

Detecting Low-Level Bed Bug Infestations in Multifamily Housing:

Bed Bugs Sucking the Budget Out of Your Buildings?

Karen Vail, Professor and Extension Urban Entomologist

Pat Barnwell, Extension Program Assistant

Jennifer Chandler, Research Specialist

Department of Entomology and Plant Pathology

Bed bugs are considered the most difficult pest to control inside homes. While management can be demanding in a single-family home often requiring two or three treatments, a multiunit structure brings additional challenges. Extensive personnel time and funds have been expended by multifamily housing managers in an attempt to provide bed bug-free housing, but progress is lacking. Our experience leads us to emphasize early detection of low bed bug infestation levels as the first step in managing this pest.

Advantages of early detection are numerous. If infestations are caught early

- They will be more easily, effectively and quickly managed,
- Less room preparation will be needed,
- Furniture removal may not be required, and
- Spread to other apartments will be reduced and nonchemical control alone (vacuuming and other physical removal, steaming and encasing) may be all that is needed to provide sufficient control.

Low-level infestations of bed bugs can be difficult to detect. Relying on residents to report bed bug presence is not advisable because 70-79 percent of infested units could go unreported. Several

viable options, such as pitfall monitors, active monitors, canine scent detection teams and visual inspections by trained personnel, can help with early detection. A combination of these options may provide the best results.

The pitfall monitor is one of the less expensive, yet most effective, tools for detecting low levels of bed bugs. Pitfall monitors are available in different shapes and sizes. Each has a roughened outer surface that allows bed bugs to climb into the device, and a smooth, concave inner surface prevents bed bugs

from escaping. Furniture or bed legs can be placed in the concave area, but this isn't necessary to catch bed bugs. They can be caught in pitfall monitors placed on the floor against mattresses or box springs lacking a bed frame or placed on the floor against a wall or other vertical surface. Examples of pitfall devices include the white ClimbUp Insect Interceptor, black ClimbUp Insect Interceptor, Blackout Bed bug Detector (now also called LightsOut Bed bug Protector) and SenSci Volcano (Figure 1).



Figure 1. Pitfall monitors (black ClimbUp Insect Interceptor, white ClimbUp Insect Interceptor, BlackOut Bedbug Detector and SenSci Volcano) (photo credit: J. Chandler)

Pitfall traps are often referred to as passive because no lure is added to increase the monitors' attractancy to bed bugs. By placing the pitfall monitors near humans, the attractants (CO₂, human body odors and heat) produced help lure bed bugs to the trap.

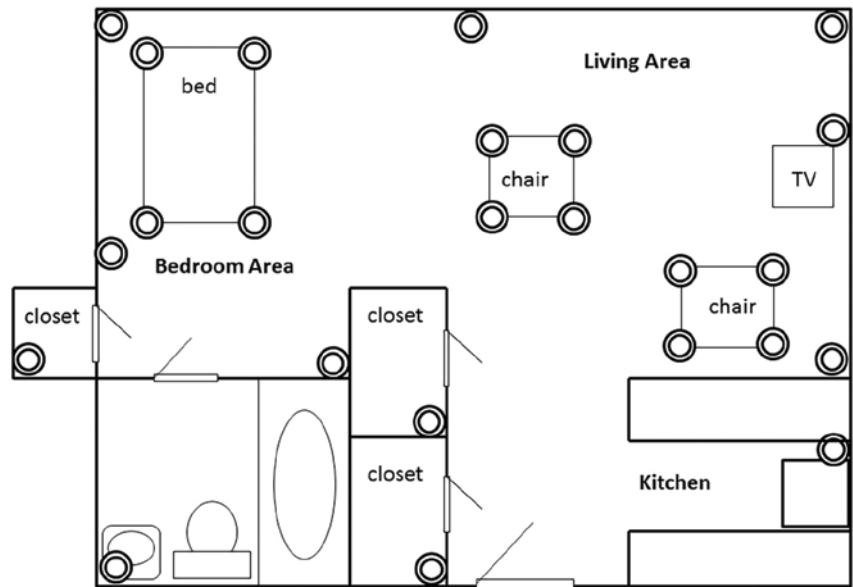
When detecting low-level infestations where no treatment has occurred, monitors should be placed where the tenants spend most of their sitting or resting time such as under or near legs of chairs, sofas and beds. A University of Tennessee Institute of Agriculture study found no significant difference in

the effectiveness of the black ClimbUp or the BlackOut in detecting low-level infestations when one, two or four monitors were placed in an apartment. Placing more than four monitors could increase the chances of and decrease the

time needed for detection. Additional monitors can be placed against walls near entryways, in corners, closets, and even in kitchens and bathrooms. Placing monitors under each leg of furniture as well as against walls away from sleep-

ing areas could require two dozen or more monitors per apartment (Figure 2). Monitors are useful only if they are periodically inspected, typically two or more weeks after placement.

