



University of California  
Agriculture and Natural Resources

# Green Bulletin

Vol. 9 • No. 2 • Summer 2019

## Effective Bait-Only Control for Outdoor Cockroaches

**T**wo species of *Blatta* cockroaches can be common peridomestic pests in California, including the familiar oriental cockroach (*B. orientalis*) and a relative newcomer, the Turkestan cockroach (*B. lateralis*, Figure 1). Adults of both species are large (usually one inch or more in length) and conspicuous insects that harbor and breed outdoors within moist crevices around structures, such as subsurface utility ports, voids associated with concrete expansion joints, and soil cracks formed at junctions of landscape and hardscape elements (Figure 2).

From these harborage sites, cockroaches venture out at night to feed on a wide variety of organic materials, such as food waste, manure, and both plant and animal matter in various stages of decomposition. In many cases, foraging cockroaches may enter structures that are not properly sealed, often triggering complaints and calls for pest control services.



AM SUTHERLAND, UCIPM

Figure 1. A mating pair of Turkestan cockroaches, *Blatta lateralis*.

### What's the concern?

Though they don't pose the same threats to public health and indoor air quality as do German cockroaches (*Blattella germanica*), oriental and Turkestan cockroaches are often targeted by both indoor and outdoor insecticide applications, usually in the form of liquid or aerosol sprays. Perimeter protection services, where liquid formulations are regularly sprayed around building exteriors to provide repellency or residual toxicity for pests that may invade the structures from outside, are especially common for cockroaches. Such programs may be largely ineffective, however, since without exclusion measures, insects can still invade, only to die within buildings.

In addition, many insects have developed resistance to commonly used active ingredients, especially pyrethroid insecticides, due to widespread



AM SUTHERLAND, UCIPM

Figure 2. Turkestan cockroaches harbor and breed within moist crevices outdoors, such as this void space associated with expansion joints in a concrete walkway.

exposure in the environment and limited variety in pesticide products. Finally, such programs may be prohibited or discouraged because of regulations enacted to protect the environment and surrounding communities (See "Ask the Expert" on page 6). For instance, public schools in California provide challenging settings for traditional perimeter protection since spray applications require special posting, notification, and reporting.

For all these reasons, professionals in California may consider alternatives to perimeter spray programs in order to provide effective control of these nuisance cockroaches for their customers.

Gel baits have proven very effective when used to control German cockroaches indoors, but can they be used for outdoor species? Furthermore, the use of baits within self-contained,

...continued on page 2

### WHAT'S INSIDE...

Brown Recluse Spider | Page 4

Healthy Schools Act | Page 5

Ask the Expert! | Page 6

Revised Pest Notes | Page 6

# Cockroach Baiting ...continued from page 1

tamper-proof bait stations is exempt from the notification and posting requirements associated with public schools.

Oriental and Turkestan cockroaches are most active during the warm summer and early autumn months, when conditions in many parts of California are extremely harsh, with very high daytime temperatures and very low relative humidity. Can baits hold up under those conditions and remain attractive, edible, and palatable to cockroaches?

## Laboratory and field trials

Several baits registered for outdoor use in California were evaluated in the laboratory. Groups of both oriental and Turkestan cockroaches were provided access to fresh deposits of professional cockroach bait products (see Table 1) for 14 days, at which time mortality was assessed. All products were considered effective, with almost all exposed cockroaches dead within 14 days.

In order to measure the potential efficacy of exterior summertime applications, new groups of cockroaches were provided bait deposits dried on a lab bench for seven days. This drying period resulted in significant water loss from gel baits, rendering them quite hard and brittle. Nevertheless, exposure to dried baits also resulted in widespread mortality, with most groups of cockroaches exhibiting mortality at or near 100% after 14 days. In some cases, very little bait was consumed, suggesting that contact rather than ingestion contributed to mortality. These results suggest that many different professional cockroach baits are attractive to *Blatta* species, even when insects have access to alternative food and water sources, and that bait deposits can effectively kill cockroaches even when they are dried.

Next, the team sought to demonstrate baiting programs in the field. For this work, we partnered with two public

**Table 1. Professional cockroach bait products evaluated in this study.**

Product	Active ingredient, formulation	Included in laboratory assay	Included in field trials
Advion Cockroach Gel Bait (Syngenta)	0.6% indoxacarb, gel	✓	✓
Advion Insect Granule (Syngenta)	0.22% indoxacarb, granule	✓	✓
MaxForce FC Magnum Roach Bait (Bayer)	0.5% fipronil, gel	✓	
MaxForce Impact Roach Gel Bait (Bayer)	1.0% clothianidin, gel		✓
Optigard Cockroach Bait (Syngenta)	0.1% emamectin benzoate, gel	✓	
Vendetta Plus Cockroach Gel Bait (MGK)	0.05% abamectin B1, 0.50% pyriproxyfen, gel	✓	

school districts experiencing Turkestan cockroach infestations: Ukiah Unified (Mendocino County) and Moreno Valley Unified (Riverside County). One of these sites, a high school in Mendocino County, had been battling a very large population (Figure 3) for several years using pyrethroid insecticide perimeter sprays, with poor control and continued population growth.

