



# **Homeowners' Do It Yourself (DIY) Bed Bug Control Guidance**

# Homeowners' DIY Bed Bug Control

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Bed bugs were once a common public health pest worldwide, but declined in incidence through the mid-20th century due to the wide scale usage of pesticides such as DDT and Malathion. During the late 1990s however, bed bugs began a dramatic resurgence and worldwide there are reports of increasing numbers of infestations. No one knows for certain what caused the resurgence of bed bugs in the United States.

The Georgia Department of Public Health, Environmental Health Program provides primary prevention through a combination of surveillance, education, enforcement, and assessment programs designed to identify, prevent, and abate the environmental conditions that adversely impact human health. One of the many mandates for the Georgia Department of Public Health, Environmental Health Program is that of inspecting tourist accommodations in order to "minimize illnesses and injuries associated with unsanitary or hazardous conditions in Georgia's lodging industry." County Environmental Health Specialists working for the local health authority inspect these facilities twice a year and when there is a complaint, including complaints about bed bugs.

Bed bugs have become a problem within dwellings of all kinds, including homes, apartments, hotels, cruise ships, dormitories and shelters. While we associate bed bugs with unsanitary conditions, the problem may be found in the cleanest of homes, hotels or other buildings. The purpose of this guide is to provide homeowners basic information about the biology and health significance of these pests, to offer guidance on inspection for bed bugs, and to provide information on how to safely and effectively control bed bugs in your home.

## Acknowledgements

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## Authors

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- Michigan Department of Community Health ([www.michigan.gov/mdch](http://www.michigan.gov/mdch))

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# Homeowners' DIY Bed Bug Control

## Introduction

Bed bugs have become a problem within dwellings of all kinds, including homes, apartments, hotels, cruise ships, dormitories and shelters. While we associate bed bugs with unsanitary conditions, the problem may be found in the cleanest of homes, hotels or other buildings.

Bed bugs lead a very cryptic lifestyle. As a result, bed bugs are often present for weeks or even months before a single bug is ever seen by the occupants of an infested structure.

Bed bugs are hard to control, and the best plan of action is to hire a pest control company, but if that isn't possible then there are a number of steps you will need to follow to get the bed bug population under control.

Using insecticides alone to control bed bugs is not the best solution. Cleaning, getting rid of clutter and taking a few other steps are just as important as applying insecticide when you're trying to control bed bugs.

This booklet is designed to walk you through how to:

- Inspect your home for bed bugs.
- Decide whether to try to get rid of the bed bugs yourself or to call in a pest management professional to do it.
- Treat your home for bed bugs.

## What are bed bugs?

Bed bugs are small wingless insects that feed solely upon the blood of warm-blooded animals. They are sometimes mistaken for ticks or cock-roaches. A mature bed bug is oval-bodied, brown to red-brown in color, wingless and flattened top to bottom. Unfed bugs are 1/4 to 3/8 inch long and the upper surface of the body has a crinkled appearance. A bed bug that has recently fed is engorged with blood, dull red in color, and the body is elongated and swollen. Eggs are white and are about 1/25 inch long and slightly curved. Newly hatched bed bugs are nearly colorless or straw-colored.

Bed bugs are active mainly at night; they reach peak activity before dawn. During the daytime, they prefer to hide close to where people sleep. Their flattened bodies enable them to fit into tiny crevices - especially those associated with mattresses, box springs, bed frames, and headboards. Bed bugs do not have nests like ants or bees, but do tend to congregate in habitual hiding places. Bed bugs do not fly, but can move quickly over floors, walls, ceilings and other

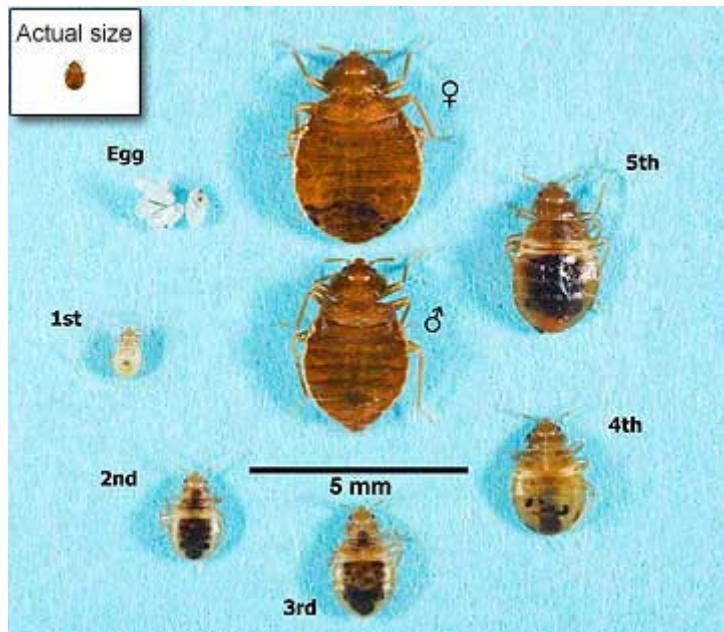


Photo Courtesy of Stephen Doggett, Department of Medical Entomology, Westmead Hospital, Sydney, Australia

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surfaces.

