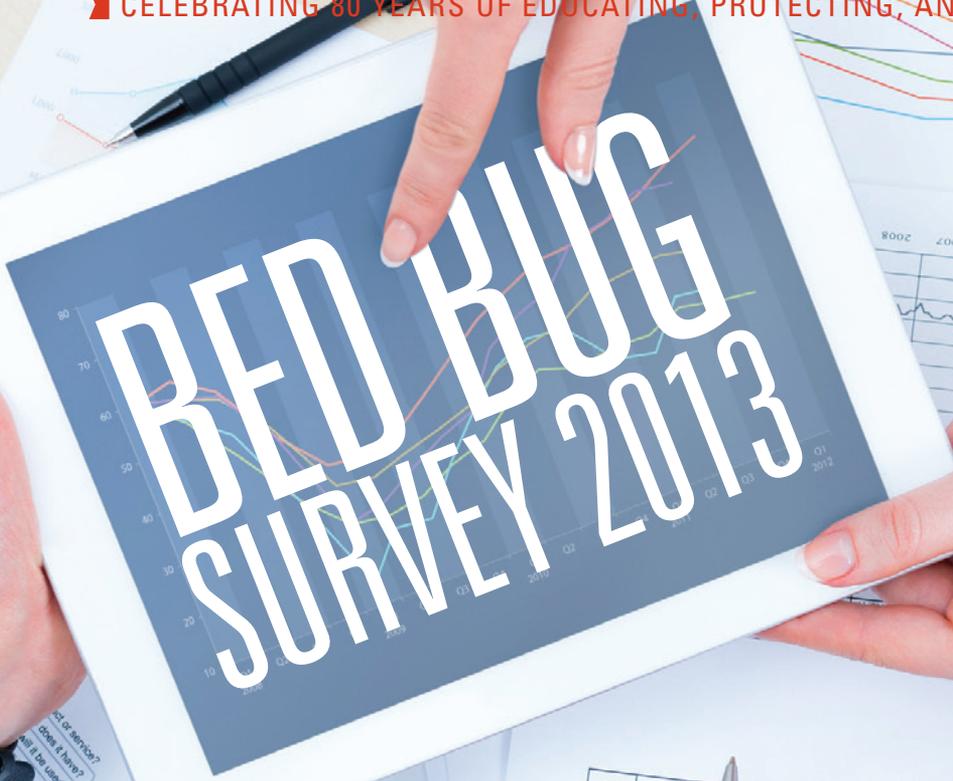


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See footnotes and notes at the end of Table 3.

(1) Preliminary estimate. (2) Revised estimate.

Category	Feb. 2012	Jan. 2012	Feb. 2011	Feb. 2010
Total business	1,236,702	1,277,901	1,149,330	1,577,798
Manufacturers	462,642	462,315	431,886	616,739
Merchants/wholesalers	564,627	580,878	543,017	482,988
Retailers	409,368	454,708	374,427	476,925
Total business	1,163,219	1,192,968	1,039,700	1,556,854
Manufacturers	441,602	425,663	396,554	616,739
Merchants/wholesalers	381,014	372,888	306,554	428,473
Retailers	340,603	394,427	336,592	489,642
Total business	381,691	381,445	336,598	443,221
Manufacturers	140	140	140	140
Merchants/wholesalers	146	146	146	146
Retailers	141	141	141	141

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In 2010 and 2011, the National Pest Management Association (NPMA) and the University of Kentucky surveyed the pest management industry about the growing bed bug resurgence. We polled U.S. firms again this year to learn what was new to report.

BED BUG NATION

Are We Making Any Progress?

BY MICHAEL F. POTTER, KENNETH F. HAYNES,
JIM FREDERICKS AND MISSY HENRIKSEN

One of the remarkable things about bed bugs has been the reach of their resurgence. When pest management firms in 43 countries were surveyed in 2010, respondents confirmed that infestations were increasing worldwide. Bed bugs were once again biting both rich and poor, wherever they slept and spent time (*PestWorld*, Sept./Oct. 2010). In summer 2011, pest managers in the U.S. were polled again, yielding additional insights—including that more bugs were being transported into schools, offices, and other ‘non-bed’ environments (*PestWorld*, Sept./Oct. 2011).

In 2012, news coverage of bed bugs waned. Health officials in New York and Cincinnati received fewer calls on their bed bug help lines. Some pest control firms also experienced a downturn in revenue, prompting speculation that the crisis is in decline. Read on to learn what the rest of the industry is saying about the state of the resurgence and whether, as a nation, we are making any progress.

Survey Parameters

An online survey was administered consisting of 32 questions, covering topics ranging from frequency of bed bug infestation, to management

and business practices. Many of the questions were similar to those in previous surveys in order to permit year-to-year comparisons. Questions were formatted either as open-ended or closed-ended (fixed) responses. Responses to the self-administered online survey were collected from January 19 to February 18, 2013. Letters requesting participation were emailed and delivered to 6972 contacts representing NPMA member companies. This resulted in 251 completed surveys for a 3.6% response rate. Respondents worked for companies ranging in size from fewer than 10 individuals to thousands of employees. The breakdown of respondents by region is shown in Figure 1.