At these sites, three different bait products (Table 1) were applied within separate large (100-foot radius) treatment areas and compared to areas that were left untreated in terms of cockroach density, as measured by sticky traps placed out overnight once a month for one year. Bait was applied during periods of cockroach activity within locked rodent bait stations (Figure 4) or within subsurface utility ports (four bait placements of 1 g to 3 g per treatment area as needed monthly, according to observed cockroach density). Six applications were made at the Mendocino County site, while only two applications were made at the Riverside County site.



Figure 3. Turkestan cockroaches attracted to spilled food.

AM SUTHERLAND, UCIPM



Figure 4. Cockroach bait was applied within lock-and-key mouse bait stations (Protecta RTU). Bait was also applied within subsurface utility ports.

C HUBBLE-WIRGLER, UCCE

...continued on page 3

# Cockroach Baiting ...continued from page 2

Control was achieved at both sites, but the population crash observed in Mendocino County was dramatic (Figure 5): 90% fewer cockroaches were trapped just one month after the baiting program began. Trap catches also fell by up to 50% in untreated plots. We believe these widespread decreases were driven by secondary and even tertiary mortality caused

by cannibalism of bait-intoxicated cockroaches or scavenging of bait-killed cockroaches. This suggests that cockroaches in our field trial moved from one treatment area to the next, meaning that Turkestan cockroaches may venture more than 100 ft from harborages during foraging. Cannibalism was commonly observed in our overnight trapping programs, with

trapped cockroaches dismembered and consumed by others (Figure 6).

At the Riverside County site, populations were smaller, foraging activity was lower, and population density within untreated plots remained high throughout the study. The one-year period ended at this site in October 2018, and preliminary data show that baits effectively reduced the population by 80% to 90% as compared to no treatment at all (Figure 7).

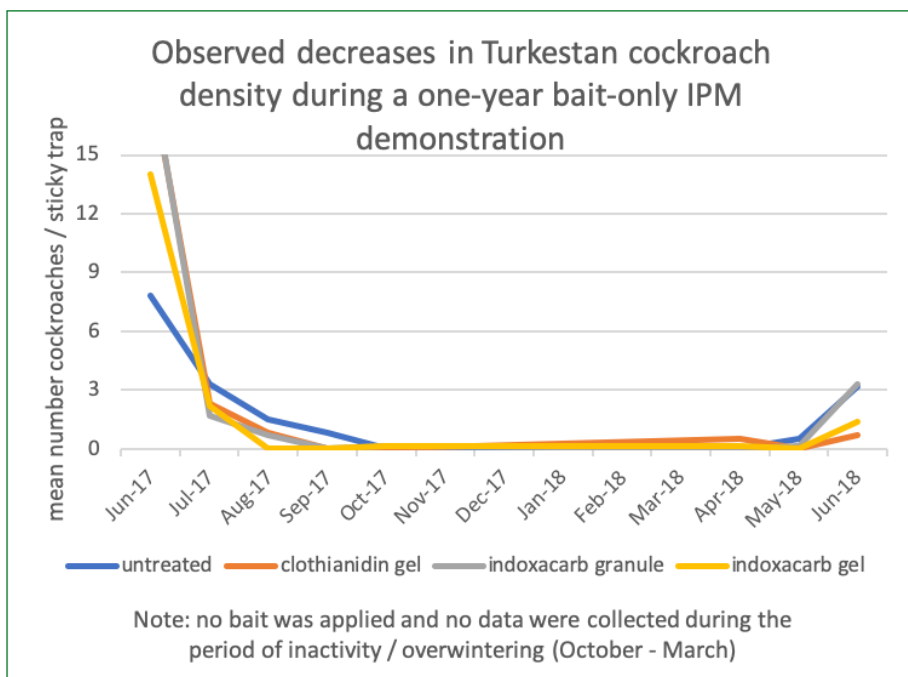


Figure 5. Turkestan cockroach density, as measured by sticky cards (Lo-Profile, B&G) placed outside buildings overnight at a public high school in Mendocino County.

