



Got Bed Bugs? Don't Panic.

Few pests evoke as much terror as the bed bug, and a recent resurgence across the U.S. has homeowners and apartment dwellers taking desperate measures to eradicate the tenacious bloodsuckers, with some relying on dangerous pesticides and fly-by-night exterminators. These measures pose more dangers than any perceived short-term benefit.

While there is no magic bullet solution to bed bug eradication, there are many ways in which they can be effectively controlled without the use of dangerous chemical pesticides. Bed bugs can be controlled through a comprehensive treatment strategy that incorporates a variety of structural and mechanical methods, vigilant monitoring, sanitation and non-chemical and least-toxic treatments. To solve the bed bug problem nationwide, it will take a comprehensive public health campaign — public-service announcements, travel tips and perhaps even government-sponsored integrated pest management (IPM) programs for public housing and other high density areas.

Facts about Bed Bugs

What are bed bugs?

There are at least 92 bug species in the family Cimicidae, some of which are known to feed on humans, bats, birds and other warm-blooded animals. All bed bugs are wingless and feed by hematophagy, or blood feeding. Adults are between 1/8 and 1/4 of an inch, reddish-brown in color and flat and elliptical in shape, appearing somewhat like a flattened apple seed. The bed bug's tiny white eggs that are nearly invisible to the eye at approximately 1mm in length (the size of two grains of salt) and are deposited in batches of 10-50. Immature bed bugs, or nymphs, are smaller than adults (about the size of a pin head) and are yellowish or clear before eating and red or purple afterwards. Bed bugs' antennae are segmented in four pieces, and the insects' bodies are covered in short, golden hairs. Their legs are well-adapted to crawling up vertical surfaces, such as wood, paper, plaster, and with some difficulty, dirty glass. Bed bugs can survive three months to one year on a blood meal.

How do bed bugs get into your home?

People can get bed bug infestations in their home by visiting other infested homes or hotels where the vermin hide in mattresses, pillows and curtains. The bugs are stealth hitchhikers that climb onto bags, clothing and luggage. In the case of apartments and/or adjoining homes, bed bugs are able to travel by way of water pipes, wall voids, gutters and wiring. Rodents, birds, and bats can

serve as alternative hosts. If nearby habitat is the source of the insect, then it should be carefully moved away from the building and the bed bugs' entryway should be blocked. Otherwise, bed bugs have likely been introduced accidentally or are traveling between homes.

Should I be scared?

There are no documented cases of bed bugs transmitting diseases in humans, and they are not effective vectors of disease. Their medical significance is mainly limited to the itching and inflammation from their bites, which can be addressed with antihistamines and corticosteroids to reduce allergic reactions and antiseptic or antibiotic ointments to prevent infection.

The stigma associated with bed bugs can cause some to panic and spray toxic pesticides, including products not registered for bed bugs, without being educated on the problem. Even registered pesticides are linked to a variety of health effects, and because many of them are sprayed in areas where there is continuous human contact (beds), there is elevated concern for exposure.

Monitoring

How do you know if you have bed bugs?

Detecting bed bugs may be as easy as realizing you are waking up with sore spots or itchy welts, often in a line. However, identification shouldn't be based solely on the appearance of the bites,

since they can resemble bites caused by many other kinds of blood feeding insects, such as mosquitoes and fleas. Find the insects and identify them, either using the description mentioned here or by taking a specimen to an entomologist.

How can you detect bed bugs?

Bed bugs are nocturnal insects. The night is the time to see them active and feeding, mostly in the hours before dawn. If attempting to see bed bugs while active, use a red light. If you are unable to see them, look for evidence of bed bugs; carefully check furniture, linens or luggage brought into the house for bed bugs or rusty-orange stains from their fecal matter.

You can also try putting duct tape on bed legs (sticky side out), which may trap insects for identification. You can also use pheromones and traps which are available either online or at a local hardware store. Additionally, dogs can be trained to find bed bugs, and there are many companies that specialize in bed bug detection.⁴

It is not a bad idea to hire a professional to inspect your home for bed bugs as well. Long term management relies on frequent monitoring in order to assess the scope of the infestation and determine the necessary actions to implement.

Bed bugs (and their eggs) are most often found in the following places:

- Cracks and crevices of bed frames or headboards; and,
- Along the seams of mattresses, or within box springs.

They may also be found in the following places:

- Cracks and crevices of the floor, plaster or ceiling moldings;
- Along the edge of carpeting;
- Under loose wallpaper; behind picture frames, wall hangings, switch plates and outlets;
- In drapery pleats, the upholstery of sofas or chairs or the folds of clothes hanging in the closet;
- In the cracks and crevices of night stands or bureaus;
- Inside clocks, phones, televisions and smoke detectors; and,
- In more established infestations, bed bugs move further from the bed.

