



Getting the  
**Bed Bugs**  
Out

**A Guide to  
Controlling Bed  
Bugs in Your Home**

Michigan Department  
of Community Health



**MICHIGAN STATE  
UNIVERSITY**

**Extension**

**HN1194**



## Before You Treat for Bed Bugs: A Checklist for Do It Yourselfers

Follow these steps before you treat your home for bed bugs:

### **1** Make sure you really have bed bugs.

Many other household pests look like bed bugs, and many other things can cause the same kinds of skin reactions that bed bugs do. Treating your home for bed bugs takes a lot of time and hard work, so it's a good idea to make sure that you really do have bed bugs before you waste time and effort trying to get rid of the wrong bug.

You can't tell from a few bites that you have bed bugs, and some people don't react to bed bug bites. You'll need to find actual bugs to know for sure. Send the suspects to Diagnostic Services at MSU (Michigan State University) or take them to a pest control company to have them identified. (Visit the Diagnostic Services website at [pestid.msu.edu](http://pestid.msu.edu) to find out how to collect and send samples to them.)

### **2** Find out whether it's the best choice - or even legal - for you to treat for bed bugs yourself.

It may not be legal for you to try to get rid of the bed bugs yourself. Renters should ask their landlords to hire a professional to treat the home for bed bugs and other pests. In Michigan, it is also not legal for people to use pesticides to treat schools, daycares or other public places without receiving special training.

### **3** Decide whether to hire a pest management professional.

Bed bugs are hard to control without help from a licensed commercial pesticide applicator. These professionals are trained to detect and isolate bed bug infestations, which gives them a better chance for success. If you can afford it, hiring a professional may be a better choice than doing the entire treatment yourself. Professional treatments usually cost several hundred dollars a visit. Even though it's costly, hiring an experienced professional may be the best way to get rid of bed bugs quickly and safely.

### **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 or building 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.

# Introduction

Anyone, anywhere can get bed bugs. Having bed bugs doesn't mean that a home, office, school or other building is dirty. It just means that the bed bugs found a place to live where there are places to hide and people to bite. They could have hitched a ride from a friend's house, from the apartment next door, from a hotel room or from a chair in a clinic waiting room.

Bed bugs are hard to control, but you **can** do it!

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.

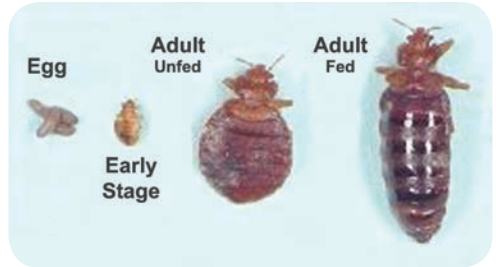


# What Are Bed Bugs?

Bed bugs are small, reddish-brown insects that are about the size and color of apple seeds. They live indoors and feed only on human (and sometimes other animal) blood. They don't eat crumbs, skin cells or anything else.

Bed bugs are flat and very good at hiding in small cracks. They don't have wings, and they don't jump. The smaller, younger stages (nymphs) start out tan and darken as they grow to the adult stage. Bed bugs that have recently fed will be swollen and reddish.

Bed bugs don't carry diseases, but their bites can cause itchy skin reactions. People who are worried about being bitten, or that they have bed bugs in their homes, also may be anxious and lose sleep.



## Bed bugs at a variety of life stages and sizes.

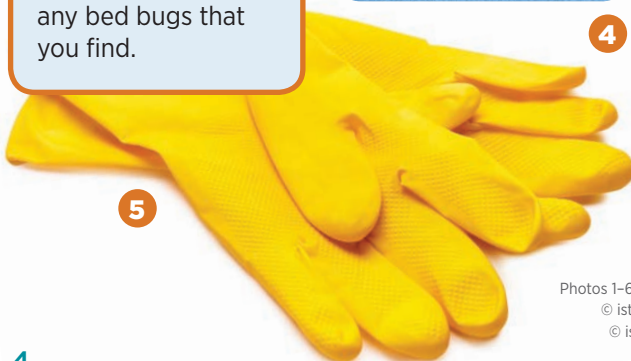
Photo: Stephen Doggett,  
© The Department of Medical  
Entomology, ICPMR, Australia

# Looking for Bed Bugs

Bed bugs can hide in the smallest cracks, and tend to prefer areas near where people sleep (including beds and living room couches). You will need to carefully inspect your home to figure out which parts of it to treat. You'll need these tools to help you with the inspection:

- 1 Bright flashlight
- 2 Magnifying glass
- 3 Long, thin probe (such as a putty knife, playing card or nail file)
- 4 Vacuum cleaner with crevice tool
- 5 Latex or rubber gloves
- 6 Paper towels

While you inspect, you will also want to crush or vacuum up any bed bugs that you find.