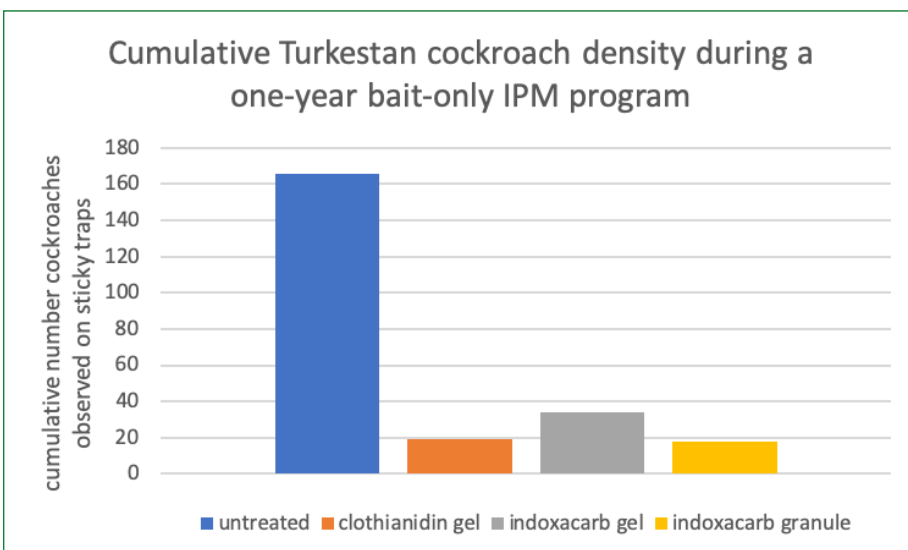


Figure 7. Turkestan cockroach density, as measured by sticky cards (Lo-Profile, B&G) placed outside buildings overnight at a public high school in Riverside County, was significantly reduced by only two applications of insecticidal bait over a one-year period.



AM SUTHERLAND, UCIPM

Figure 6. A male Turkestan cockroach that has been mostly consumed by other cockroaches after becoming trapped on a sticky trap.

## What did we find?

The results of this project suggest that bait-only programs can be very effective when used against oriental and Turkestan cockroaches in California, even when populations are large. The products tested were all very effective. We believe bait-only programs represent important alternatives to perimeter sprays and should be strongly considered when seeking to minimize exposure risk within IPM programs and when serving sensitive sites such as schools and child care centers, hospitals, municipal properties, and public outdoor spaces.

—Andrew Sutherland,  
Urban IPM Advisor,

Statewide IPM Program and San Francisco Bay Area,  
[amsutherland@ucanr.edu](mailto:amsutherland@ucanr.edu)



# The Brown Recluse Spider Does NOT Occur in California

If you were to ask an audience of more than a few people if they or anyone they know has ever seen or been bitten by a brown recluse spider (Figure 1) in California, many hands would be raised. This is quite remarkable because the brown recluse spider has NEVER established breeding populations in California!

The myth of the brown recluse has been generated and sustained by 1) physician misdiagnoses (where many skin lesions of diverse non-spider origin are blamed on a non-existent spider), 2) media articles that report claims of horrendous bite injury without proof of spider involvement, and 3) misidentification of harmless brown spiders as brown recluses by the general public as well as "authorities" who lack adequate spider identification skills.

Brown recluse mythology is persistent throughout North America, even in places such as Alaska and Canada, which are far from where the spider is actually found. In some places, it is easy to argue against this myth because no recluse spiders have ever been found there. For California, this argument is less definitive because the state's southeastern deserts are home to several related native species such as the desert recluse spider (a different species than the brown recluse). Additionally, in urban Los Angeles County, there have been rare records of isolated populations of the Chilean recluse spider. However, the native desert species occur where few people live and the Chilean recluse has only been found in commercial buildings, never in homes. There have been no confirmed bites by this non-native Chilean recluse since it was originally found in Los Angeles in the late



Figure 1. Adult brown recluse spider, *Loxosceles reclusa*.

1930s. There have been rare findings of brown recluse in California, but these have occurred as hitchhikers in moving boxes from other areas of the country and the spider was destroyed after locating.

Although there are some recluse spiders in limited areas within California, this does not explain the hundreds (and maybe thousands) of brown recluse bite misdiagnoses made in California each year. In a study mapping out such misdiagnoses vs. known populations of recluse spiders in California, more than 95% of the purported brown recluse bites occurred in urban areas where the spiders are not known to inhabit (Figure 2).

