

# Bedbugs and Pesticides in the Home

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**Bed bugs are blood-feeding pests that are invading human living quarters in increasing numbers.**

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## **BED BUGS OCCUR REGULARLY IN MONTANA,**

though at low numbers relative to many other locations in the U.S. As is true elsewhere, infestations of these nocturnal blood-feeders appear primarily in rooms where people sleep, particularly in bedding. While sanitation helps, even the cleanest indoor environment may harbor bed bugs. Places where there is abundant human traffic arriving from diverse locations (such as apartment complexes, health care facilities, and tourist accommodations) have increased odds of infestation and must be monitored carefully.

## **Identification, Life Cycle, and Effects on Humans**

Bed bugs are reddish-brown, oval, flattened, wingless, blood-feeding insects that are just under one-quarter inch long (Figure 1). Females may live for a year, depositing up to 400 eggs in their lifetimes. This may lead to heavy infestations over short periods of time. Severe infestations can cause anemia in children and the elderly, and lead to sleeplessness and stress in the home. Bed bugs have not been found to vector human diseases, yet they are still medically important because many people suffer from unpleasant allergic reactions to the saliva injected with the bite, typically appearing as red circular welts (Figure 2). Once the mouthparts are completely inserted, bed bugs can't get away quickly if disturbed. However, they can move early in the feeding sequence, and are quick to move a short distance if disturbed. This often results in characteristic rows or clusters of bites. Some people do not exhibit bite reactions and are not aware of having been bitten.

After feeding, bed bugs move away and lie inactive for several days before depositing a cluster of white eggs. Females seek another opportunity to feed after deposition of eggs, a cycle repeated throughout their lifetimes. Because bed bugs hide during the day the first sign of an infestation may be streaks of blood or fecal spots on bedding. Also inspect all crevices and gaps within bedrooms for insects, cast skins, and eggs. High populations have been noted to smell like raspberries.

## **Look-alike Species**

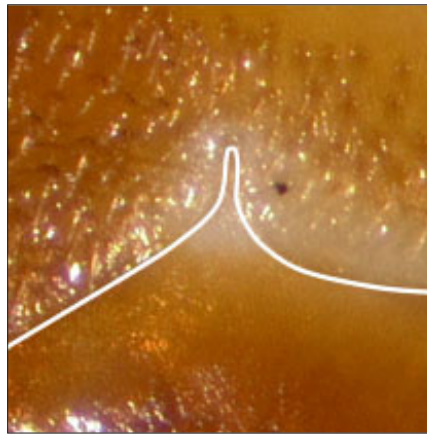
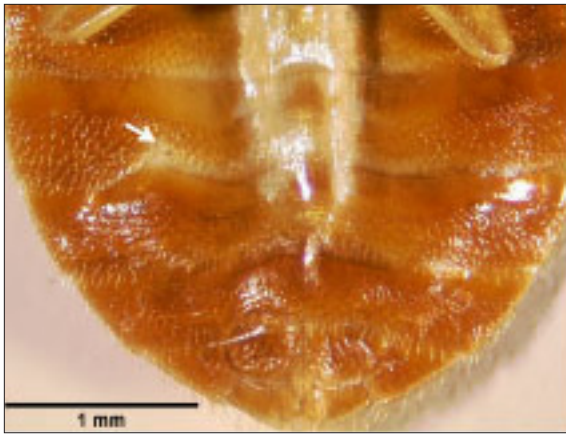
Similar-looking species of “bat bugs” and “bird bugs” in the same insect family (Cimicidae) can also bite humans. In our region these include the western bat bug, *Cimex pilosellus*, and the swallow bug, *Oeciacus vicarius*. Magnification is required to distinguish these look-alikes from bed bugs. When viewed on its back, the left side of an adult female bed bug has a narrow, pointed notch (“paragenital sinus”) on the fourth visible abdominal segment (Figure 3, page 2). The female bat bug (no image) also has a notch, but it has a rounded



**FIGURE 1.** Adult bed bug. (photo by Ruth O'Neill)



**FIGURE 2.** Bite welts. ([urbanentomology.tamu.edu/bedbugs.cfm](http://urbanentomology.tamu.edu/bedbugs.cfm))



**FIGURE 3.** The notch on the underside of a female bed bug adult is narrow and pointed - highlighted in white in the image on the right; on bat bugs (not shown), the notch is rounded. (photos by Ruth O'Neill)

margin. Differences in the shape and thickness of the hairs fringing the body segments can also help separate bed bugs from both bat bugs and swallow bugs. Bed bugs of both sexes have short body hairs that curve backward slightly, while the look-alikes have long bug slender hairs that stand straight out (Figure 4).

The distinction is an important one because control efforts differ. Unlike bed bugs, bat bugs and bird bugs occur solely in the vicinity of nesting birds or roosting bats. Mitigation requires locating and removing bird nests under eaves of houses and sheds, and screening roosting bats out of attic spaces and wall voids. Bird nesting boxes should never be attached to exterior walls of houses. These look-alike species will eventually disappear once host nesting activities are disrupted, although attacks on humans can occur as the insects disperse. Neither bat bugs nor any of their close relatives have been shown to transmit human diseases.