The bite of a bed bug is painless. The amount of blood loss due to bed bug feeding typically does not adversely affect the host. Unlike flea bites, which occur mainly around the ankles, bed bugs feed on any bare skin exposed while sleeping. Skin reactions are associated with the saliva injected during feeding by the bed bug. Bed bugs have never been proven to biologically transmit any human pathogen, including HIV and hepatitis B.

## Inspecting for Bed Bugs in Your Home

Bed bugs leave fecal stains in the areas they inhabit. These stains are actually partially digested blood. As the blood is digested it turns black and therefore the bed bug droppings usually consist of several black spots in one area. The fecal spots will not flake off if rubbed and will smear if wiped with a wet rag.

Because bed bugs can hide in virtually any crack and crevice, efforts should be concentrated on dark, isolated, and protected areas. Bed bugs prefer wood, paper and fabric surfaces and so these materials should receive special attention during the inspection process.



*Photo: Stephen Doggett, © The Department of Medical Entomology, ICPMR, Australia*

| Tools you will need for an inspection: | What to look for:         |
|--|---------------------------|
| A bright flashlight                    | Live or dead bed bugs     |
| A magnifying glass                     | Empty shed skins          |
| A long, thin probe                     | Eggs                      |
| A vacuum cleaner with crevice tool     | Fecal stains or droppings |
| Latex or rubber gloves                 |                           |
| Paper towels                           |                           |

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## How to look:

Start to look for bed bugs within 15 or 20 feet of where people sleep. (This is where bed bugs are most likely to be found.) Move carefully across the whole area. Angle your flashlight beam along the surface you're inspecting to help make eggs and newly hatched bed bugs easier to see.

It's important that you look at all of the cracks and crevices that might hold bed bugs so that you don't miss anything. Stick a probe such as a putty knife, playing card or nail file into the cracks to force out any bed bugs that might be hiding in them. A puff from a canister of compressed air can also work.

You may want to take notes on where you find bed bugs to make it easier to remember all of the places that will need to be treated later.

## Where to look:

- Furniture must be inspected carefully, even to the point of dismantling the bed for easier inspection and possible treatment. Look especially behind the headboard. Check the mattress and box spring carefully, particularly the seams and dust cover on the underside of the box spring.
- Check under and behind other pieces of furniture, such as chairs, couches, dressers, etc. It may be necessary to remove the dust covers on the undersides of chairs and couches. Remove slipcovers and inspect them. Pull drawers out of dressers, inspect them carefully and examine the interior of the dresser. Check under lamps on nightstands.
- Remove and inspect objects, such as pictures, mirrors, curtains, etc., that are hung or mounted on walls. Inspect blinds, drapes, and other window coverings.
- Check obvious cracks and crevices along the baseboards, particularly the back framing pieces. Check window frames and trim. Check crown molding.
- Inspect torn or loose wallpaper and decorative borders. Check cracks in plaster or drywall.
- Check along the edges of carpets and rugs, as well as underneath any floor coverings.
- Check clothing and other items stored in areas where bed bugs have been found. Inspect bed linens, blankets, and comforters.
- Check carefully behind electrical outlets and switches and inside smoke detectors, clocks, phones, computers, and other electrical devices.
- Remove and inspect clutter.

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Places to Look in Your Home.

### Where to Look for Bed Bugs



<https://dph.georgia.gov/environmental-health/insects-and-diseases>

### After the Inspection

There are three possible results of the inspection: no bed bugs found, bed bugs possibly found, bed bugs definitely found.

If no bed bugs are found, you might want to take steps to help keep them from getting them. Keep looking if you still think you've got bed bugs, or hire a professional to inspect your home, as bed bugs can be hard to find.

If insects are found that might be bed bugs, take or send a few of the insects to an expert to find out whether they really are bed bugs. Experts can be found at local environmental health offices, the state environmental health office, or extension services. While you wait to find out for sure, it's time to plan what to do if they really are bed bugs.

If you find bed bugs, it is time to plan how to manage the infestation in your home.

