

# Bed Bugs in America: A Pest Management Industry Survey

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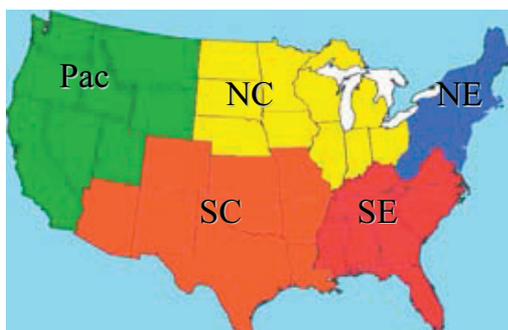
The common bed bug, *Cimex lectularius* L., is an important economic and nuisance pest that infests the numerous places where people sleep, including houses, apartments, hotels, and college dormitories. Human risks associated with bed bugs include sleeplessness, itchy bites and skin welts, anemia, stress, economic losses, and the potential for overexposure to pesticides used for bed bug management. Recent increases in bed bug complaints across the United States, plus extensive media attention, suggested the need for a nationwide survey that would elucidate the scope of this growing problem, after almost 50 years of little attention.

## Survey

In 2004, entomologists from Cornell University and the University of Massachusetts teamed with experts from the University of Minnesota, North Carolina State University, Oklahoma State University, and Spokane Falls Community College to develop a survey of U.S. pest management companies about their experiences with bed bugs. The group used 15 multiple-part questions to gather information that described the current status of the bed bug as a significant pest in the continental United States.

Cornell University's Survey Research Institute (SRI) administered the phone survey instrument using its Computer-Assisted Telephone Interviewing (CATI) system. Owners, managers, and supervisors from individual pest control companies that provide bed bug management for their customers participated. Survey regions were modeled after the five geographic regions of the Entomological Society of America (Fig. 1.) and adjusted to equalize populations within regions. Participating companies from each region were selected at random from lists obtained through state regulatory agencies, the Yellow Pages, the National Pest Management Association, or other means. Announcement letters describing the scope and purpose of the survey were sent in advance of calling.

Pilot interviews began on 14 March 2005 and finished on 22 March 2005; 22 interviews were completed. The survey was then revised by the team

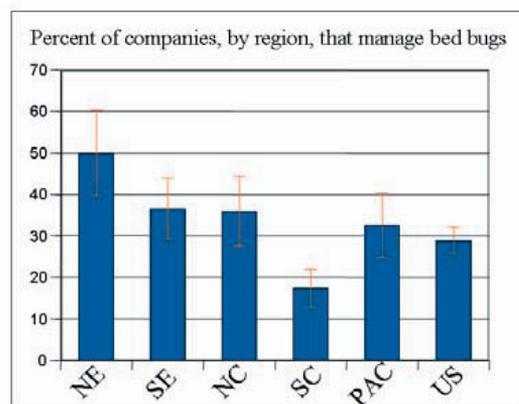


and fully administered from 25 April through 16 June 2005. A total of 225 surveys were completed, amounting to 45 surveys from each of the five geographic regions.

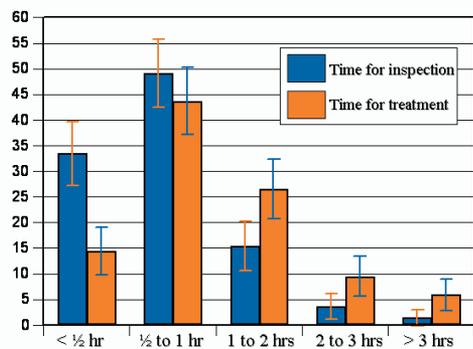
Survey questions were designed to gather information about the prevalence of bed bug complaints and the nature of pest control work, including the number of technician hours spent inspecting and treating, number of visits and callbacks, successful management tools, and innovative techniques used. We also wanted to gain a better understanding about the frequency of use of chemical and non-chemical management tools, as well as typical and unusual locations where bed bugs are often found, and methods and tools used for inspection. Only companies that offer bed bug management services were included in the survey; however, data from this qualifying question were also collected.

