) range—concentrations implying acute toxicity to the most sensitive invertebrate species. Figure 1 serves as an example for the Orange County sites.

- High levels of fipronil and metabolites in Southern California runoff. Fipronil and its metabolites always appeared in samples from all Orange County sites. The median combined levels were 200 to 440 ppt, implying potential toxicity to shrimplike crustaceans.

- Higher levels in storm runoff. In general, high levels of insecticides were present in storm runoff than in irrigation runoff. Figure 2 is an example of the composition of insecticides in storm runoff samples from one of the Orange County sites.

- Most found insecticides. In general, bifenthrin and fipronil (and its metabolites) were almost always

found in runoff from the southern sites. In addition, cyfluthrin and permethrin also were frequently detected. Figure 3 is a snapshot demonstrating this pattern.

### A significant finding

The finding of fipronil and its metabolites is of special significance. Fipronil is increasingly used by professional applicators in California for termite and ant control. In the environment, fipronil is readily converted to three metabolites, i.e., fipronil sulfone, fipronil sulfide, and fipronil desulfinyl.

While toxicity values are still scarce, the few available studies show that these metabolites possess similar or even higher biological activities than the parent compound. Fipronil and its metabolites are much more water soluble than pyrethroids and therefore have a tendency for transport in water and might move over long distance. The toxicity thresholds for fipronil and its metabolites must be established to allow for better risk assessment.

— Jay Gan,  
Professor of Soil Science and  
UC Cooperative Extension Specialist,  
Environmental Sciences,  
UC Riverside, [jgan@ucr.edu](mailto:jgan@ucr.edu);

—Darren Haver, Water Resources/  
Water Quality Advisor,  
UC Cooperative Extension  
Orange and Riverside counties and  
Director, South Coast Research and  
Extension Center,  
[dlhaver@ucdavis.edu](mailto:dlhaver@ucdavis.edu); and

—Loren Oki,  
UC Cooperative Extension Specialist,  
Landscape Horticulture Department  
of Plant Sciences, UC Davis,  
[lroki@ucdavis.edu](mailto:lroki@ucdavis.edu)



# Ask the Expert!

**Q** I understand that currently the main problem with pyrethroid insecticides is that they kill tiny crustaceans when contaminated runoff gets in creeks and streams. Why is this a problem?

**A** Even though many people rarely see these tiny, aquatic invertebrates, they are very important in the food chain, or pyramid, that supports fish, birds, and other wildlife (Fig. 1). In fact, pyrethroids are also very toxic to fish, so the presence of pyrethroids at levels that kill the smaller organisms gives us warning that even more serious environmental problems will occur if we don't change our pest management practices.

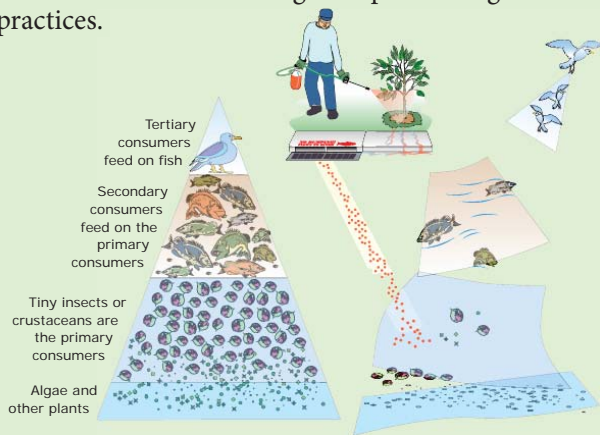


Figure 1. The aquatic food pyramid in balance (left) and disturbed (right).

**Q** How can I tell if the insecticides I am using are pyrethroids? None of the pesticides I am using says "pyrethroid" on the label.

**A** "Pyrethroids" is the name given to a group of insecticides that mimic the action of the botanical insecticide pyrethrin, which is derived from chrysanthemum daisies but is more persistent in the environment. To determine if the pesticide is a pyrethroid, look at the **active ingredient** listed in small type on the pesticide label. Common pyrethroid active ingredients often, but not always, end in "-thrin" such as bifenthrin, cypermethrin, permethrin, cyfluthrin, and deltamethrin. Pyrethroid insecticides are sold under many brand names, so it is important to find the active ingredient.