**Be aware, there is a lot of misinformation on the internet. And, do not assume that the picture on the internet that is supposed to be a bed bug really is a bed bug.**

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## Treating Your Home

After your search, you know which parts of your home have bed bugs. And if you've crushed and vacuumed up all of the bed bugs that you found while you searched, you've already made progress. It's time to take the next steps in the process of ridding your home of those pesky critters.

Here is a list of the steps to take; each step is explained in the next sections. Doing as many of these steps as possible will get you the best results. Bed bug treatment takes time, and you will have to repeat some of the steps, but remember that every time you do, you're closer to being free of bed bugs.

1. Gather your tools.
2. Isolate and protect the beds.
3. Clean and organize.
4. Vacuum everywhere.
5. Make repairs.
6. Decide whether to treat or throw away infested items.
7. Wash surfaces and furniture.
8. Treat with steam or dry heat.
9. Treat with insecticide.

## Steps to Controlling Bed Bugs in Your Home

1. Gather your tools - the tools you will need to fight bed bugs includes:
  - Mattress covers for all box springs and mattresses
  - Commercial or homemade bed bug interceptors
  - Vacuum cleaner with a crevice tool
  - Caulk gun and caulk
  - Screwdriver and other hand tools
  - Bucket of hot, soapy water
  - Sponge
  - Plastic bags or bins
  - Insecticide products (if you are not hiring a professional)

Read and follow the labels of any insecticidal products you use, it is the law.

- Steam cleaner (optional) or portable heating device

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2. Isolate and protect the beds - start by isolating the beds to help reduce the bed bug bites you get and improve your quality of life. Then, encase the mattresses to keep more bed bugs from getting into them.

- Vacuum the bedroom carefully to cut the number of bed bugs, especially in the sleeping areas and around and under the bed.
- Inspect and clean the headboards and bed frames with standard household cleaners to get rid of any bed bugs you see.
- Enclose the mattresses and box springs in sturdy zippered covers labeled for bed bugs. Look for smooth, strong covers that don't have any folds around the zippers (folds can hide bed bugs). The covers will trap any bed bugs that are already inside them and will help keep more bed bugs from getting into them. The smooth covers are also easy to inspect, vacuum and clean. If a cover rips or tears, replace it or fix it with duct tape.
- Move the beds away from the wall. Take off any bed skirts and make sure the bedding doesn't touch the floor. (This will help keep bed bugs from climbing onto the bed.)



*Interceptor device under furniture leg.*

*Photo: University of Nebraska-Lincoln Extension*

to replace them right away.

- Put interceptor devices under each leg of the beds. Interceptor devices keep bed bugs from crawling up from the floor and help you monitor for bed bugs. You can buy ready-to-use bed bug interceptor devices on the internet, or make them by placing each leg of the bed into a sturdy plastic dish, empty soup can or cream cheese container with a thin layer of cooking oil in it. If the interceptors crack, be sure

3. Clean and organize - Cleaning and organizing a room or home to help get rid of bed bugs can be a lot of work. It's very important though, because bed bugs thrive in cluttered living areas.

- A bucket of hot water with soap or detergent and a vacuum cleaner will help you clean up bed bug debris and allergens, making the environment healthier for the people living there.
- Inspect, treat and seal all movable items from infested rooms in plastic bags or tote bins that don't have air holes.
- Pick up everything from the floor and remove all items from shelves, closets, dressers, wardrobes, and other furniture and storage containers.

### Suggested cleaning methods for various items:

- Washable clothes, shoes, stuffed toys, pillows and bedding – Wash these items

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in hot water and dry them on the highest heat setting possible. (Note: Any clean clothes don't have to be rewashed. Just put them in the dryer on high heat for 30 minutes.)

- Hard toys, electronics, books and other papers, and breakable items that can't be washed – Store items like this in sealed plastic bags or bins until you can inspect and treat them.
- Hard toys and breakable items that can be washed – Some hard toys (such as building blocks and plastic figures) can be put into washing bags and run through a dishwasher with "heated dry" turned on. It's probably best to hand wash breakable items.
  - Once items have been washed or treated, store them in plastic bags or bins so that bed bugs can't reinfest them. You can remove items from the bags and bins once you've killed all of the bed bugs.



After everything in a room has been cleared, move all furniture away from the walls. You may want to install interceptors on the legs of the furniture, too.