**FIGURE 4.** Bird bugs (left) and bat bugs (not shown) have longer body hairs than bed bugs (right). (photos: bird bug, <http://www.biodiversity.ubc.ca>; bed bug, Ruth O'Neill)

## Bed Bug Control

Getting rid of bed bugs requires a multi-faceted approach that includes prevention, removal of access points and hiding places, and thorough cleaning. With these measures in place, pesticides are not always warranted. However, if pesticides are to be used, then careful selection of properly labeled products is a must. Concerned homeowners trying to protect their children from bed bugs may inadvertently place their children or themselves at risk. **Homeowners should NEVER apply pesticides which are not specifically labeled for bed bugs in the home.** The illegal use of some organophosphate, pyrethroid or carbamate pesticides may cause allergies, asthma, immune system hyper-sensitivity, nausea, convulsions, or death.

## Prevention

Be wary of bringing infested items into your home. Bed bugs are now quite common in many areas of the United States and in some foreign countries, and they do infest luggage. Inspect all clothing and baggage for fecal spots prior to unpacking. At home, seal all crevices that may provide shelter for bed bugs. Caulk will work around windows and baseboards. Tighten up any loose electrical outlets, and repair loose or torn wall paper. Outlet cover plates with hinged or sliding socket covers are now available.

## Cleaning

Sanitation includes daily vacuuming of all potentially infested rooms. Mattresses can be vacuumed with a brush attachment, to help scrape eggs off the fabric. Vacuum bags should be sealed in plastic before disposal. Infested mattresses can be enclosed in bed bug-proof encasements and left in place for at least one year to ensure that the insects starve and die out. Hot or cold temperature extremes can be lethal to bed bugs. Sheets, blankets, and clothing should be laundered in hot water (ideally over 140°F), and

can also be placed in a hot dryer for 20 minutes to kill bed bugs. Steam cleaning at a high temperature is also effective. Uninterrupted exposure to temperatures below 23°F for five days will also kill bed bugs.

## Removing Access Points and Hiding Places

Bed bugs cannot fly so they must access beds by crawling. They often access beds directly from walls, curtains or from overhanging bedspreads which contact the floor. Beds should be carefully examined to remove these access points. Double-sided tape can also be wrapped around the legs of the bed to limit access.

## Pesticides

Bed bugs are often difficult to manage with pesticides. These insects live in small cracks, mattresses or box springs which may be difficult to access without a thorough inspection of the area and use of proper pesticide formulations. These pesticides are typically applied as spot treatments to crevices where bugs are hiding. Room foggers and pest strips are less desirable because applications are not as well targeted as spot treatments. **Never use pesticide products intended for outdoor or agricultural use in the home!**

Very few pesticides are labeled for use on mattresses, and pesticides should not be used on beddings or linens. Beddings and linens may be washed in hot water with heavy detergent. Treated mattresses or box springs should be placed inside bed bug-proof encasements after application to prevent bed bugs from escaping and also keep other bed bugs from re-infesting.

In general, there are three classes of chemicals used against bed bugs including neurotoxins, natural abrasives and insect growth regulators (Table 1). For additional pesticide recommendations see the EPA pesticide recommendation database for bed bugs at <http://cfpub.epa.gov/opprpref/bedbug>. Reapplication of pesticides is often necessary after 7 to 14 days (depending on product formulation).

Care should be taken to remove occupants until well after the restricted entry interval (REI) has passed. Pesticides should never be used in rooms which are occupied by infants, the sick or the elderly. Prior to application:

- Check to ensure that the product is labeled for bed bugs.
- Ensure that you're using the pesticide in a manner listed on the pesticide product label. Many pesticides simply won't reach bed bugs hiding in cracks and crevices within the room.
- Ensure that the product is labeled for use inside the home.

If application is unsuccessful, a professional fumigation may be necessary. Contact a commercially certified applicator for any bed bug fumigations. Fumigations may use highly toxic substances which often require that the entire house be sealed prior to application.

**TABLE 1.** Some pesticides available for use on bed bugs within the home.\*

Mode of action	Chemical Class/Active Ingredient	Comments
Neurotoxins	Pyrethrins	Made from chrysanthemum flowers
	Pyrethroids	Cyphenothrin, esfenvalerate, deltamethrin, lambda-cyhalothrin, permethrin, phenothrin, resmethrin, and beta cyfluthrin
	Organophosphates (OP)	Most OPs are no longer labeled for use inside homes. Dichlorvos (DDVP) is labeled for use. DDVP has been listed as a possible human carcinogen by the International Agency for Research on Cancer (1991) and a probable human carcinogen by the U.S. EPA (1994).
Natural Abrasives	Diatomaceous Earth	Causes desiccation through abrasion of an insect's exoskeleton
	Boric Acid	
	Silica Gel	
Insect Growth Regulator	Hydropene	Genitol IGR. IGRs inhibit insects from reaching maturity thus causing mortality.

\* Pesticides target different bed bug locations within the home. It is an applicator's responsibility to always read and follow the product label instructions to ensure the safety of you and your family. Due to labels and registrations which are constantly changing, Extension cannot assume liability for the suggested use of chemicals herein.

## For more information

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103 Animal Bioscience, P.O. Box 172900  
Bozeman, MT 59717-2900  
phone: 406-994-5067  
web: [www.pesticides.montana.edu](http://www.pesticides.montana.edu)  
email: [pesticides@montana.edu](mailto:pesticides@montana.edu)

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