

# TRENDS IN BED BUG MANAGEMENT, MONITORING AND TREATMENT

By Dr. Ron Harrison, Director of Technical Services, Orkin Commercial Services

## Bed Bugs: A Potential Threat to Any Business

The bed bug resurgence, which started about a decade ago after a 50-year absence, shows no signs of abating. Activity has risen steadily in the past 10 years in which bed bugs have spread beyond the bedroom. From hotels to hospitals and apartments to offices, bed bugs have been known to establish colonies anywhere they can find a food supply and harborage.

Bed bugs feed exclusively on blood and are attracted to carbon dioxide emitted by humans, as well as their body heat and body odor. Their bites can cause mild to serious skin reactions that result in soreness or itching. Additionally, bed bugs are incredibly resilient and are able to live up to 12 months without a meal, hitchhike with humans, and reproduce, often exponentially when undetected. Moreover, it's bed bugs' ability to withstand most traditional control measures that challenges pest management professionals. This has led to the pest management industry looking to find new, more effective methods to monitor and control them.

## New Research on Bed Bug Biology

The Centers for Disease Control and Prevention has issued a call for additional research on bed bugs to better understand the public health implications of bed bugs and to improve detection and control techniques. Several university research teams responded to the call and have made advancements in understanding more about bed bug biology.

- ◆ Researchers from North Carolina State University have found that bed bugs can sustain their populations through inbreeding, as most infestations show a single source of DNA. Unlike other species, consistent inbreeding does not seem to negatively affect the health of bed bug offspring.
- ◆ University of Cincinnati research shows that bed bugs can carry almost 50 pathogens and leave them behind in fecal matter. However, transmission of these pathogens to humans remains undocumented.
- ◆ Bed bugs' skin and cuticles aid them in resistance to pesticides, according to research from the University of Kentucky and Washington State University. In some cases, bed bugs produce substances that break down chemicals used in treatment at the molecular level. Bed bugs also have biological pumps that can remove chemicals from their cuticles before they can penetrate into the nerves.
- ◆ Researchers in Europe are studying the movement of bed bugs. While bed bugs are known to move around when they are hungry, scientists are also seeing movement in male bed bugs who wander around looking for a mate.
- ◆ Auburn University is looking at how bed bugs' metabolism is affected by starvation and feeding to determine how they are able to survive a year or longer without feeding. Findings thus far indicate that bed bugs are able to slow their metabolism when blood meals are scarce. Further research is being conducted to evaluate the effect temperature has on metabolism.
- ◆ While there are Do-It-Yourself products for treating bed bugs available, University of Minnesota researchers found that the active ingredients in many of these products are not effective against bed bugs. Furthermore, using these ineffective products can cause bed bugs to disperse, making them more difficult to manage.

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## ▼ New Threats to Businesses

A 2013 study by the National Pest Management Association and the University of Kentucky found that 99.6 percent of U.S. pest management professionals have encountered a bed bug infestation in the past year. Also, three out of four pest management providers consider bed bugs the most difficult pest to treat.

Orkin and its parent company Rollins saw a 20 percent increase in bed bug treatments from 2012 to 2013 alone. Many of those treatments occurred in businesses, which face several threats from bed bugs. An infestation can be costly to treat and negative media or social media attention can be even more costly to a business' reputation. In some cases, businesses face litigation related to the timely and effective detection and treatment of an infestation. The business implications range from remediation costs to HR concerns surrounding the origin of infestations and establishing a clear protocol for communication and course of action before a problem arises. What was once the purview of pest control is now inching into the PR, risk management and legal departments of many businesses.

**If your business has bed bugs, news can travel fast. Several bed bug registry sites are updated daily with new bed bug cases, including:**

- ◆ [bedbugreports.com](http://bedbugreports.com)
- ◆ [bedbugregistry.com](http://bedbugregistry.com)
- ◆ [registry.bedbugs.net](http://registry.bedbugs.net)
- ◆ [badbedbugs.com](http://badbedbugs.com)

## ▼ New Techniques on the Horizon

Given the resistance bed bugs have shown to traditional treatments, bed bug monitoring and treatment techniques continue to evolve as researchers look for new ways to combat this old pest.

### ◆ BIOMIMETICS

- ◆ Researchers from the Universities of California and Kentucky are working on synthetic materials that replicate the structure of kidney bean leaves, which have tiny hook-like hairs that immobilize bed bugs. This material could serve as a sustainable, cost-effective and non-toxic monitoring option.

