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Managing Bed Bugs

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Human bed bugs are found worldwide and are dispersed through human travel. During the last decade, there has been a significant increase in bed bug infestations in the U.S. The reason for this recent upsurge is unknown. Although bed bugs have never been shown to transmit diseases, people living in bed bug infested homes may experience psychological stress, anxiety and insomnia.

Currently, treatment is difficult, but as time passes, pest control professionals should gain expertise in treatments and there will be new effective products developed.

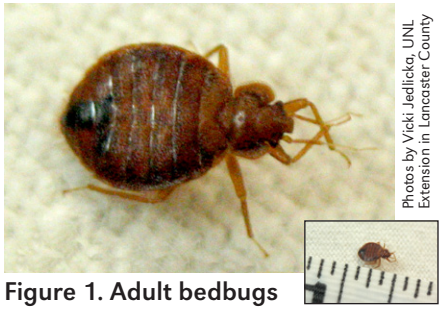
Description and Habits

Bed bugs are reddish-brown, wingless and very flat (Figure 1). Adults are about 3/8 to 1/4-inches long. Immature stages may be light brown or yellowish in color until after they have fed and then they are darker. After feeding, they are bright red from the blood they have ingested and have a distended body and may look like a different insect altogether.

Bats and birds may be hosts of blood-feeding bugs that look nearly identical to bed bugs. It is important to make sure you are dealing with bed bugs, because a bat bug infestation may require removal of bats. Consult your local extension educator to verify what you have.

Bed bugs usually attack humans, but may feed on other warm-blooded animals, including pets. During the day, bed bugs hide in cracks and crevices near the bed or places where people sleep at night. At night, bed bugs come out of their hiding places to feed. Bites are most often found on the upper body: neck, arm and shoulders, but may be found on legs or ankles. Some people are sensitive to the bites which may become inflamed.

Bed bugs may be able to live 6-12 months without food and can survive in infrequently-used hotel rooms or vacant apartment buildings until occupied by an unfortunate victim.



Photos by Vicki Jedlicka, UNL Extension in Lancaster County

Figure 1. Adult bedbugs are small, reddish brown, wingless and have very flat bodies. Above — highly magnified view. At right — actual size.

Where Do They Come From?

Bed bugs don't just appear spontaneously in a home or apartment. They cannot fly, so most of the time, people move bed bugs from place to place. The most common ways bed bug infestations get started are:

- Travelers bring bed bugs home from infested hotels or motels in their luggage.
- They may be brought home with infested used furniture.
- Bed bugs can hitch a ride to another location by hanging on clothing. (Be careful if you visit someone who has an infestation.)

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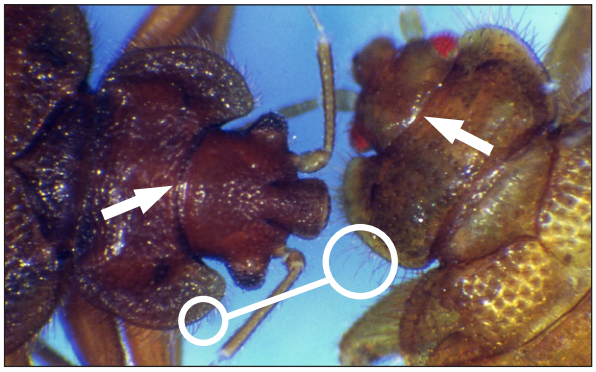
Difference Between a Bed Bug and a Bat Bug

The bed bug belongs to the family Cimicidae. Other members of this family feed on bats and birds. Because bats can live in or near human dwellings, it is important to determine whether it is a bat bug or a bed bug before control measures are taken. When dealing with bat bug or bird bug infestations, eliminating bats or birds is the first step needed to solve the bug infestation.



Photos by Jim Kalisch, UNL Entomology Department

	BED BUG (left)	BAT BUG (right)
Front edge of pronotum:	deeply concave	slightly concave
Hair length/edge of body:	less than width of eye	greater than width of eye

Know how. Know now.