4. Vacuum the entire home - Vacuuming is one of the best ways to remove the live bed bugs that are hiding in a room. A regular vacuum is fine, but a vacuum cleaner with a HEPA (high-efficiency) filter will also help reduce the spread of allergens. A crevice tool will help focus the vacuum's suction in small spaces, cracks and crevices. You could also use a brush attachment, which may help in dislodging eggs.
  - How to vacuum - Once all of the personal items, clothing and bedding in the room have been organized and bagged, it's time to start vacuuming.
    - Start with the bed. Pay special attention to the mattress and box spring seams. Take the mattress and box spring off of the bed frame. Inspect and vacuum all surfaces to remove all loose dirt and visible bed bugs. Use a brush or crevice tool with a scraping motion to loosen bed bugs and eggs.
    - Vacuum inside and under the drawers of night stands, dressers and other furniture. Be sure to vacuum any screw and nail holes.
    - Vacuum along the bottoms of the walls and all of the moldings and other trim. If molding or wallpaper is loose, lift or remove it and vacuum underneath or behind it. Make sure to vacuum around the heating vents.
    - Vacuum upholstered furniture such as couches and recliners and their cushions. Pay special attention to all cracks and folds. Turn the furniture over to vacuum the undersides.
  - How to clean and store the vacuum cleaner

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- When you're done vacuuming, the vacuum cleaner may have live bed bugs and eggs inside.
- Remove the entire vacuum bag or debris container (if you have a bagless vacuum) after each use. Put the whole vacuum bag or the container contents into a plastic bag. Seal the plastic bag with tape and throw it outside in the garbage. Wash the debris container with hot water and detergent.
- Wash the vacuum brush attachment with hot water and detergent to remove any live bugs or eggs caught in the bristles.
- After you've cleaned the vacuum cleaner and attachments, store them in large plastic garbage bags that are closed tightly.

5. Make repairs home repairs - Making simple repairs will help control bed bugs, get rid of their breeding areas, and keep them from coming back.

- Caulk along moldings and joints with silicone sealant (silicone or latex will work, however silicone is generally not paintable) to close off bed bug hiding spots. Pay attention to the floors, doors, cabinets, windows and other places bed bugs could hide, small cracks and crevices, any window or door molding that a dime can slide under, and old screw or hardware holes in wooden furniture. Try to fill in screw heads and nail holes on the bottom of furniture. Use a credit card (or similar card) to check cracks and crevices. If the card can fit, so can a bed bug.
- Inspect and repair wall outlets and switch plates to reduce gaps that could let bed bugs into the room.
- Seal the openings around pipes and other objects that come through walls, floors and ceilings to keep bed bugs from moving to and from nearby rooms or units.
- Repair or remove peeling wallpaper. Repair cracks in walls and floors.

6. Throw away infested items - You may not have to throw away everything that has been infested with bed bugs. But some things may have so many bed bugs and be so hard to clean that throwing them away is the best choice.

- Things that you might be able to save:
  - Mattresses or box springs that have been infested with bed bugs. Put the kinds of sturdy covers mentioned earlier on them instead.
  - Furniture items such as dressers, night stands, bookshelves, desks and tables can be successfully cleaned or treated with insecticides.
- Things difficult to treat (not worth saving):
  - Some furniture items, such as upholstered couches and recliners, or

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wicker furniture, may be very difficult to treat and can be thrown away. If you throw away infested furniture or mattresses, wrap them in plastic and put labels on them that read “infested with bed bugs.” You should also destroy or deface the infested items to keep other people from taking and reusing them. Slash mattresses and upholstered furniture, break box spring frames, and label items with the words “bed bugs” to prevent the spread of bed bugs in your community.

- Small items that aren’t washable, that are heavily infested or that aren’t worth the hassle of trying to save. Put these smaller items that you plan to throw away into plastic garbage bags before moving them around. That way you won’t release bed bugs into other parts of your home. Label the bags with the words “bed bugs” before taking them outside. Keep the bags in a secure area until trash pickup day; if you can, so that other people aren’t tempted to take them.

## 7. Wash surfaces and furniture

- Wash all furniture that isn’t upholstered and all hard surfaces in the room using soap and water. Be sure to wash the crevices and spaces in the frames.
- Wash cribs and children’s bed frames with soap and water. Don’t use insecticides on children’s beds or bedding.
- Wash the floors, moldings, window sills and walls thoroughly.
- Pet beds may also become infested with bed bugs. These can be placed in the clothes dryer, steamed (see below), or may need to be thrown out.

## 8. Treat with steam - Steam treatments are optional but recommended, because they will kill all life stages of bed bugs, including the eggs, and can be used in places where insecticides cannot.

- Steam is a good partner to use with most insecticides, which won’t kill bed bug eggs and can’t be applied to certain areas. If you are using both steam and insecticides, always do the steam cleaning before you apply insecticides. Otherwise, the steam is likely to remove your insecticide.
- You can use steam on mattresses and upholstered furniture, such as couches and chairs. One of the drawbacks of steam is that it will only kill bed bugs in places where the steam can reach. You can help the steam reach up to three-quarters of an inch into mattresses and furniture if you move the nozzle slowly and almost 2.5 inches into cracks. Take about 20 seconds to move the nozzle 12 inches ([https://www.youtube.com/watch?v=f\\_tTehoyQng](https://www.youtube.com/watch?v=f_tTehoyQng)).
- Do not try to steam electrical outlets. Steam and electricity are not a good mix.
- Steam is dangerously hot. Don’t forget to stay focused and safe.

