

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. 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.

Risk Factors

While sanitation helps, even the cleanest indoor environment may harbor bed bugs. An accommodation that has frequent turnover of residents and high-density stays is at higher risk for bed bug infestations. Although smaller cities are not exempt, larger cities tend to have higher instances due to increased cases fitting the above criteria.

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. A very small percentage of people (less than 20%) 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 lifetime. 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.



FIGURE 1. Adult bed bug (photo by Ruth O'Neill). Inset shown actual size.



FIGURE 2. Bite welts. (urbanentomology.tamu.edu/bedbugs.cfm)

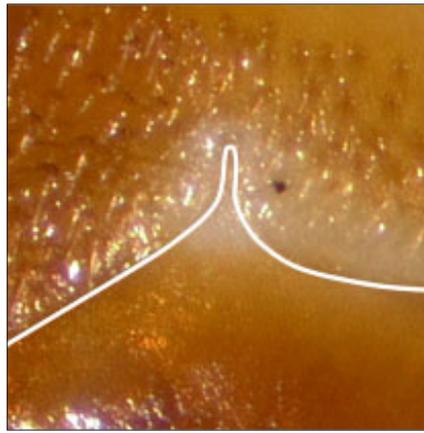
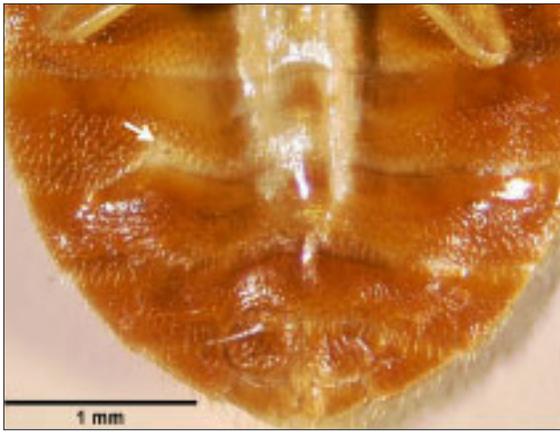


FIGURE 3. The notch on the underside of a female bed bug adult is narrow and pointed - highlighted in white in the image on the right; on bat bugs (not shown), the notch is rounded. (photos by Ruth O'Neill)

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). The female bat bug (no image) also has a notch, but it has a rounded 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, slender hairs that stand straight out (Figure 4).



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)

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.

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 hypersensitivity, 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 should be managed using an integrated management approach. Bed bugs are difficult to manage using only pesticides. Homeowners are urged to contact commercial pesticide applicators rather than attempting to manage bed bugs using pesticides on their own. 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 linens. 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.

There are several classes of chemicals used against bed bugs including neurotoxins, natural abrasives, insect growth regulators, and biochemicals among others (Table 1, page 4). For additional pesticide recommendations see the EPA pesticide recommendation database for bed bugs at <https://www.epa.gov/bedbugs/find-bed-bug-pesticide-product>.

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 the product is labeled for bed bugs.
- Ensure 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 the product is labeled for use inside the home.

For more information

- Schutter Diagnostic Lab
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121 Plant Bioscience Building
Bozeman, MT 59717
406-994-5704
www.diagnostics.montana.edu

Acknowledgements

The content of this Montguide was originally written by Ruth O'Neill, Entomology Research Associate, at Montana State University, and edited by Amy Bowser, MSU Pesticide Education Technician.

TABLE 1. Pesticides available in Montana for bed bug control.¹

Type of Active Ingredient	Representative Chemicals/ Active ingredients	Examples of Pesticide Products ²	Hazard to Humans	Comments
Biochemical	Neem oil (Azadirachtin)	Cirkil Cx; Proof	Non-toxic.	Produced from seeds of the Neem tree. Acts as an insect repellent, feeding reducer and insect growth regulator.
Insect Growth Regulators (IGR)	S-Hydropene	Gentrol Aerosol; Zoecon Gentrol Igr Concentrate	Low to moderate toxicity.	IGRs inhibit insects from reaching maturity, thus causing mortality.
Desiccants	Diatomaceous earth (silicon dioxide)	Celite 610; Safer Brand Bed Bug Killer	Low toxicity	Desiccants destroy the exoskeleton causing dehydration and death of bed bugs.
Pyrethrins & pyrethroids	Prallethrin Cyfluthrin Deltamethrin Permethrin	Raid Multi Insect Killer 7; Cy-Kich CS Controlled Release Insecticide; Deltadust Insecticide	Low to moderate toxicity. Possible carcinogen.	Pyrethrins are made from the chrysanthemum flower. Pyrethroids are synthetic versions of pyrethrins. They are the most common bed bug pesticide active ingredient. Some bed bug populations have become resistant.
Pyrroles	Chlorfenapyr	Prescription Treatment Brand Phantom Pressurized Insecticide	Moderate toxicity. Possible carcinogen.	Disrupts functions in cells causing death.
Neonicotinoids	Acetamiprid Imidacloprid Dinotefuran	Transport Ghp Insecticide; Bedlam Plus; Alpine D Dust Insecticide	Moderate toxicity.	Causes nervous system failure.
Organophosphates	DDVP (dichlorvos)	Nuvan Prostrips	High toxicity. Carcinogen.	Registered as a pest strip for treatment of small enclosures. Only on commercial or industrial sites where children are not present.

1. Pesticides target different bed bug locations within the home. It is an applicator's responsibility to read and follow the product label instructions to ensure the safety of you and your family.

2. This table represents only a few pesticides which may be available on the market. Discrimination or endorsement by Montana State University Extension is not intended with the listing of commercial products. For a broad list of pesticides available for use on bed bugs visit <https://www.epa.gov/bedbugs/find-bed-bug-pesticide-product>.



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