For many decades throughout North America, it has been readily assumed by the medical community that many skin lesions resulted from brown recluse spider envenomation. However, recent research shows that most of these lesions are unrelated to spiders. Causes include some medical conditions that are much worse than any recluse bite would be.

One real danger of such a recluse bite misdiagnosis is that the actual causal condition will not respond to recluse bite remedy, allowing the real condition to continue on unabated, worsen-

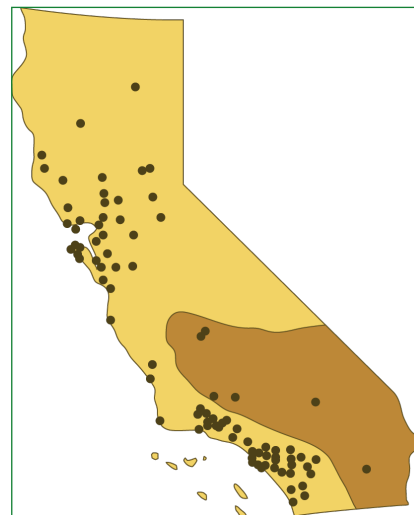


Figure 2. Diagnoses of brown recluse spider bites (represented by dots) in California, compared to the known distribution (shaded area) of the native California desert recluse. Some dots represent a city with more than one diagnoses.

Modified from Vetter et al. 2003, *Toxicon* 42:413-418. Redrawn by K. Fontecha, 2019.

ing and potentially leading to death. Some of these afflictions misdiagnosed as recluse bite include: cancer, leukemia, lymphoma, Lyme disease, bacterial infections, anthrax, adverse reaction to blood thinners, poison ivy, poison oak, chemical burn, thermal burn, and more. One of the most common conditions misdiagnosed as a spider bite is the bacterial infections caused by methicillin-resistant *Staphylococcus aureus* (MRSA).

To find out more about the different species of recluse spiders, identifying features of the brown recluse, and other spiders commonly mistaken for recluses, see the recently updated *Pest Notes: Brown Recluse and Other Recluse Spiders* on the UC IPM website.

—Richard S. Vetter, Staff Research Associate (retired),  
UC Riverside Entomology,  
[rick.vetter@ucr.edu](mailto:rick.vetter@ucr.edu)

**WHAT IS IPM?** Integrated Pest Management (IPM) programs focus on long-term prevention of pests or their damage through a combination of techniques including resistant plant varieties, biological control, physical or mechanical control, and modification of gardening and home maintenance practices to reduce conditions favorable for pests. Pesticides are part of IPM programs but are used only when needed. Products are selected and applied in a manner that minimizes risks to human health, beneficial and nontarget organisms, and the environment.

# Healthy Schools Act Report: Your Feedback is Needed!

**D**o you work at or service a school or multiple schools? If so, the California Department of Pesticide Regulation (DPR) is seeking your input about the Healthy Schools Act. Feedback from stakeholders—school district staff, child care providers, parents, teachers, and pest management professionals—is being collected throughout 2019.

## What is the Healthy Schools Act?

When pesticides are used at schools and child care centers in California, the Healthy Schools Act defines requirements for school and child care center staff, pest management professionals, and DPR. The law was originally passed by the California Legislature in 2000. In the almost 20 years since then, the law has been amended multiple times to expand the requirements. The requirements for school and child care center staff and pest management professionals include providing notification, submitting pesticide use reports, and completing training. DPR is required to facilitate the adoption of IPM practices and provide Healthy Schools Act compliance assistance throughout California.

## Why is DPR asking for input?

Assembly Bill 2816 (passed in 2018) directs DPR to write a report that evaluates and provides recommendations for the Healthy Schools Act. The



report will focus on implementation and compliance of each of the Healthy Schools Act requirements. DPR's School and Child Care IPM Team would like to learn directly from stakeholders about how they have implemented the law, what changes they have made to their pest management practices, and what recommendations they have for improving the law. Real-world experiences from stakeholders will help the Department to write a better report and give practical recommendations.

Stakeholders from throughout the state are encouraged to provide input by emailing us at [HSAinput@cdpr.ca.gov](mailto:HSAinput@cdpr.ca.gov). The Department's [Healthy Schools Act Legislative Report webpage](#) has additional information

about the report and stakeholder involvement.

The report is due to the Legislature by January 1, 2021, and we need input from you by **December 31, 2019**.

The Department of Pesticide Regulation's School and Child Care IPM Team would like to thank you in advance for contributing to this effort.