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- Immediately after steam treatment the surface should be recording at least a temperature of 70 to 80 degrees C (=158 to 176 degrees F)
- A professional steam machine with a large water-holding tank, many types of attachments and variable output rates is best. You may be able to rent a steam cleaner from a local grocery, hardware or home improvement store. Dry-steam or low-vapor steamers are better because they use and leave behind less moisture. Clean the steam machine before you return it to make sure no bed bugs hitch a ride to the store on it.

9. Treat with dry heat – Portable heating chambers can heat treat items that you can't put in a clothes washer or dryer. These products plug into the wall, and will heat the items inside enough to kill bed bugs and eggs.

- There are several portable heat devices currently on the market into which you can place packed or unpacked luggage, stuffed animals, shoes, "unwashable" clothing, and hard-to-treat items such as electronics, artwork and books that can't be put in a clothes washer or dryer. Make sure that any items you put in the heating unit won't be damaged by high temperatures.
  - You leave your stuff in it for several hours while it heats up to kill bed bugs and eggs inside.
  - You need to carefully follow the instructions and monitor the temperature at the core of your items, in order to make sure 120 degrees F is attained throughout, and then leave the unit running for an hour after the temperature is reached.
- Many people who travel a lot use these products to treat their luggage when they return home.
- Professional pest management companies may also have larger heating chambers available for you to use or rent.
- Only use heat chambers that are designed for killing bed bugs.
- Turning up the heat in your home or using space heaters won't work and may create a fire hazard.

10. Treat with insecticides - Insecticides alone won't get rid of a bed bug infestation, but they're an important tool when combined with the steps outlined earlier.

- If you can afford it, hiring a pest management professional may be a better choice than applying insecticides yourself. Professionals are trained in how to safely and effectively use pesticides in a home.

Note: Even if you decide to hire a professional, you still need to do most of the steps described earlier.

- If you decide to use insecticides to try to control bed bugs on your own, you must read and follow the insecticide label directions. The improper use of insecticides may hurt or make you sick, and it may even make the bed bugs

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harder to control. The information that follows will help you choose and safely apply the right products.

## Insecticide Use

### Using Insecticides Safely

When it comes to insecticides, “the label is the law.” You must always read and follow the directions on the label of any insecticide you plan to use. A set of insecticide “Do’s and Don’ts” follows.

Do:

- Purchase insecticides that have full label directions and are registered with the U.S. Environmental Protection Agency (it will have an EPA registration number listed on the front of the container).
- Always read the label to determine how and where the insecticide should be applied.
- Choose a product that is appropriate for the indoor areas you need to treat.
- Use protective gloves, safety goggles, and facemasks; and any other personal protective equipment if it is required by the directions on the label.
- Ask questions if you are unsure how to use an insecticide. The National Pesticide Information Center can help.
- Dispose of empty containers according to product label directions.

Don’t:

- Don’t use an insecticide indoors that is labeled only for garden, outdoor or agricultural use. Doing so is illegal and dangerous, and may cause serious health problems for you, pets, or for anyone else who lives in your home.
- Don’t use a product that appears to be homemade or custom formulated because they may be dangerous or not meant to be applied around people or pets. You should only use EPA-registered products that come in their original packaging.
- Don’t apply any products to your skin in an attempt to kill or repel bed bugs. This will be ineffective and dangerous to your health. Mosquito repellants, lice shampoos and similar products won’t prevent bed bug bites.
- Don’t use more insecticide than the label directions allow. Doing so is illegal and could make the problem worse or cause serious health problems.
- Don’t use any insecticide on a mattress or bedding unless the product label says it’s okay to use it that way.
- Don’t use “bug bombs” as they are not very effective and also disperse the pesticide to

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many surfaces of the home that people and pets contact on a daily basis.

## Insecticide Labels

To help get rid of bed bugs, use an insecticide whose label:

- Lists bed bugs as one of the insects it can be used against.
- Says it's meant for indoor use.
- Gives clear instructions for its use and safety.

Remember that insecticides must be applied according to the label directions. If you don't follow the instructions you face several risks:

- If you apply more insecticide than the label recommends you and your children and pets could get very sick from it, or health problems you already have could get worse.
- It takes less insecticide to make children and pets sick than it does adults.
- Unskilled use of insecticides can spread bed bugs into nearby rooms and units.
- It's illegal to use an insecticide without following its label directions.