Photos 1-6: © istock.com/kvkillorov; © istock.com/Coprid; © istock.com/Eldad Carin; © istock.com/ stuartbur; © istock.com/kuzma; © istock.com/IvanMikhaylov

## What to Look For

Signs to look for when you're looking for bed bugs include:

- » Live or dead bed bugs
- » Empty skins they have shed as they grow from one stage to another
- » Eggs
- » Fecal stains or droppings.

## 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.

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.



### Inspecting a bed frame for bed bugs.

Photo: Virginia Tech Dodson Urban Pest Management Laboratory

## LOOK FOR...



### Live or dead bed bugs

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



### Empty skins

Photo: Lou Sorkin



### Eggs

Photo: Dr. Harold Harlan, AFPMB



### Fecal stains or droppings

Photo: Lou Sorkin

## Where to Look

### **The bed**

Look at and under the mattress and box spring, bed frame, headboard and footboard. Focus on the trim and seams of the mattress. Also look inside the cracks and crevices under the box spring. Check the sheets and pillow cases, too.

### **Furniture near the bed**

Examine the nightstands, dressers, and wardrobes, toy chests and other storage containers, chairs and other furniture. Empty the furniture and containers, then remove and inspect all drawers, frames and cracks. Check the rails, joints and screw holes in the frames.

### **Walls**

Check cracks in the plaster or drywall and behind peeling wallpaper and paneling.

### **Trim**

Inspect any cracks in and along the floorboards, baseboards and crown molding (if you can reach it safely).

### **Windows and doors**

Check the frames and trim.

### **Window coverings**

Inspect the blinds, drapes, curtains, shades and other window coverings.

### **Electrical system**

Look inside smoke detectors, clocks and phones, and behind the face plates of electrical outlets and switches. **(Warning:** Don't put anything into any area with electrical wires or connections!)

### **Decoration**

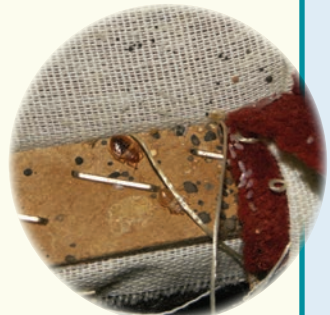
Check the frames and behind any decorative objects on the walls, including wall hangings, pictures, posters and mirrors.

### **Floor coverings**

Look along the edges of carpet and rugs, and under rugs, floor cloths and other movable floor coverings.

### **Upholstered furniture**

Inspect the tufts, seams, trim and zippers of upholstered furniture such as sofas, couches, chairs and ottomans (foot stools). Look at their undersides and legs, and under the slipcovers, too (if you have them).



Left Photo: Stephen Doggett, © The Department of Medical Entomology, ICPMR, Australia Middle & Right Photos: Lou Sorkin



## After the Search

Your search for bed bugs in your home has probably ended with one of the following three results:

### You found no insects that you think might be bed bugs.

Yay! You may not have to fight bed bugs right now, but you might want to take steps to help keep from getting them. Keep looking if you still think you've got bed bugs, or hire a professional to inspect your home, because bed bugs can be hard to find.

### You found insects that you think might be bed bugs.

Take or send a few of the insects to an expert to find out whether they really are bed bugs. Visit Diagnostic Services at MSU online at *pestid.msu.edu* to find out how to collect and send sample bugs to them. While you wait to find out for sure, it's time to plan what to do if they really are bed bugs.

### You found bed bugs.

Time to plan how to manage the infestation in your home.

## 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.

A list of the steps to take follows, and 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'll 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.
9. Treat with insecticide.





## Gather Your Tools

Gather the tools you will need to fight the bed bugs.

- 1 Mattress covers for all box springs and mattresses
- 2 Commercial or homemade bed bug interceptors
- 3 Vacuum cleaner with a crevice tool
- 4 Caulk gun and caulk
- 5 Sponge
- 6 Bucket of hot, soapy water
- 7 Screwdriver and other hand tools
- 8 Plastic bags or bins
- 9 Insecticide products (if you are not hiring a professional)
- 10 Steam cleaner (optional)



## Isolate & Protect the Beds

Start off 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.