—Lisa Estridge,  
School and Child Care IPM Program,  
California Department of Pesticide  
Regulation,  
[Lisa.Estridge@cdpr.ca.gov](mailto:Lisa.Estridge@cdpr.ca.gov)



## Subscribe to the UC IPM urban pest management blog!

UC IPM's blog provides readers with timely information about pests in and around homes, gardens, landscapes, and structures in California. We post articles about common seasonal pests, invasive pests, beneficials, and new UC IPM resources, including new and revised *Pest Notes*, training events, and other educational materials for residential audiences and pest management professionals.

View or subscribe to the blog at [ucanr.edu/blogs/ucimpurbanpests/](http://ucanr.edu/blogs/ucimpurbanpests/).

# Ask the Expert!

**Q:** The cockroach baiting article mentions “enacted regulations.” What is this referring to?

**A:** The article is referring to three separate regulations intended to protect human health and the environment.

- In 2012, perimeter sprays of most pyrethroid insecticides were restricted with DPR’s new regulations. Band sprays to horizontal impervious surfaces and to doors and windows are now strictly prohibited, while band sprays to vertical impervious surfaces, such as walls, are still allowed within two feet of the grade level.

Read more about the 2012 pyrethroid restrictions in the November 2012 issue of the *Green Bulletin*. [ipm.ucanr.edu/PDF/PUBS/greenbulletin.2012.nov.pdf](http://ipm.ucanr.edu/PDF/PUBS/greenbulletin.2012.nov.pdf).

- California’s Healthy Schools Act requires that pest control companies providing services in schools and licensed child care centers report their pesticide use directly to DPR and receive training in IPM at schools. The HSA promotes IPM and seeks to minimize pesticide exposure to children in all public K–12 schools and licensed private child care centers.

To find more information and resources on the California Healthy Schools Act, visit [apps.cdpr.ca.gov/schoolipm/main.cfm](http://apps.cdpr.ca.gov/schoolipm/main.cfm).

- In 2017, DPR enacted new seasonal restrictions on the application of fipronil to reduce the runoff potential of this active ingredient into waterways. You can find out more about these restrictions in the Spring 2018 issue of the *Green Bulletin*. [ipm.ucanr.edu/PDF/PUBS/greenbulletin.2018.spring.pdf](http://ipm.ucanr.edu/PDF/PUBS/greenbulletin.2018.spring.pdf).



C. REYNOLDS, UCIPM

## Revised Pest Notes



### Soil Solarization for Gardens & Landscapes

Soil solarization is a technique home gardeners and professionals alike can use to control weeds and diseases. *Pest Notes: Soil Solarization for Gardens & Landscapes*, was recently updated by authors Jim Stapleton, Cheryl Wilen, and Richard Molinar of the University of California Cooperative Extension and the UC Statewide IPM Program. In this new version, you can find information on biosolarization, a technique that can increase the pesticidal effects of solarization treatments by incorporating organic materials into the soil prior to solarization.

Online at [ipm.ucanr.edu/PMG/PESTNOTES/pn74145.html](http://ipm.ucanr.edu/PMG/PESTNOTES/pn74145.html).

**Always read and carefully follow all precautions and safety instructions provided on the pesticide container label, as well as any other regulations regarding the use of pesticides. Not following label directions, even if they conflict with information provided herein, is a violation of state and federal law. No endorsements of named products are intended, nor is criticism implied of products not mentioned.**

### University of California Statewide Integrated Pest Management Program



2801 Second Street  
Davis, CA 95618-7774  
E-mail: [ucipm@ucanr.edu](mailto:ucipm@ucanr.edu)  
Online: [ipm.ucanr.edu/greenbulletin](http://ipm.ucanr.edu/greenbulletin)  
Editor: K. Windbiel-Rojas  
Production: B. Messenger-Sikes

Produced by the University of California Statewide IPM Program with partial funding from the USDA NIFA CPPM Extension Implementation Program. For more information about managing pests, contact your University of California Cooperative Extension office, or visit the UC IPM website at [ipm.ucanr.edu](http://ipm.ucanr.edu).

### ANR NONDISCRIMINATION AND AFFIRMATIVE ACTION POLICY STATEMENT

It is the policy of the University of California (UC) and the UC Division of Agriculture & Natural Resources not to engage in discrimination against or harassment of any person in any of its programs or activities. Complete nondiscrimination policy statement can be found at [ucanr.edu/sites/anrstaff/files/215244.pdf](http://ucanr.edu/sites/anrstaff/files/215244.pdf).

Inquiries regarding ANR’s nondiscrimination policies may be directed to John Fox, Affirmative Action Contact, University of California, Agriculture and Natural Resources, 2801 Second Street, Davis, CA 95618, (530) 750-1397.

### Connect with us!



@ucipmurban



@ucipm