## Renters and Insecticide Use

Renters should report suspected bed bug infestations to their landlord or building managers and should not apply insecticides themselves. Landlords or property managers should respond promptly when they are notified that a unit may have bed bugs. It's also recommended that they hire a licensed pest control company to inspect and treat infested units. It's important that residents and landlords work together to get rid of bed bugs. Most of the information in this booklet will be useful in preparing an apartment for insecticide treatment by a professional.

If you don't receive an adequate response from your manager, consider contacting your city's code enforcement or buildings department. Be aware, Georgia has no bed bug laws, so specific bed bug language may be written into the rental agreement.

Local laws may ban the use of insecticides by renters in government housing. HUD does have specific guidelines for bed bug control. If you live in HUD housing and have bed bug questions, please contact your local or State HUD office.

## Types and Uses of Insecticides

### 1. Insecticidal Dusts

Several insecticidal dusts are labeled for bed bug control. Many dusts kill bed bugs by damaging their exoskeleton (hard outer skin). These dusts work very well because bed bugs are always susceptible to being damaged by the dust particles. Apply insecticidal dusts in protected areas where there is very little risk of the dust drifting into open areas.

Dusts are the best choice for treating cracks where bed bugs like to hide, such as behind headboards, along the bed frame, and under the baseboards. If dust is applied in these areas, the bed bugs will become coated in the dust and won't be able to escape. Dusts can be puffed

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in behind electrical outlets and switch plates and used in the empty spaces behind walls to catch bed bugs travelling from one room to another.

One of the disadvantages of dusts is that they can't be used in as many places as liquids. It's important to follow the label directions on where to apply the dust and how much to use. This is because dusts are easily moved on air currents, and people could breathe them in. It is not recommended or safe to heavily cover surfaces with dusts. A thin layer of dust is effective. If there is exposed dust, wipe it up with a wet rag and dispose of the rag and dust in the trash.

- **Diatomaceous Earth**

Diatomaceous earth (DE) is a powder made of the fossilized remains of a kind of algae. It's popular for bed bug control because it's natural and doesn't contain any synthetic insecticides. The downside is that it doesn't work as quickly or as well as synthetic insecticides – it may take several days for the exposed bugs to die (<http://www.pctonline.com/article/pct1213-diatomaceous-earth-study/>). DE kills bed bugs by damaging their exoskeleton. Make sure you're buying DE that is labeled for use as an insecticide.

Note that although DE is natural, it can still damage the lungs of any person or animal that breathes it in. Don't apply more than the recommended amount – just apply a very fine layer into cracks and crevices with a bulb duster or by lightly squeezing the bottle or container.

- **Other Insecticidal Dusts**

Some insecticidal dusts combine silica (which works the same way as DE) with other insecticides. These can be very effective because they kill bed bugs in two different ways: by physically damaging the exoskeleton and by attacking the nervous system.

### 2. Liquid Insecticides

Liquid insecticides don't work as well as dusts for killing bed bugs. Dusts should be your first choice in any area where they can be used; only use liquid insecticides for areas where you can't use dust. Liquid insecticides come in many ready-to-use formulas, which means no mixing is required. Some liquids are sold in concentrated forms. With these, you have to figure out how much water to add to cut them to the right strength, mix them with water and then place the solution into a spray bottle or other applicator.

If you spray the bed bugs themselves with a liquid insecticide they will usually die quickly. Liquid sprays also leave behind chemicals that are meant to kill bed bugs after the product has dried. Unfortunately, bed bugs don't usually die just from walking across a sprayed area. They need to sit on the dried product – sometimes for several days – to absorb enough to kill them. This is why most label directions recommend that you only spray cracks, baseboards, seams

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and smaller areas where bed bugs like to hide. For instance, don't spray the entire floor of a room, or the surfaces of beds or furniture, with a liquid insecticide. Follow the label use directions.

- **Aerosol Sprays**

Aerosol products are insecticides made with a propellant that allows them to be sprayed out of a can into cracks and crevices. Many different insecticides are sold in aerosol form, and each insecticide has different directions about where the product can be used. For example, one aerosol label may say that the product can be sprayed directly on an infested mattress, while another product label doesn't allow the spray to be applied on fabric surfaces. Read and follow the use directions on the label.

Like all liquid insecticides, aerosols work best when you directly spray the live bed bugs with the product. However, a few aerosols leave residues that are active for several days after they've been applied.

