



Non-Chemical Bed Bug Management

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Introduction

Bed bugs have proven to be a very challenging pest. While most people would like to have a pest management professional come to their home and spray a magic potion that eliminates bed bugs forever, no such potion exists. Bed bugs are highly resistant to a number of insecticides, and their eggs are impervious to most insecticide formulations. Complicating the situation further is the human host. Many people live in highly cluttered environments providing bed bugs with many places to hide. Boxes, books, stuffed animals, and electronic equipment cannot be treated with insecticides so there are many safe locations where bed bugs find refuge. This is why we cannot rely on insecticides alone to cure bed bug problems. Pest management professionals have recently started using a variety of non-chemical tools to help manage bed bug infestations. Below is a discussion of the non-chemical methods that can be used as part of an integrated pest management program for bed bugs. This publication is not intended to endorse any of the products described below, however, these products are specifically mentioned because they are unique technologies and known to be effective.

Clutter Removal

Highly cluttered homes and bedrooms provide bed bugs with numerous places to hide, and makes treating the home with insecticides almost impossible. Therefore, reducing clutter will greatly improve your chances of eliminating



bed bugs. Before having your home treated for bed bugs, place piles of clothes that are laying on the floor into sealed bags for laundering. Remove all items from under the bed, but do not put anything on top of the bed or move items into another room (potentially spreading the infestation)*. Go through your closets. Bag and throw away any items that you no longer use. Do not move items from the closets into other rooms. Stack those items that you wish to keep in front of the closet door so that they can be inspected*. Items that have no value, such as old newspapers, junk mail, magazines, and broken electronic equipment should be bagged and thrown in the trash immediately. Your pest management professional may provide you with specific instructions on how to reduce clutter in your home or apartment. Be prepared to follow those instructions to the letter.

Dissolvable Laundry Bags*

Your pest management professional may provide you with dissolvable laundry bags or you can purchase them yourself. Dissolvable (GreenClean™) laundry bags are laundry bags that dissolve in the washer. You can pack your clothing and other washable belongings into the bags and put them directly into the washer without having to open the bag or dispose of a potentially infested bag in the laundromat*.

Bed Bug Detection

It is very important to catch a bed bug infestation before the population becomes large and difficult to control. But how do you monitor a home or apartment for bed bugs? You may have heard the old stories of how people used to put tuna cans full of water under the legs of their bed to prevent bed bugs from crawling up and feeding on them. Modern bed bug monitoring devices like the ClimbUp™ Insect Interceptor use that same idea to detect bed bugs before an infestation develops. For the ClimbUp™ device to work, the bed must be properly prepared. The bed must be moved away from the wall so that it is not touching the wall or another piece of furniture. There must be no dust ruffle or any other bedding touching the floor during the day or night. A ClimbUp™ interceptor is then placed under each bed leg (4-6 devices total) so that the leg sits inside the inner well of the device.



The ClimbUp™ interceptor is basically a dish that is rough on the outside and coated with talc on the inside. Hungry bed bugs coming to feed on the host crawl up the outside of the device and fall into the outer well where they cannot escape. The ClimbUp™ is an excellent tool for early detection because bed bugs moving in from the apartment next door may be found in the ClimbUp™ before anyone starts getting bitten. The ClimbUp™ device is also useful as a trap. The devices can capture hundreds of bed bugs as they attempt to approach the host. The ClimbUp™ will not eliminate an infestation, but it can catch enough bed bugs to actually reduce the population size.*



Vacuuming

The value of vacuuming is not that it controls bed bugs, but that it makes inspections so much easier. In large infestations, bed bug harborage and aggregation sites are not only filled with live bed bugs, but also with their debris (dead bed bugs, molted skins, hatched egg shells, and feces). It is often difficult to distinguish what is alive from what is dead in a messy harborage, particularly after treatment. A high powered vacuum is very useful for removing this debris. While no vacuum is powerful enough to remove all of the bed bug eggs (eggs are cemented into place), the removal of the bed bug debris makes it much easier to see if anything is still alive in these harborage sites after they have been treated. Just make sure that the infested vacuum bag is thrown away outside of the building.

Steam

Bed bugs are easy to kill using heat. Their thermal death point is reported to be 114-115° F. Putting infested clothing in a hot dryer is an excellent way of killing bed bugs and their eggs. Heat can also be used to kill bed bugs and their eggs in furniture and carpeting. The most common method of killing bed bugs with heat is by using a steamer. Many pest management companies are using professional steam cleaners to kill bed bugs in infested apartments. The steamers are used to kill bed bugs on mattresses, couches and other locations where insecticide applications are undesirable.

Steaming bed bugs is a slow process that takes patience. The technician must move slowly enough so that the heat concentration is maintained over every inch of surface. The steamer head must also be large to avoid the steam coming out at such velocity that it blows bed bugs and their eggs across the room. Steam cleaning is an effective way of reducing an infestation quickly. However, steam alone will not eliminate an infestation.

