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## ::: URBAN ENVIRONMENTS :::

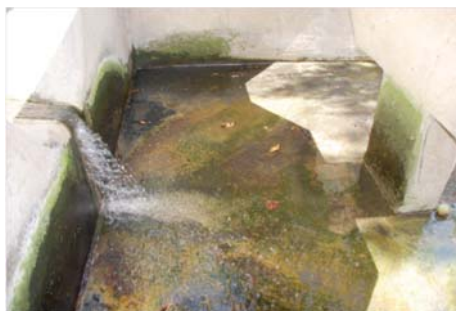
# Pesticide Applications to Hard Surfaces

**F**lying over a city, one easily can see just how much of the land consists of impervious surfaces such as roofs, sidewalks, driveways, parking lots, and streets. Impervious surfaces don't let water or other liquids pass through; instead, the liquid runs off. Most of these impervious surfaces are directly connected to storm drains and flood control channels where they quickly carry runoff to a body of water such as a river, a lake, or an ocean. Connecting impervious surfaces in this fashion has increased the movement of pollutants—including pesticides—in storm runoff and runoff from irrigation, car washing, and the cleaning of hard surfaces (Fig. 1).

This article gives an overview of the potential pollution issues from applying pesticides to various types of surfaces found in the landscape.

### Concrete Increases Problems

Historically, most of the hard surfaces in an urban landscape have been made from concrete and asphalt. Very little information is known about what happens to pesticides applied either



D. L. Haver

Figure 1. Runoff from various outdoor activities in a residential neighborhood carrying nutrients and pesticides.

directly to these surfaces or deposited on them as a result of drift during application. Preliminary data from a recent study published in *Environmental Toxicology and Chemistry* (W. Jiang et al. 2010. Wash-off potential of urban use insecticides on concrete surfaces. 29(6):1203–1208.) suggest pesticide residues on concrete can continue to be released and carried in runoff for a long time. Further studies will help determine why pesticides seem to stay longer on concrete than in soil and turfgrass environments.

In the July issue of *UC IPM Green Bulletin*, two other studies highlighted the ability of pesticides to be carried in residential runoff, specifically pesticides that generally are applied around building foundations and along edges of driveways and sidewalks. Researchers found that using application techniques such as a pin stream spray reduced the amount of pesticide found in surface runoff collected in the gutter.



D. L. Haver

Figure 2. Flagstone walkway set in decomposed granite.

### New Materials, Methods

During the last decade, landscape architects, engineers, and scientists working in the field of water quality began to recognize the importance of integrating more pervious hard surfaces—those that allow water to pass through—into urban designs in order to reduce pollutants carried in urban runoff from irrigation and storm water. Design concepts in commercial and residential landscapes are beginning to incorporate elements that allow for runoff to infiltrate the soil beneath the surface. These use more pervious materials or sloping surfaces toward surrounding vegetation and soils where possible.

New materials and techniques being used include pervious concrete and asphalt, decomposed granite with and without a binder (Fig. 2), slot drains

... continued on Page 4

## WHAT'S INSIDE ...

Weed Control and Pavers | Page 2

Interlocking Pavement | Page 3

New UC Publication | Page 3

Ask the Expert! | Page 4

# WEED CONTROL on Permeable Pavers

**P**ermeable pavers help reduce runoff and in some cases actually can filter out pollutants such as cigarette butts and other trash. However, in some installations, weeds can grow in the cracks between the pavers. What can you do for that? Four methods give you the best chance of reducing weeds in permeable (or other) paver sites.

## **The first is manual removal.**

This involves using tools to scrape weeds out from in between the pavers. It usually is a quick method of control and does not involve using any pesticides. Tools that are effective for removing weeds in cracks include tricorner weeders, “Cape Cod” weeders, and pavement or crack and crevice weeders. In general, these tools have a thin blade or a pointed tip that allows you to get between the pavers and cut off the weeds. On the down side, the entire plant might not be removed and could regrow. Also, manual removal disturbs the fill sand between the pavers, allowing for the possibility of more weed seeds becoming established and starting to grow.