- **Natural or Repellent Sprays**

Many products can kill bed bugs "on contact." Many spray and liquid insecticides on the market claim to be "all-natural" and say they will both kill and repel bed bugs. In fact, these products may only kill bed bugs that are sprayed directly with the spray. Once such a spray has dried, it will have no killing effect on bed bugs. You could use one of these sprays to kill bed bugs that you find during your inspection, but crushing the bugs or vacuuming them up works just as well. These sprays have only a limited usefulness, and will not keep bed bugs from biting you. Avoid purchasing "natural products" that aren't registered with either the EPA or MDARD because they may not be effective, labeled correctly or safe.

### 3. Foggers or "Bug Bombs"

Don't use total release foggers (also called "bug bombs") to treat bed bugs. Even fogging products that specifically claim to be for bed bugs haven't worked well in independent tests. Because of the way they work, foggers can't reach the tiny cracks and crevices where bed bugs hide. Foggers can, however, cause bed bugs to move into new rooms or apartments, making an infestation even harder to treat. Foggers also scatter insecticides throughout the living area, which could expose you and your children and pets to the insecticide residue.

### 4. Pesticide Strips – container fumigation

Another option for treating fragile or heat-sensitive items is to place them in airtight containers with dichlorvos (Nuvan) strips. These strips work by releasing odorless vapors that build up

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inside the container over several days and kill bed bugs. Professional pest management companies may offer this service, or you could buy the strips yourself.

Before you buy or use Nuvan Prostrips®, make sure they're labeled for use against bed bugs (some aren't), and include instructions for how to use them in a sealed container such as a plastic bag or bin. Always follow the label instructions, and carefully seal the containers so that no air can get in or out. This will help keep people and pets from breathing in the vapors.

Store the sealed containers in a shed, garage or other site outside of the main living area so that if any vapors do escape there will be less danger to people and pets. When it's time to open the sealed container, do it outside or in a well-ventilated area. Be sure to dispose of used strips according to the label directions.

### Are the Bed Bugs Gone from My Home? Post-Treatment Evaluation

As you've now learned, it takes a lot of time and work to get rid of bed bugs. If you've followed the steps outlined in this booklet, you should see fewer bed bugs than you did before.

No matter what cleanup methods you use, some adult bed bugs and eggs may still survive. In fact, it usually takes more than one insecticide application to get rid of all of the bed bugs. You may have to use different combinations of management methods several times over several weeks. Some of the management methods, like inspection and vacuuming, should be repeated every few days. Reapply insecticides according to the label instructions (normally every two to four weeks) until you haven't had any bites and haven't seen any bed bugs or new signs of them for two weeks.

A treatment may fail for some or all of the reasons that follow:

- The home has too much clutter for the bed bugs to hide in.
- The bed bugs may have been in a different room or unit that wasn't treated. You (or your landlord) may need to inspect nearby rooms and units for bed bugs. (Remember to inspect for bed bugs **before** you treat a room or unit so you don't treat a space that doesn't need it.)
- An insecticide didn't work or was applied in the wrong places.
- Infested items were brought back into the room or home.

Monitoring bed bug activity with sticky traps and interceptors can give you an early warning of the need to attack the problem again. Try not to be too discouraged if you have to repeat the

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whole inspection and treatment process. You **can** get back to the point where you go to bed without worrying about the bed bugs biting.

### A Checklist for Homeowner Do-It-Yourselfers

So, you think you might have bed bugs. Before you do anything, there are a few steps that should be followed:

1. Make sure you really have bed bugs.

Bed bugs are small wingless insects that feed solely upon the blood of warm-blooded animals. They are sometimes mistaken for ticks or cockroaches. A mature bed bug is oval-bodied, brown to red-brown in color, wingless and flattened top to bottom. Unfed bugs are 1/4 to 3/8 inch long and the upper surface of the body has a crinkled appearance. A bed bug that has recently fed is engorged with blood, dull red in color, and the body is elongated and swollen. Eggs are white and are about 1/25 inch long and slightly curved. Newly hatched bed bugs are nearly colorless or straw-colored.

You cannot tell from a few bites that you have bed bugs, and not everyone reacts to bed bug bites. You do need to find actual bugs to know for sure. Bugs you collect should be taken to an Extension Agent, Environmental Health Specialist, or Entomologist for identification. Do not rely on the internet for identification as not all information found there is accurate.

2. Do some research on your legal control options.

Bed bugs may in fact be the most challenging pest problem currently facing the pest control industry. There are many pests that homeowners and building managers may decide to try and control on their own, but bed bugs should not be one of them. Even the most experienced pest management firms will have their work cut out for them and it may be difficult to guarantee the total elimination of bed bugs from some infested environments. Reduction of bed bug populations is not difficult in most cases. However, it can be extremely difficult, if not impossible, to eliminate every last bug in some situations. If even one adult female survives, the environment may become re-infested. The longer bed bugs exist without being detected, the greater their opportunity to disperse within the environment, making it harder to find and eliminate 100% of the population. Bed bug control takes hard work, follow-up efforts and it can be expensive. However, if you can afford it, hiring a professional may be the best way to get rid of bed bugs quickly and safely rather than doing the entire treatment yourself.