Prevent and Control

I HAVE BED BUGS! What do I do?

Before attempting any other control methods and especially before considering using a chemical control, do the following:

Eliminate Clutter

Clutter creates areas for the bed bugs to hide, making eradicating them excruciatingly difficult. When efforts to control bed bugs fail, it is almost always due to clutter and lack of cooperation with the pest control company's preparation and follow up instructions.

Items that are badly infested may be discarded; however, with the many treatment options available, it is not necessary. If you do decide to get rid of something from your home, it's imperative that it gets disposed of properly. Infested furniture (especially mattresses) haphazardly placed on the curb will only help spread

Bed Bug Pesticides Are Toxic!

These are the active ingredient chemicals¹ that can be found in products labeled for bed bug control and the health effects² that they have been linked to:

- **Bifenthrin** - Moderately Acutely Toxic, Cancer (possible), Endocrine Disruption, Neurotoxicity, Sensitizer/Irritant
- **Chlorfenapyr*** - Moderately Acutely Toxic, Cancer (potential), Kidney/Liver Damage
- **Cyfluthrin*** - Moderately Acutely Toxic, Reproductive Effects, Neurotoxicity, Kidney/Liver Damage, Sensitizer/Irritant
- **Deltamethrin*** - Moderately Acutely Toxic, Endocrine Disruption, Neurotoxicity, Sensitizer/Irritant
- **D-Phenothrin*** - Slightly Acutely Toxic, Neurotoxicity, Kidney/Liver Damage
- **Fenvalerate** - Slightly Acutely Toxic, Endocrine Disruption, Neurotoxicity, Kidney/Liver Damage, Sensitizer/Irritant
- **Hydroprene** - Slightly Acutely Toxic, Sensitizer/Irritant
- **Lamda Cyhalothrin** - Moderately Acutely Toxic, Endocrine Disruption, Neurotoxicity, Sensitizer/Irritant
- **Pyrethrins*** - Slightly Acutely Toxic, Cancer (likely), Sensitizer/Irritant
- **Permethrin*** - Moderately Acutely Toxic, Cancer (possible), Endocrine Disruption, Reproductive Effects, Neurotoxicity, Kidney/Liver Damage, Sensitizer/Irritant
- **Propoxur** - [This pesticide is not registered by EPA for bed bug control, however, it has been used illegally and some pest companies and states are attempting to get EPA to allow it.³] Highly Toxic, Cancer (probable), Reproductive Effects, Neurotoxicity, Kidney/Liver Damage

**These pesticides can be found in products that include uses for mattresses on the label.*

the bed bugs into other people's homes. Be sure to place a warning sign on any discarded furniture to discard others from picking it up. Additionally, bagging or wrapping the items can help prevent the bugs from spreading while they are en route to your garbage facility.

In addition to clutter inside your home, it is important to eliminate clutter outside too! Remove any animal habitats near, attached to, or inside the house, such as bat roosts or bird nests in the eaves, roof or attic, and exclude animals from entry. Deal with any rodent infestations using least-toxic management strategies (see Beyond Pesticides alternatives fact sheets - www.beyondpesticides.org/alternatives/factsheets). Move woodpiles and debris away from the structure, and eliminate all garbage.

Encasements and Isolating Items

Isolating and encasing furniture simplifies the habitat for treatment and prevents items from becoming infested. This will kill bed bugs only if insects have no chance for escape and if they are enclosed for long enough to starve. Recommendations based on old research suggests that bed bugs can live over a year without a meal, however, in a 2010 study by Andrea Polanco from the Miller Lab at Virginia Tech finds that bed bugs die within three months.⁵

Mattress and box spring encasements are costly at around \$50, however if you're considering the alternative of throwing out your mattress and getting a new one, this price pales in comparison. Encasements eliminate hiding spots for the bed bugs, which make early detection of an infestation easier. They will also trap any bed bugs that are hiding inside of the mattress if an infestation has already developed, and if left on for over a year, will effectively kill those trapped. Bed Bug Central⁶ has a great guide on buying mattress encasements.