**A second method is to use heat from a flamer or steamer.** This can be an effective and safe way to control weeds, because the pavers are not combustible. Keep



T. J. Majcherek

*Weed seeds can get established in spaces between pavers and become very unsightly if allowed to grow. While postemergent contact herbicides can reduce weed growth, the weeds can recover. The photo on the left shows an untreated and unweeded area, while the photo on the right shows weed growth eight weeks after being treated with the contact herbicide diquat.*

in mind that you should not use flamers close to other vegetation or structures that could catch on fire. You can treat small areas with propane gas-powered machines such as Red Dragon kits or Green Steam Weed Killer.

**The third nonchemical method is to use a polymeric sand between the pavers.** Polymeric sand is paving sand that has a polymer additive to make it harden like mortar while still allowing some water to infiltrate. Because the surface is hard, weed seeds usually cannot establish and grow. Polymeric sand is easy to use on new installations. Apply it dry, brushing it into the cracks. After compacting the sand, wet it and let it dry. On older installations, you will have to remove the joints before using the polymeric sand. While not a 100% fix, polymeric sand will help reduce weeds and often ants too. Organic binders made with psyllium, which is derived from the plant *Plantago ovata*, also can help to harden and stabilize the sand.

**Finally, herbicides can be used for both pre- and postemergent weed control.** Postemergent applications can be more desirable, because the herbicides are applied directly to the plant, increasing the likelihood that most of the product will reach the

weed rather than the ground. Spot sprays will use less herbicide than broadcast applications. You can use contact herbicides such as Reward (diquat) and Scythe (pelargonic acid), organic herbicides that contain plant essential oils such as clove oil or d-limonene, or systemic herbicides such as Roundup (glyphosate). Household vinegar is not a good product to use unless the weather is very warm, and even then the results are variable. One herbicide that is available with 20% acetic acid is more effective than household vinegar, but it carries a DANGER signal word.

Preemergent herbicides can provide a few months of control. Sprays are better than granules, because you can apply them more precisely to the cracks and granules might be easily carried off-site with runoff by irrigation or rain. Try to use herbicides that contain ingredients that have low water solubility such as pendimethalin, proflaminate, or dithiopyr.

As in any integrated pest management program, you will need to monitor the weed pressure and use nonchemical methods whenever possible.

—Cheryl Wilen,  
UC IPM South Coast Area Advisor,  
[cawilen@ucdavis.edu](mailto:cawilen@ucdavis.edu)

# LEARN MORE about Permeable Interlocking Concrete Pavement

**P**ermeable interlocking concrete pavement (PICP) creates a surface designed to reduce the rate of storm water runoff by letting it pass through the material. The pavement is comprised of a layer of concrete pavers separated by joints filled with small stones. Water enters joints between solid concrete pavers and flows through an open-graded base, i.e., crushed stone layers with no small or fine particles. The spaces between the crushed stones store water that infiltrates back into the soil below the grade. The stones in the joints provide 100% surface permeability, and the base filters storm water and reduces pollutants.

## Permeable Pavement Fact Sheets

Created by the Low Impact Development Center and the Interlocking Concrete Pavement Institute (ICPI), these fact sheets are geared toward design professionals, developers, municipalities, and schools and universities. Each four-page, color brochure—which is available as a PDF—introduces PICP, its advantages, and how each meets the needs of the individual audiences:

- Municipal officials, [www.icpi.org/node/1231](http://www.icpi.org/node/1231);
- Residential and commercial developers, [www.icpi.org/node/1230](http://www.icpi.org/node/1230);
- Schools and universities, [www.icpi.org/node/1232](http://www.icpi.org/node/1232); and
- Design professionals, [www.icpi.org/node/1229](http://www.icpi.org/node/1229).

According to the *Municipal Officials* fact sheet, stormwater runoff from PICP:

- Reduces pollutants from rainwater runoff;
- Is LEED® points eligible for sustainable sites, water efficiency, materials and resources and/or innovative design and also earns Green Globe points;

- Meets U.S. EPA stormwater performance criteria as a structural best management practice (BMP) while providing parking, road, and pedestrian surfaces;
- Helps meet local, state, and provincial stormwater compliance with the U.S. National Pollutant Discharge Elimination System (NPDES) regulations;
- Is compatible with underground stormwater storage systems and many slower-draining clay soils; and
- Can qualify for government tax incentives, utility fee reductions, expedited permitting, or a demonstration project to encourage use.