### ◆ PHEROMONE MANIPULATION

- ◆ Controlling bed bug populations may lie in identifying and understanding the function of chemical compounds secreted by the pests, ranging from those that attract bed bugs to those that signal danger to repel them. Researchers are still finding new compounds that influence bed bug behavior that could be incorporated into monitoring devices and repellants.

### ◆ BED BUG PERFUMES

- ◆ SRI International is focusing on identifying the volatile compounds that are present in bed bug samples that create a signature perfume. If the constituents of that signature perfume are identified, they can be used to enhance detection and control of bed bugs.



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## ▼ New Techniques on the Horizon, cont'd

### ◆ PITFALL TRAPS

- ◆ A do-it-yourself bed bug trap developed by research scientists at Rutgers University uses a simple collection of household materials to attract bed bugs and capture them. However, only three-quarters of the bed bugs released during the test were collected in the trap, indicating more research is needed to develop a commercially viable detection unit.

### ◆ LIQUID BAIT

- ◆ North Carolina State University researchers are looking into a four-component liquid bait that 1) attracts; 2) entices to ingest; 3) supplies a pesticide, and 4) exposes the rest of the population. Such a substance could result in a cost-effective commercially available product for treatment.

### ◆ RNA MANIPULATION

- ◆ University of Kentucky researchers are using RNA interference to selectively turn off the enzyme inside bed bugs that breaks down insecticides. While resistance measures have worked in the lab, researchers are now aiming to recreate the results on a larger scale. Ultimately, these researchers aim to develop a product to shut down resistance in bed bugs and enable pesticides to work more effectively.

### ◆ EFFECTIVE REPELLANTS

- ◆ Researchers from New Mexico State University are evaluating repellants that people can apply to luggage and personal items, especially when they go to hotels. BASF and other manufacturers are also developing chemical treatments for bed bugs, some of which could be used proactively.

## ▼ Current Bed Bug Strategies

While new treatment and monitoring techniques are on the horizon, there are effective ways to monitor for bed bugs today.

### ◆ ONGOING VISUAL INSPECTIONS

- ◆ Highly trained specialists are needed to inspect common areas on a regular basis for the first signs of bed bugs. The provider may recommend bed bug monitors for any areas that have had past bed bug infestations. Some pest management providers will also educate staff about how to identify bed bugs and to enhance their monitoring activity.

### ◆ DNA TESTING

- ◆ Pest management providers can now determine whether bed bugs have been in an area by swabbing areas of the room for their DNA. DNA testing provides a history of what occurred in that area, while also allowing a business to have an area out of service for a much shorter period of time. However, DNA testing may also pick up the DNA of bed bugs that have already left an area.

### ◆ BED BUG DOGS

- ◆ Highly trained canines and their licensed technicians can detect bed bugs and their eggs, which the human eye may have a hard time detecting because of their extremely small size. They are trained similarly to dogs that sniff around for narcotics and explosives. And because they're trained to detect bed bug scents at all life cycle phases – from eggs to adults – they can find these elusive pests wherever they might be hiding.



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## Current Bed Bug Strategies, cont'd

If bed bugs are found in an area, work with a pest management professional to find the best available treatment. Current treatments include:

### ◆ DISPOSAL AND LAUNDERING OF INFESTED ITEMS

- ◆ If a pest management professional can determine that bed bug activity is limited to a few items, it may be best to either dispose of the items or put them in a dryer, which produces enough heat such that bed bugs cannot survive.

### ◆ HEAT TREATMENT

- ◆ Heat treatment is an effective bed bug treatment option, especially for sensitive environments that prefer not to use traditional control methods. Depending on the infestation's location, the provider will use a trailer or mobile heat-generating unit to pump heat into the area. Because the treatment is difficult to conduct and may present a hazard or cause damage to furniture if not managed correctly, only a trained, licensed professional should perform heat treatment.

### ◆ CHEMICAL TREATMENTS

- ◆ There are several chemical options for treating bed bugs today, including both residual and non-residual treatments. Everything from sprays, liquids and dusts to full fumigations are currently on the table. A licensed and trained pest management specialist can determine the most appropriate treatment for your business.

## The Bottom Line on Bed Bugs

There's still no silver bullet for treating bed bugs, but the research that is underway is moving us forward in the fight against bed bugs. For now, continue to follow your business plan for proactive inspection and protocols for suspected bed bug activity – if you don't have a bed bug plan, work with a pest management provider to create one. Stay in touch with your pest management professional about developments in this research and other emerging trends and technology. The renewed focus by the CDC is driving enterprising research that may soon deliver more effective preventive, monitoring and treatment techniques.

## SOURCES

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## SOURCES, CONT'D

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