Photo by Jim Kalisch, UNL Entomology Dept.

Figure 2. Bed bugs produce a distinctive, musty, sweet odor and live in groups on porous surfaces like wood or fabric.

Figure 3. Typical bed bug spots and smears on a mattress.

Photos by Barb Ogg, UNL Extension in Lancaster Co.

Figure 4. Bed bug spots under the fabric stapled to the framing of foundation/box springs.

- Family members living away from home (for example, at college) may bring them home on holidays.
- If you move into an infested home or apartment, you will have an instant infestation.

Once brought inside apartments or hotel rooms, bed bugs readily travel to other bedrooms as their numbers increase. If you live in an apartment, you can get them from your neighbors.

Where Do They Hide?

Bed bugs are very flat and live in cracks and crevices around the bed. They produce liquid feces which are dark spots left on bedding or in hiding places. Bed bugs produce a musty sweet smell that may be noticeable in heavy infestations.

Studies have shown most of the bed bugs will be found in the mattress and foundation/box springs or within 15-feet of the bed, but some bed bugs may be found in locations farther away from the bed. If people have been sleeping on sofas, these are likely to be infested.

Examine the bed and foundation/box springs. Remove all the bedding and examine it for fecal spots/smears and bugs. Carefully examine the mattress and foundation (Figure 3). One common hiding place is the wood framing of the foundation. Remove the dust cover on the bottom of the foundation. Carefully examine the wood framing for cracks formed where wood pieces come together. Peel back where fabric is stapled to the wood frame (Figure 4).

Near the bed, look behind picture frames, within books, in telephones or radios, bedside furniture, look along the edge of carpet, next to the wall and even in electrical receptacles. Don't forget the closet. Bed bugs can be found in closets attached to clothing.

A recent do-it-yourself bed bug trap has been developed and made from simple items costing about $15. Find directions for making this trap at *http//lancaster.unl.edu/pest/bug.shtml.*

Managing Bed Bugs

Thoroughly clean infested rooms. Launder bedding and dry thoroughly in a hot dryer to kill all stages of bed bugs. Dry clean wool blankets. Vacuum infested areas thoroughly, including mattress, foundation/box springs, furniture, beds, headboards, sofas. Don't forget the void area underneath box springs. Vacuum the area where the carpet meets the wall, especially near the head of the bed. After you are finished, take the vacuum cleaner bag immediately to the trash. Steam cleaning carpets is good, but must be done before pesticide applications, so coordinate efforts with your pest control professional. If there is a serious bed bug infestation, removing wall-to-wall carpets may be helpful.

Some people recommend throwing mattresses away. If the mattress and foundation is in poor condition, this would be helpful. On the other hand, if the mattress is in good condition, you can encase the mattress with a zippered cover that is tightly woven to prevent the mattress from harboring bed bugs. These mattress covers are available for all sizes of beds. Keep the mattress cover on the mattress for at least a year to make sure all the bugs are dead. You will also need to encase the foundation.

It is extremely important to eliminate clutter and reduce hiding places for bed bugs. Reduce clutter to the bare necessities to make treatments more effective.

Chemical Treatments. Non-chemical methods (vacuuming, steaming, laundering, mattress encasement) will be helpful in bed bug control, but, by themselves, are not likely to eradicate the bed bug population. This means insecticides must be used to treat bed bug harborage areas. Insecticide treatments in sleeping areas are a potential health risk so it is very important to use products which can be safely used in bedrooms. Do not treat mattresses or bed linens unless the label specifically says you can treat them.

All bed bug hiding places must be identified and treated. Use liquid treatments on surfaces and dusts in void areas. Because treating all the areas where bed bugs hide is difficult, we recommend hiring an experienced pest control professional. Pest control professionals also have more choices of insecticides, which may improve the effectiveness of control.