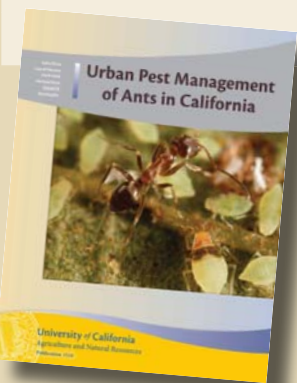
For more information about PICP, visit ICPI's Web site at [www.icpi.org](http://www.icpi.org).

—Information used by permission of the Interlocking Concrete Pavement Institute



Courtesy of the Interlocking Concrete Pavement Institute/the City of Chicago

Storm water runoff before (left) and after (right) the installation of permeable interlocking concrete pavement as part of the Chicago Green Alley Project.



## Just Released: New UC Publication!

**A**nts are among the most prevalent pests in urban areas. They invade households, restaurants, hospitals, offices, and warehouses—anywhere they

can find food and water. Once established, colonies are difficult to control, and they present a formidable challenge to the pest management professional.

Responding to the public's growing demand for less toxic, environmentally friendly pest control techniques and growing regulatory control of pesticides, experts at the University of

California have written *Urban Pest Management of Ants in California* (J. Klotz, et al.), a new guide to aid pest control professionals in developing more effective, targeted, and greener solutions to urban ant problems.

This new publication takes you beyond an identification guide, providing practical information and recommendations for control strategies. Illustrated with 77 color photographs, the guide covers status, identification and biology, and management strategies for the four major urban ant species and 16 other frequently encountered species. The UC IPM Ant Key, a glossary, and references round out this essential guide.

Controlling ants is a tough job, but with this guide, you've got a better shot at solving your customers' problem the first time. To order a copy, go to <http://anrcatalog.ucdavis.edu>, and search for publication No. 3524.

Only  
\$20!

# Pesticide Applications to Hard Surfaces ...

... continued from Page 1

in driveways and sidewalks to collect runoff and channel it to surrounding vegetation (Fig. 3), and interlocking pavers (Fig. 4). Although each of these surfaces allows runoff to infiltrate, actual rates vary depending on the underlying or nearby soil conditions. However, the overall goal remains the same: minimizing runoff to minimize undesirable movement of pollutants.

## Chemical Choice Depends Upon Surface

If these pervious surfaces are used in a landscape where you're working, they can impact which chemicals you select for pest control. Where possible, especially if groundwater is

close to the surface, choose a pesticide that will cling to soil but doesn't dissolve well in water, since it is more likely to remain on site in these conditions. With surfaces that let liquid infiltrate downward, pesticides that dissolve easily in water but don't cling readily to soil particles can contaminate the groundwater.

If you are working in urban environments where pervious surfaces are not used and the surfaces connect directly to the storm drains, it is vital to:



D. L. Haver

Figure 3. Slot drain in driveway sloped toward planter.



D. L. Haver

Figure 4. Interlocking pavers used for a driveway. Photo was taken during a rainstorm.

- Minimize drift onto hard surfaces;
- Communicate with the owner about the importance of minimizing runoff from irrigation, car washing, and cleaning; and
- Use the latest application techniques resulting in effective pest control and minimal exposure of the pesticide to runoff.

—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)

# Ask the Expert!

**Q** Can Permeable Interlocking Concrete Pavement (PICP) be used to replace every kind of pavement?\*

**A** PICP is best suited for use in areas of low-speed traffic such as parking lots, residential streets, driveways, patios, plazas, sidewalks, and parking lanes on busier travelways. Nevertheless, PICP has been successfully used even under heavy commercial loads.

**Q** Is maintaining PICP difficult?\*

**A** No. PICP can be maintained through street sweeping and vacuuming based on periodic inspection.

**Q** What projects are suitable for PICP?

**A** PICP is particularly suitable for public projects such as parks and outdoor seating areas, street-tree planting areas, plazas, sidewalks, or parking lots. It also works well for driveways and parking strips along streets. Proper professional installation is key to insure the success of your project, especially where loading is significant such as parking lots and driveways.

\*Question and answer reprinted from the Interlocking Concrete Pavement Institute's *Municipal Officials* fact sheet.

Have a question?

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

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)



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