Laundering Fabrics and Clothing

This is one of the best control methods from both a practical and efficacy standard. The heat in a clothing dryer is extremely effective at killing both bed bugs and the eggs; however it is important to note that the same container used to transport infected clothing and fabric should not be used to hold the freshly laundered clothing. You can use either dissolvable (GreenClean™ dissolvable laundry bags) or washable bags to transport clothes to the laundry room or facility. Wash and dry clothing for a full cycle on the hottest settings that the fabric will allow; once clothes are finished, place the clean clothing in a sealed bag to prevent re-infestation and keep non-essential items in the sealed bags for as long as practical or at least during the treatment period. For dry clean only clothing, or clothing that is already 'clean' but may be



Check for bedbugs on the seam of mattresses.

infested, simply put clothing in the dryer only and either run it for 30 minutes on the hottest setting, for a full cycle on a lower heat setting if the fabric will be damaged at the highest heat.

Vacuuming

Thorough vacuuming will get rid of any visible bed bugs along with any dirt that provides them shelter, helping to reduce populations. Make sure that the vacuum has a removable bag and seal and discard it after using. Additionally, it's best to choose a vacuum attachment that does not have bristles or brushes.

Why you shouldn't just spray

In addition to the health effects associated with toxic pesticides, the recent resurgence of bed bugs is partly due to the development of resistance to pesticide applications. The solution is not the usage of even more toxic pesticides to which these resilient insects would inevitably become resistant. Insecticides, which kill common household insects (such as cockroaches and ants) exposed bed bugs to a range of chemicals and allowed them to gradually build up resistance to these pesticides. As such, chemicals that were once effective at controlling bed bugs are no longer efficacious. Examples include esfenvalerate and other widely used synthetic pyrethroids. The problem must be approached strategically using collaborative methods and instituting IPM methods that are preventive and not reliant on hazardous chemicals.

Carefully vacuum rugs, floors, upholstered furniture, under beds, around bed legs, bed frames, and all cracks and crevices in the room. Scrubbing infested surfaces with a stiff brush will help dislodge eggs and using a powerful vacuum will help remove them from cracks and corners.

Caulk and Seal Crevices

Fill cracks, nooks or crannies in bed frame, floors, walls, the edge of baseboards and moldings with sealant. Re-glue loose wallpaper. Seal up cracks and crevices and fix screens, to prevent bed bug entrance from the outdoors.

The following options work best after the above steps options are taken:

Steam Treatments

Steam treatments, when properly applied, will kill all stages of bed bugs. Proper application includes using low moisture or “dry” steam from a commercial unit with a floor and upholstery attachment, moving the nozzle over the bed bugs at a rate of 20 seconds per linear foot.⁸ If it is applied with too much pressure, the bed bugs will be blown away. In order to diffuse the pressure an upholstery nozzle can be wrapped in a piece of fabric.

It’s important to note that many, if not most, pest management companies have steam units available. Due to the length of time it takes to apply, however, they might not routinely use it. If you hire a company to treat your home for bed bugs, be sure to ask them if they have this equipment available and request that they use this for treatment!

Heat Treatments

Depending on the quality of the preparation and treatment, using ambient heat can either provide complete control or significantly reduce bed bug population and infestation. A pest control company can use fans and a heat source, a space is heated to 130°F to 140°F and held until all areas within the space are heated to 120°F.⁹ A whole room can be heated, or a few items in a smaller, insulated area can be heated. It is not advisable for homeowners to do this task themselves, as there is the potential for causing a fire or serious burns.

To be the most effective all areas that are infested must reach 120°F. Opening drawers and peeling carpet away from baseboards can help this process. Though this method will work best after clutter has been eliminated, thorough vacuuming has taken place, and clothing/fabrics have been laundered and enclosed in a sealed plastic bag. However, in some cases where these steps are not possible, heat treatments may be still be performed effectively to reduce bed bug populations. These circumstances include cases where tenants or homeowners are physically unable to take the above steps.

Least-Toxic Chemical Treatment (Last Resort)

Open wall voids and treat with, sodium borate⁹ or food-grade diatomaceous earth.¹⁰ Wear a dust mask when handling powder formulations. Seal void completely. Clean vacuumed areas (see above) with diluted sodium borate (2 oz per quart of water). If you hire a professional, ask what if they plan to use any pesticides. Read about the health effects of pesticide ingredients on the Pesticide Gateway - www.beyondpesticides.org/gateway.

Footnotes

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- 2 Beyond Pesticides, 2010. Gateway on Pesticide Hazards and Safe Pest Management. <http://www.beyondpesticides.org/gateway/index.htm>
- 3 Beyond Pesticides, 2010. Under Pressure EPA Denies Ohio’s Request to Use Restricted Pesticide, Beyond Pesticides Daily News Blog. <http://www.beyondpesticides.org/dailynewsblog/?p=3719>
- 4 Green, P., 2010. A New Breed of Guard Dog Attacks Bedbugs. New York Times. <http://www.nytimes.com/2010/03/11/garden/11bedbug.html>
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Other Resources

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