## Results

Using data from the qualifying question, i.e. "Does the company offer bed bug management services?", we compared the proportions of "yes" and "no" responses for each U.S. region (Fig. 2.). The South Central region was the only area with significantly fewer companies offering bed bug control services to their customers.



Number of technician hours spent on a typical bedroom, inspection vs. treatment



The Northeast region had a significantly higher number than the U.S. average. Two-thirds (66.7%) of the individuals completing the survey said that they noted an increase in bed bug calls to their company in the past 12 months. When analyzed by region, there were no statistical differences between regions in the numbers of “yes” responses to this question ( $X^2, P \geq 0.05$ ), indicating that there has been a similar increase in calls across the United States.

We also asked company representatives several questions about inspections performed by technicians. When asked about the time spent inspecting a typical bedroom, most claimed that inspection lasts <1 h (Fig. 3.). Treatment, however, of a typical bedroom generally takes more time than inspection. Products or tools used for treatment were unspecified. Nearly all companies reported that bed bugs are sometimes or always found on the mattress (98.2%) and box spring (93.6%). Baseboards and carpets were also common places to find bed bugs (94.1%). These results highlight critical inspection sites. Unexpected bed bug hiding spots included inside automobiles, radios and other electronics, the kitchen, a shower head, on curtains, on a person, and many other places, indicating the importance of thorough inspections. Inspection signs most often cited by technicians were the bed bugs themselves and evidence of bed bugs, such as bites or cast skins and customer reports of bed bug sightings. Many respondents (67.9%) reported using sticky traps; however, an innovative monitoring trap was described by several participants. This trap was composed of a heating pad plus a sticky trap, and one individual also included carbon dioxide in the form of dry ice. Effectiveness of this type of tool is unknown, but worth investigating.

Most companies (62.6%) claim to control bed bug infestations in two or three visits. Only 10.7% of respondents reported that they made five or six visits to solve the problem. An interesting result

is that only 6.1% of companies claim successful control after only one visit. A wide variety of responses was found with respect to the use of insecticides. About 40% of respondents never use aerosol insecticides or general dusting for bed bugs. However, 98.6% said they use crack and crevice treatments (liquid or dust), and 92.3%

applied a liquid spray to baseboards, floors, and other surfaces. We asked whether parts of the bed were treated with insecticides. Positive responses (either “sometimes” or “always”) for the mattress were 75.1%, box spring, 87.3%, and the bed frame and headboard, 93.7%. We asked an open-ended question about which insecticides were most often applied for bed bug control. Overwhelmingly, pyrethroids were the insecticides of choice; deltamethrin and cyfluthrin were most commonly mentioned. Insect growth regulators (IGRs) were less popular than the pyrethroids, but are commonly used in combination. Participants were asked which products did not work well. Boric acid and sometimes IGRs gave disappointing results, but there was no indication from this survey that pyrethroids were failing. Nonchemical control methods such as steam, heat, freezing belongings, encasing the mattress, or placing a sticky barrier on furniture legs are not used by most companies (Fig. 4). Many participants recommend cleaning and physical controls, and they emphasize customer communication, education, and awareness as a part of their management program. Inspection and regular communication were the primary criteria used to determine whether the problem was solved.

Information gathered through this survey confirmed that bed bug problems are increasing, and that insecticides are the most widely used tool for their control. It is evident that the pest control industry needs new low-risk effective management tools for bed bugs, especially considering that these pests are found and treated on mattresses, box springs, and bed frames. Alternative, nonpesticide techniques, such as steam, heat, and cold, need to be investigated for effectiveness and cost.

## Future

This coast-to-coast survey of the pest control industry can be used to help develop priorities for future research and outreach efforts to address increasing problems with bed bugs. Best management practice guidelines need to be further developed to address the needs of the pest control industry, as well as municipal housing agencies, college dormitory managers, private multiunit owners and dwellers, health departments, and domestic and international travelers and the hotel industry, to name a few. Additionally, public awareness must be raised about reducing the risks of transporting bed bugs from place to place, the potential hazards and failure of do-it-yourself pest control, sanitation and nonpesticide methods, and cooperation with pest management professionals.

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Frequency of the use of alternative control methods