Figure 2. Potential placements of monitors as indicated by double circles. If only two monitors are used, one would be placed at the bed and the most frequently used chair. (credit: R. Harmon)



Active monitors are similar to pitfalls but have an attractant that mimics human exhalation (CO₂), body odor or heat. Carbon dioxide will lure bed bugs from longer distances than human body odors or heat. Those monitors producing CO₂ were very effective in trapping bed bugs, but were often more costly. Active monitors have been introduced to the commercial market, but few remain today. One active monitor currently available is the SenSci Activ, which consists of a lure mimicking human skin odors added to the SenSci Volcano.

Well-trained canine detection teams can be valuable in inspecting large areas such as offices, movie theaters, schools, department stores and apartment complexes for live bed bug nymphs and adults as well as viable eggs (Figure 3). With their acute olfactory sense, canines are able to detect bed bugs more quickly than humans visually searching. It is important for dogs to be able to distinguish all living bed bug stages (eggs, nymphs and adults) from signs of an inactive infestation such as dead bed bugs, cast skins and bed bug feces. The team's accuracy depends on the ability of the dog to detect the scent of the target and of the handler to direct and manage

the inspection and interpret the dog's response. Although success rates for bed bug detecting dogs in a controlled setting are high, in the field the success rate may be lower.

Dogs are capable of indicating false positives (indicating the presence of bed bugs when they are not present). Before

treating for bed bugs, the physical presence of living bed bugs should be verified. Monitors can be placed for 14 days to aid in detection if a visual search fails to produce physical evidence. Pesticides should not be applied if the physical presence of a pest is not verified.



Figure 3. Canine scent detection team inspecting for bed bugs. (photo credit: Dog Inspectors LLC)

Visual inspection is the technique used most frequently by the pest management industry, but it can be very time consuming and has been documented to be less accurate than pitfall monitors when bed bugs are present at low levels. To visually inspect an apartment in its entirety could require hours of effort. Inspections typically start with the bedding (comforter/bedspread, sheets and other bed coverings). Next, the entire mattress cover is inspected as are the seams, edges, rips, tags and other tight spaces. The top surface and

the sides of the entire boxspring are inspected. Next, the boxspring is turned over and careful attention is paid to the overlapping material around the stapled areas of the dust cover. The dust cover is removed, and the interior, especially the rough wood surfaces, is inspected. The bed frame, including headboards and footboards, is disassembled as needed to inspect cracks and crevices. The inspection then moves to the areas surrounding the bed that provide harborage for bed bugs such as nightstands, dressers, tables, chairs and carpet, as well as the

tack strip under the carpet and behind baseboards. Concentrate on upholstered furniture where residents spend considerable time and nearby cracks and crevices, and then on less-used upholstered furniture. Not only are exposed surfaces inspected, but pillows are removed and the furniture flipped to inspect the undersides. Dust covers may be removed to allow inspection of the furniture's interior. Bed bugs may also be found in coat closets, bathrooms, kitchens, picture frames, wall outlets/switches, popcorn ceilings and smoke detectors.



Figure 4. Quick inspection of bed and upholstered furniture requires about three minutes in an efficiency or one-bedroom apartment. (photo credit: C. Lykins)

The combination of a quick three-minute visual inspection of all apartments in the building with the placement of monitors as needed may be the best method for detecting low-level bed bug infestations. Conducting a building-wide inspection is important to find all the infestations at the same time, thus preventing bed bug spread. For the quick visual inspection, only the bed-

ding and outer surfaces of the mattress (especially seams, tufts and tags) and box spring are inspected as are the upper surfaces of the upholstered furniture and all sides of furniture pillows (Figure 4). No flipping of furniture or beds is required. In this scenario, monitors are used only if bed bugs aren't detected but their evidence is present or a resident complains of recent bites or sightings.

Monitors are placed under or against legs of beds or upholstered furniture and inspected after two weeks. Four or fewer monitors could be used with the quick inspection but detection may require four weeks. For a detailed explanation of the detection techniques described here, see "The Techniques of Detecting Low Level Bed Bug Infestations in Multifamily Housing" at bedbugs.utk.edu.



United States
Department of
Agriculture

National Institute
of Food and
Agriculture

"This material is based upon work that is supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, Southern Region IPM Grants Program under award numbers 2013-41530-21214 and 2013-34103-21213."

"Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the view of the U.S. Department of Agriculture."

Disclaimer: This publication contains pesticide recommendations that are subject to change at any time. The recommendations in this publication are provided only as a guide. It is always the pesticide applicator's responsibility, by law, to read and follow all current label directions for the specific pesticide being used. The label always takes precedence over the recommendations found in this publication. Use of trade or brand names in this publication is for clarity and information; it does not imply approval of the product to the exclusion of others that may be of similar, suitable composition, nor does it guarantee or warrant the standard of the product. The author(s), the University of Tennessee Institute of Agriculture and University of Tennessee Extension assume no liability resulting from the use of these recommendations.



AG.TENNESSEE.EDU

R12-4610-334 8/16 17-0019

Programs in agriculture and natural resources, 4-H youth development, family and consumer sciences, and resource development.
University of Tennessee Institute of Agriculture, U.S. Department of Agriculture and county governments cooperating.
UT Extension provides equal opportunities in programs and employment.