Pressurized Carbon Dioxide Snow

Some of the larger pest management companies have been using a new technology where bed bugs are frozen to death by being exposed to pressurized CO₂ snow at -108° F. The technology goes by the trade name Cryonite®. The snow mixture is blown out of a pressurized cylinder through a nozzle that forms vapors to penetrate baseboards, bedding, box springs, the furniture, other cracks and crevices where bed bugs aggregate. The pressurized snow freezes the cells of the bed bug killing them instantly. Similar to steam cleaning, the Cryonite® process requires patience and will not eliminate a bed bug infestation if used alone. Other control methods will still have to be used.

Diatomaceous Earth

Diatomaceous earth (DE) is a desiccant dust made of the silica-based skeletons of microorganisms called diatoms. This dust kills bed bugs by sticking to the outside of their bodies and absorbing the wax layer that keeps them from losing their body moisture. The bed bugs desiccate and die within a couple of days.

DE is very safe to use and has a broad label allowing the product to be applied in many locations where insecticidal dusts cannot (bed frames, carpeting, pet bedding etc.). However, be aware that there is more than one type of diatomaceous earth. There is the 100 percent diatomaceous earth that is an insecticide labeled for crawling insect pests. There is a 100 percent DE that is used as an animal food additive (also works well for killing bed bugs). There are also insecticide formulations of DE that contains pyrethrins. These products will have more restrictive labels regarding where the product can be used. The fourth type of DE is used for swimming pool filters. The swimming pool form of DE has been heat treated so that the diatom skeletons are no longer the same shape. Swimming pool DE is a serious inhalation hazard and should never be put into someone's home. Be sure that if you are purchasing DE yourself, you avoid those products used for swimming pool filters.

Mattress Encasements

Mattress encasements are now a standard part of a quality bed bug management program. A mattress encasement is more than a bed cover. The encasement is intended to seal your mattress so that no bed bugs can infest your mattress, and any bed bugs currently infesting your mattress can never bite through or escape from the encasement. It is extremely important that the mattress encasement be placed on both the mattress and the boxsprings. If you cannot afford to encase both, make sure that the boxsprings is put into the encasement. The boxsprings is a favorite bed bug harborage, and it is very difficult to treat. Encasing the boxsprings makes bed bug treatment much easier and more effective.

It is also important that the mattress encasements you purchase have a zipper that will close completely. Many people neglect to zip the cover all the way up and this is the number one escape route used by bed bugs. Mattress encasements that have a zipper protector (Protect-A Bed or Mattress Safe) will prevent bed bug escape even if the zipper is not entirely closed. Also, **the teeth of the zipper must be tight enough to keep newly hatched bed bugs**

from escaping through the teeth. Not all mattress covers are effective at keeping bed bug inside so make sure that the product you purchase describes on the label how it has been tested for containing bed bugs.



Heating Systems

Some of the most effective new technologies for bed bug control have been the development of heating systems that are capable of superheating infested rooms to kill all the bed bugs. There are currently two heating systems being used for bed bug elimination. These are the ThermaPureHeat[®] and the Temp-Air Heat Remediation System[®]. The principles behind these two methods are essentially the same. Propane generated heat or electric heaters are used to raise the temperature inside the room to 135° F (this temperature will not damage electronic equipment). The heat is blown into the room for several hours. The temperatures in cracks, crevices, and hard-to-reach places are monitored remotely from numerous sensors placed throughout the room. Once the bed bug thermal death point is reached at all of the sensors (114-115° F), the heating process is continued for 60 minutes (or more) to kill all of the bed bugs and their eggs. The advantages of these heat systems are that the resident does not have to remove or bag their belongings, and most infestations can be cured in a single treatment. The disadvantage of heat treatment is that the technology is still so new that it is difficult to find a pest management company that has purchased the system. The process is also time consuming (taking 6-8 hours from setup to take down), and therefore expensive.

Heat treatment is one of the few methods that can be used alone for bed bug control. However, some buildings (usually older remodeled buildings) may have construction features that create heat sinks. In cases where construction issues are a concern, it is wise to supplement the heat treatment with a conventional insecticide application in cold

spots where bed bugs might find refuge.

The Temp-Air Heat Remediation System[®] uses electric heaters to generate the heat needed to treat a room or apartment (typically a 4-heater system will treat 900-1100 sq. ft.). The heaters are placed in the infested room and powered by a generator located outside. High velocity fans are used to blow the heated air into all corners of the room. The temperature of the room will increase to between 120-135°F. The sensors are monitored until each has reached 115°F. This temperature is adequate for killing bed bugs but not high enough to damage belongings inside the home.

The ThermaPureHeat[®] system uses a large propane fueled heater to generate the heat needed to treat an infested apartment unit. The propane heater is located outside the building and the heat is funneled into the apartment through insulated duct work. The ducts are extended into various areas of the home creating positive pressure as the propane heat is continuously blasted into the unit. The temperature of the room will increase to 135°F, heating bed bugs harborage to the thermal death point, but not damaging items in the apartment.



Summary

Insecticides alone can rarely eliminate a bed bug infestation. Long-term control requires that non-chemical methods be used in combination with insecticides as part of an integrated bed bug management program.

*Cooper Pest Solutions, Lawrenceville, New Jersey