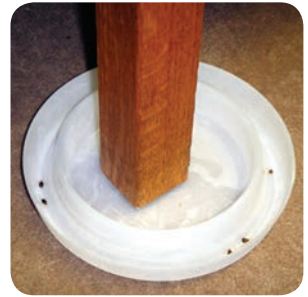
1. Vacuum the bedroom carefully to reduce the number of bed bugs, especially in the sleeping areas and around and under the bed.
2. Inspect and clean the headboards and bed frames with standard household cleaners or soapy water to get rid of any bed bugs you see.
3. Enclose the mattresses and box springs in sturdy zippered covers labeled “allergen rated,” “for dust mites” or “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.
4. 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.)
5. 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 in local stores or online, 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 to replace them right away.

### Interceptor device under furniture leg.

Photo: University of Nebraska-Lincoln Extension

### Encasing a mattress in a zippered cover.

Photos: University of Nebraska-Lincoln Extension (below),  
Virginia Tech Dodson Urban Pest Management Laboratory (lower right)



## Clean & 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 the many hiding places of 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 into plastic bags or tote bins that don't have air holes. Pick up everything from the floor and remove everything from all shelves, closets, dressers, wardrobes, and other furniture and storage containers.

Suggested cleaning methods for various items follow.

- » **Washable clothes, shoes, stuffed toys, pillows and bedding** – Wash these items in hot water and dry them on the highest heat setting possible. (**Note:** Clean clothes don't have to be rewashed. Just put them in the dryer on medium to 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 bricks and plastic figures) can be put into lingerie bags and run through a dishwasher with "heated dry" turned on. It's probably best to hand wash breakable items.



Photo: © istock.com/wwing

- » **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.

### **Dry clothes, shoes, pillows and bedding on high heat for 30 minutes.**

Photo: Virginia Tech Dodson Urban Pest Management Laboratory





## Vacuum Everywhere

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.

### Clean & Store the Vacuum Cleaner

- » 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.



Photo: © istock.com/stuartbur

## Make Repairs

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

- » Caulk along moldings and joints with sealant (silicone or latex will work; however, silicone is generally not paintable) to close off bed bug hiding spots. Pay attention to 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.
- » 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.



Photo: © istock.com/FuatKose



**Caulking along moldings and joints with a sealant.**



Photo Left: © istock.com/ Blue\_Cutler; Photo Right: © istock.com/Lee Rogers

## 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 you might be able to save:

- » Mattresses or box springs that have been infested with bed bugs. Use the types of mattress encasements mentioned earlier.
- » Furniture items such as dressers, night stands, bookshelves, desks and tables can be successfully cleaned or treated with insecticides.

Things it will be hard or impossible to save or that may not be worth trying to save:

- » Some furniture items, such as upholstered couches and recliners, or wicker furniture, may be so difficult to treat that it is best to throw them 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 the smaller items 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.



**Mattress encased in a sturdy zippered cover.**

Photo: Virginia Tech Dodson Urban Pest Management Laboratory



Photo: © istock.com/-lvinst-

## Wash Surfaces & 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 beds can be placed in the clothes dryer or steamed (see the "Treat With Steam" section that follows), or they may need to be thrown out.



Photo Top: © istock.com/joebelanger  
Photo Bottom: © istock.com/Floortje

## 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. That makes steam 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. Take about 20 seconds to move the nozzle 12 inches.

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.



**Steam cleaning upholstered furniture using a professional steam machine.**

Photo: M. Sheperdigian - Rose Pest Solutions

## 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.

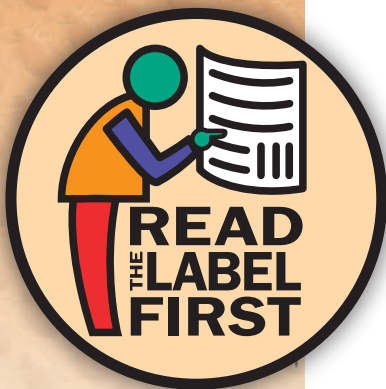
**Note:** Even if you decide to hire a professional, you still need to do most of the steps described earlier.

For more information on choosing a pest control professional, visit [www.michigan.gov/bedbugs](http://www.michigan.gov/bedbugs), and look for the brochure called "Choosing a Pest Control Company" (at this writing the brochure's web address is [www.michigan.gov/documents/emergingdiseases/ChoosingPestCompany\\_433781\\_7.pdf](http://www.michigan.gov/documents/emergingdiseases/ChoosingPestCompany_433781_7.pdf)).

In Michigan, businesses that apply insecticides for hire must be licensed with the Michigan Department of Agriculture and Rural Development (MDARD) and their applicators and employees applying the insecticides must be certified or registered.

For a list of licensed commercial pesticide application businesses in Michigan, visit [www.michigan.gov/mdard](http://www.michigan.gov/mdard) and look for the "Licensing, Certification and Registration" section.