**Q** If my clients ask for information on health or environmental impacts of the pesticides I am applying, is there a good resource that I can send them to?

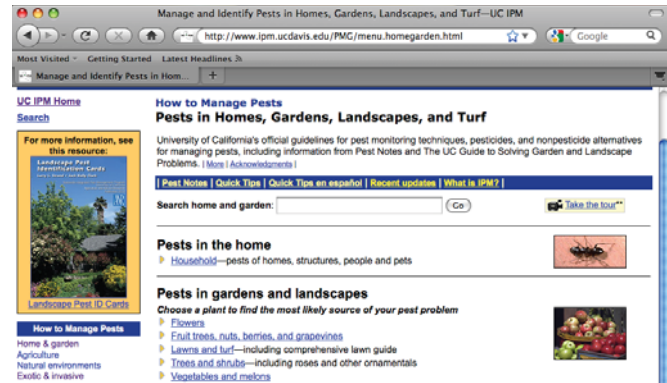
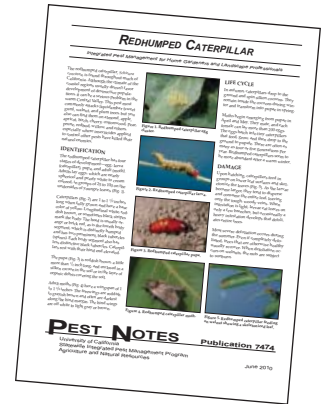
**A** Yes, the National Pesticide Information Center is a good place to start. They have lots of information on their Web page, <http://npic.orst.edu>. They even have a toll-free phone number, 1-800-858-7378.

Have a question? E-mail it to [ucipm@ucdavis.edu](mailto:ucipm@ucdavis.edu).

# Just Released!

**U**C has recently released several updated IPM *Pest Notes* publications of interest to landscape or structural pest managers or their customers. View them at [www.ipm.ucdavis.edu/PMG/menu.homegarden.html](http://www.ipm.ucdavis.edu/PMG/menu.homegarden.html). They include:

- *Bordeaux Mixture*;
- *Crabgrass*;
- *Creeping Woodsorrel and Bermuda Buttercup*;
- *Fleas*;
- *Nematodes*;
- *Redhumped Caterpillar*;
- *Sycamore Scale*;
- *Voles (Meadow Mice)*;
- *Windscorpions*; and
- *Wood-boring Beetles in Homes*.



University of California  
Statewide IPM Program  
One Shields Avenue  
Davis, CA 95616-8621

Phone: (530) 752-8350

E-mail: [ucipm@ucdavis.edu](mailto:ucipm@ucdavis.edu)

Online: [www.ipm.ucdavis.edu](http://www.ipm.ucdavis.edu)



Supported by the University of California Statewide IPM Program and the California Department of Pesticide Regulation through the Urban Pesticide Runoff Mitigation and Outreach Project.

The contents of this document do not necessarily reflect the views and policies of UC IPM or CDPR nor does mention of trade names or commercial products constitute endorsement or recommendations for use.

The University of California prohibits discrimination against or harassment of any person on the basis of race, color, national origin, religion, sex, physical or mental disability, medical condition (cancer related or genetic characteristics), ancestry, marital status, age, sexual orientation, citizenship, or status as a covered veteran (special disabled veteran, Vietnam-era veteran, or any other veteran who served on active duty during a war or in a campaign or expedition for which a campaign badge has been authorized).

University policy is intended to be consistent with the provisions of applicable state and federal laws.

Inquiries regarding the university's nondiscrimination policies can be directed to the Affirmative Action/Staff Personnel Services Director, University of California, Agriculture and Natural Resources, 300 Lakeside Drive, 6th Floor, Oakland CA 94612-3560, or call (510) 987-0096.