3. Hiring a professional.

Because these pests are so difficult to exterminate, it is important that you find a bed bug pest control operator (PCO) who is experienced, reputable and capable of handling whatever might come up. Below are a few tips to help you find the best man (or woman) for the job.

#### Steps for Hiring a Pest Control Operator

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Step 1 – Get in touch with licensed pest management companies with a bed bug PCO that has a long track record and inquire as to their bed bug experience level. Though you may have to pay a little extra for their services, you'll save yourself a large sum of money down the road getting the issue addressed properly the first time.

Step 2 – If you have area friends or family members whom you know have dealt with similar issues in the past, contact them to find out who they used.

Step 3 – Schedule an appointment for the pest control operator to come by your property and walk through to make certain that you're actually dealing with a bed bug issue. Speak with them regarding their proposed treatments. If possible, you'll want to obtain at least 2-3 different opinions and quotes for various companies in your area before making a decision.

Step 4 – Decide on someone who offers the most effective and comprehensive plan to address your issues rather than the professional who offers the lowest rate. Though it may sound nice, avoid believing any service claiming to have you rid of your pest in one solitary treatment. In reality, it will take weeks working closely with a specialist to eliminate the issue.

Step 5 – In most cases, the property owner should expect to be in for just as much work as the pest control operator. A representative should come to your property to provide inspections and treatments. The property owner will need to reduce clutter, vacuum regularly, and monitor bed bugs in the periods between visits. A written integrated pest management (IPM) plan should be requested from the pest control operator. This plan should detail the methods and insecticides to be used by the pest control operator and describe the efforts expected by the building manager or home owner.

### 4. Make a plan.

If you decide to treat the bed bugs yourself, don't just start spraying without a plan. That could make things in your home worse. Before you start, read through this whole booklet and pick the treatment methods you will use. You'll probably need to use more than one to get rid of the bed bugs. Put together a step-by-step plan, and make sure you have all of the supplies you need before you start.

## References

- Georgia Department of Public Health  
<https://dph.georgia.gov/environmental-health/insects-and-diseases>
- State of Michigan <https://www.michigan.gov/emergingdiseases/home/bed-bugs>
- U.S. Environmental Protection Agency [www.epa.gov/bedbugs/](http://www.epa.gov/bedbugs/)
- eXtension [www.extension.org/pages/64456/bed-bug-hot-topics](http://www.extension.org/pages/64456/bed-bug-hot-topics)
- National Pesticide Information Center <http://npic.orst.edu/pest/bedbug>
- NYC Department of Health <https://www.nyc.gov/site/doh/health/health-topics/bedbugs-pest-management-professionals-guide.page>
- Centers for Disease Control and Prevention <https://www.cdc.gov/bed-bugs/about/>
- Bed Bug Central <http://www.bedbugcentral.com/>
- Goddard, J. 2003. Do Bed Bugs Carry Human Diseases? Pest Control Technology, 31: 38-40, <http://insectsinthecity.blogspot.com/2011/05/do-bed-bugs-carry-disease.html>
- Gordon's Key to Insect Orders <http://www.earthlife.net/insects/orders-key.html>
- Kells, S.A. 2010. Control of Bed Bugs in Residences: Information for Pest Control Companies. University of Minnesota Fact Sheet, St. Paul, MN. [www.bedbugs.umn.edu](http://www.bedbugs.umn.edu)
- Cornell IPM, How to Get Bed Bugs Out of Your Belongings,  
<https://ecommons.cornell.edu/bitstream/handle/1813/55760/get-bed-bugs-out-NYSIPM.pdf>
- National Center for Healthy Housing. What's Working for Bed Bug Control in Multifamily Housing: Reconciling best practices with research and the realities of implementation.  
[http://nchh.org/resource-library/report\\_what's-working-for-bed-bug-control-in-multifamily-housing.pdf](http://nchh.org/resource-library/report_what's-working-for-bed-bug-control-in-multifamily-housing.pdf)
- NPMA's Best Management Practices for Bed Bugs  
<https://www.pestworld.org/media/562243/npma-bed-bug-bmps-approved-20160728-1.pdf>
- Potter, M, et al. Dec 2013. Diatomaceous Earth: Where Do Bed Bugs Stand When the Dust Settles?, PCT Bed Bug Supplement  
<http://www.pctonline.com/article/pct1213-diatomaceous-earth-study/>
- A Look at Bed Bug Look-Alikes, <http://www.pctonline.com/article/bed-bug-look-alikes/>



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