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 you or make you sick, and it may even make the bed bugs harder to control. The information that follows will help you choose and safely apply the right products.





## 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) and MDARD.
- » 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. Your local MSU Extension office, or the National Pesticide Information Center (see the “Find Out More” section) 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, your pets or 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- and MDARD-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,” because they are not effective and also disperse the pesticide to 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.



Photo: © istock.com/joebelanger

### If You Are a Renter

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.

Local laws may ban the use of insecticides by renters in government housing.



Photo: © istock.com/grandaded

# Types & Uses of Insecticides

Insecticides are chemicals that are made to kill insects. Different types of insecticides may be better for certain areas than for others. For example, insecticidal dusts are best for under baseboards, and liquids or aerosols might be best for the undersides of dresser drawers. Several types of insecticides are described in this section.

## 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 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 as synthetic insecticides – it may take several days for the exposed bugs to die. 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.

## Pesticide dust application.

Photo: Virginia Tech Dodson Urban Pest Management Laboratory



## 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.

## 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 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.

## 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.

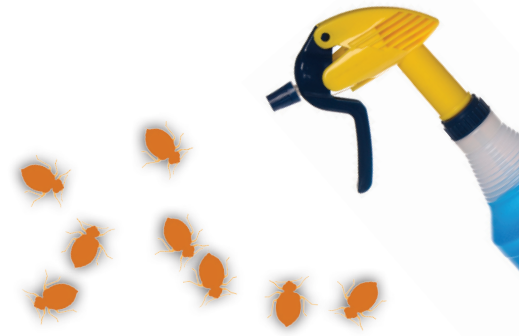
## Treating Sensitive Items

For hard-to-treat items such as electronics, artwork and books that can’t be put in a clothes washer or dryer, you might be able to use container heat or container fumigation.

### Containerized 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. Make sure that any items you put in the heating unit won’t be damaged by high temperatures. 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.



## Pesticide Strips

Another option for treating fragile or heat-sensitive items is to place them in airtight containers with dichlorvos (registered for use in Michigan as DDVP) strips. These strips work by releasing odorless vapors that build up 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 DDVP strips, 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? 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 whole inspection and treatment process. You **can** get back to the point where you go to bed without worrying about the bed bugs biting.

# Find Out More

The web pages listed here provide more information on identifying, controlling and preventing bed bugs.

- » State of Michigan  
[www.michigan.gov/bedbugs](http://www.michigan.gov/bedbugs)
- » U.S. Environmental Protection Agency  
[www.epa.gov/pesticides/bedbugs/](http://www.epa.gov/pesticides/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  
[www.nyc.gov/html/doh/downloads/pdf/vector/bed-bug-guide.pdf](http://www.nyc.gov/html/doh/downloads/pdf/vector/bed-bug-guide.pdf)
- » Centers for Disease Control and Prevention  
[www.cdc.gov/parasites/bedbugs/](http://www.cdc.gov/parasites/bedbugs/)

## MICHIGAN STATE UNIVERSITY | Extension

MSU is an affirmative-action, equal-opportunity employer, committed to achieving excellence through a diverse workforce and inclusive culture that encourages all people to reach their full potential. Michigan State University Extension programs and materials are open to all without regard to race, color, national origin, gender, gender identity, religion, age, height, weight, disability, political beliefs, sexual orientation, marital status, family status or veteran status. Issued in furtherance of MSU Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Thomas G. Coon, Director, MSU Extension, East Lansing, MI 48824. This information is for educational purposes only. Reference to commercial products or trade names does not imply endorsement by MSU Extension or bias against those not mentioned. Printed on recycled paper. HNI194. 1P-2M-BP-12:2013-RLM

---

## Acknowledgments

### Authors

- » Michigan State University Extension  
([www.msue.anr.msu.edu](http://www.msue.anr.msu.edu))
- » Michigan Department of Community Health  
([www.michigan.gov/mdch](http://www.michigan.gov/mdch))

This bulletin was produced by ANR Communications, MSU Extension ([anrcom.msu.edu](http://anrcom.msu.edu)).

Michigan Department  
of Community Health



*MDCH is an Equal Opportunity Employer, Services and Programs Provider.*

*Cost of printing 2,000 copies: \$1,493.91 or \$.75 each.*

*This publication was supported by Cooperative Agreement Number 83506201 from the Environmental Protection Agency (EPA), and was not paid for with state funds.*



[www.michigan.gov/bedbugs](http://www.michigan.gov/bedbugs)

Michigan Department  
of Community Health



MICHIGAN STATE  
UNIVERSITY

Extension