Prevention

When checking into a hotel, it is a good idea to immediately inspect rooms for bed bugs. Bed bugs like to live in groups, in cracks and other dark, tight places. These "hot spots" can often be identified because bed bugs leave small brown/black spots and smears (liquid feces) in these hiding places. Fecal spots may also be found on bed linens, pillows and mattresses.

Bed bugs live in cracks the width of a credit card and in void areas created by wood framing of the foundation. Hotel and motel bed headboards are often fastened to the wall. You may need to lift the headboard off its hanger to inspect behind it. Even if no bed bugs are found, don't place luggage on the floor near the head of the bed.

Problems with Chemical Treatments

A recent study at Purdue University showed how difficult treatment can be. Researchers treated eight infested units of a 15-story apartment building. Liquid pyrethroid insecticides were used (deltamethrin, Suspend® SC), along with a dust pyrethroid (cyfluthrin (Tempo® 1% dust). Professional-use products were used in bed areas, mattresses, foundations, and cracks and crevices where bed bugs were hiding. Every two weeks, bed bug-infested units were inspected and treated if live bed bugs were found. After four applications, two apartments still had bed bugs. These researchers concluded that successful eradication of bed bugs requires at least two visits, with considerable time needed to inspect and treat the unit, but some infestations may require four or more applications. In addition to insecticide treatments, these researchers also used non-chemical tactics, including the discarding of heavily infested furniture, steam machine applications and washing bedding materials every time bed bugs were found.

Bed bug resistance to pyrethroids has been documented in a recent study by researchers at the University of Kentucky (2007, 2010). Most insecticide products that can be used in the home belong to this class (Table 1). But, because we cannot predict which bed bug populations have resistance, these products still must be used, because they are the only choices we currently have.

Insect growth regulators, which interfere with insect molting and reproduction have been effective tactics for managing a number of structural insect pests, including cockroaches and fleas. However, a recent study at Virginia Tech showed that bed bugs were not adversely affected by hydroprene (Precor).

Table 1. Professional-use Products Available In Nebraska For Use Against Bed Bugs

Active Ingredient	Product Name(s)	Class	Formulation*
Chlorfenapyr	• Phantom	pyrrole	SC
Cyfluthrin	• Tempo SC Ultra • Tempo 20WP • Tempo WP	pyrethroid	SC WP WP
Cyfluthrin & pyrethrins	• Intruder HPX	pyrethroid & pyrethrins	A
Deltamethrin	• DeltaDust • D-Force HPX • Suspend SC	pyrethroid	D A SC
Diatomaceous earth or Silicon dioxide	• Natural Guard Crawling Insect Control • Safer Brand Ant & Crawling Insect Killer	inorganic desiccant	D D
Dichlorvos (DDVP)	• Nuvan Prostrips • Nuvan Prostrips +	organophosphate	F
Esfenvalerate	• Onslaught	pyrethroid	ME
Hydroprene	• Gentrol	insect growth regulator	EC
Lambda cyhalothrin	• Demand CS • Bug Stop-Spectracide(OTC)	pyrethroid	ME RTU liquid
Permethrin	• Prelude	pyrethroid	EC
Phenothrin with isopropanol with MGK264	• Sterifab • Bedlam	pyrethroid	RTU A
2-Phenethylpropionate (PEP) with piperonyl butoxide (PBO) and pyrethrins	• EcoPCO EC • EcoPCO DX	botanical (PEP) synergist (PBO) pyrethrins	EC D
Pyrethrins/pyrethroids with piperonyl butoxide	• Kicker • Prescription Treatment PI • CB-80 • CB-123 Extra • 565 Plus XLO	pyrethrins/ pyrethroids and synergist	EC A A A A
Silica and pyrethrins	• Drione • Tri-Die	inorganic w/ pyrethrins	D D
Tralomethrin	• Saga WP	pyrethroid	WP

** A (aerosol), D (dust), EC (emulsifiable concentrate), ME (microencapsulation), RTU (ready-to-use), WP (wettable powder), F (fumigant)*