Still Going Strong

Nearly every respondent (99.6%) indicated their company treated or was asked to treat for bed bugs in the past year—compared to 99% and 95% in the 2011 and 2010 surveys (Figure 2). When asked about the incidence of bed bugs in their region, 72% of all respondents said infestations were increasing while 25% said they were staying about the same. Only 3% felt that incidence of bed bugs was decreasing (Figure 3). Regionally, more respondents in the West (79%), Midwest (77%) and

FIGURE 1. RESPONSES BY REGION

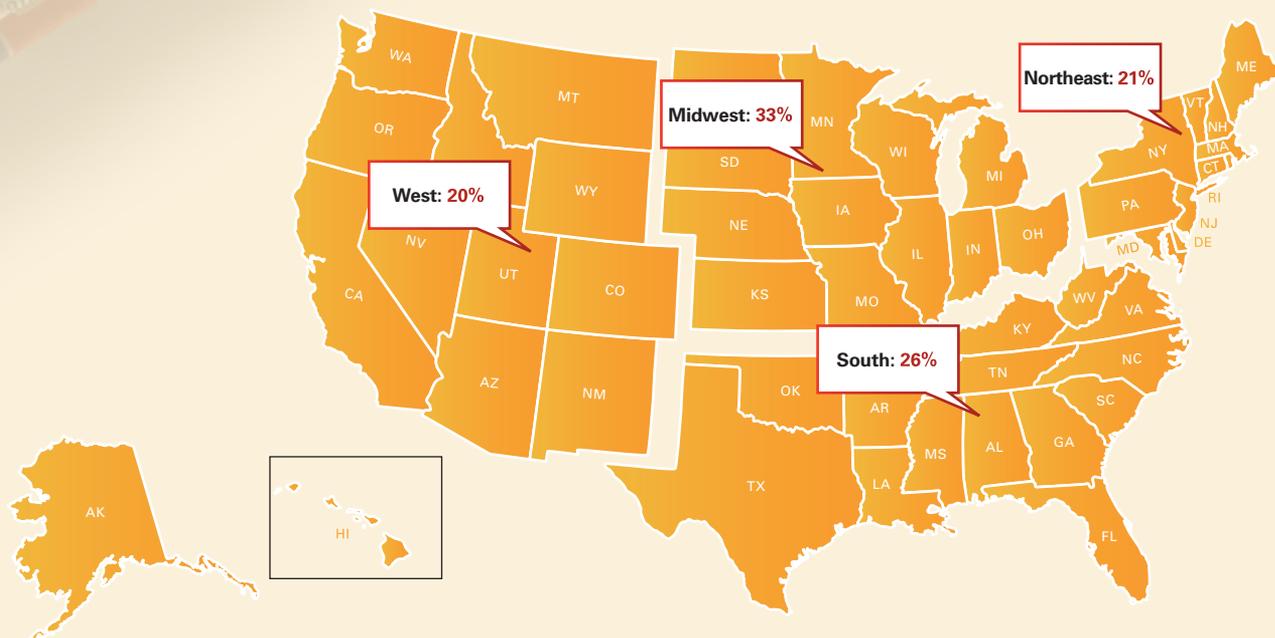


FIGURE 2. HAVE YOU TREATED OR BEEN ASKED TO TREAT FOR BED BUGS WITHIN THE PAST YEAR?

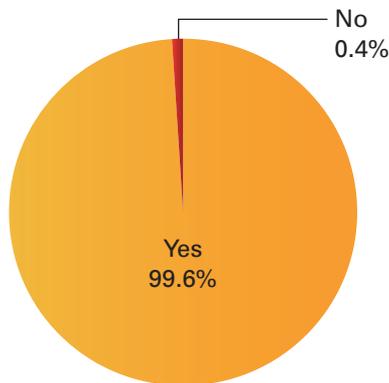


FIGURE 3. OVER THE PAST YEAR, DO YOU FEEL THE INCIDENCE OF BED BUGS IN YOUR REGION IS ...?

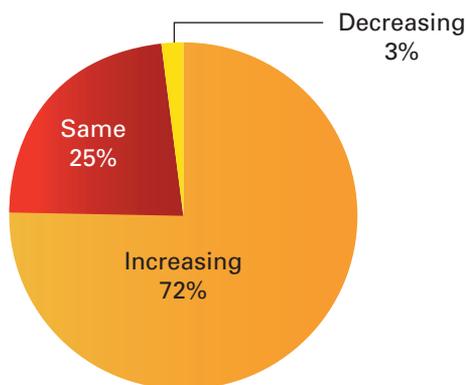
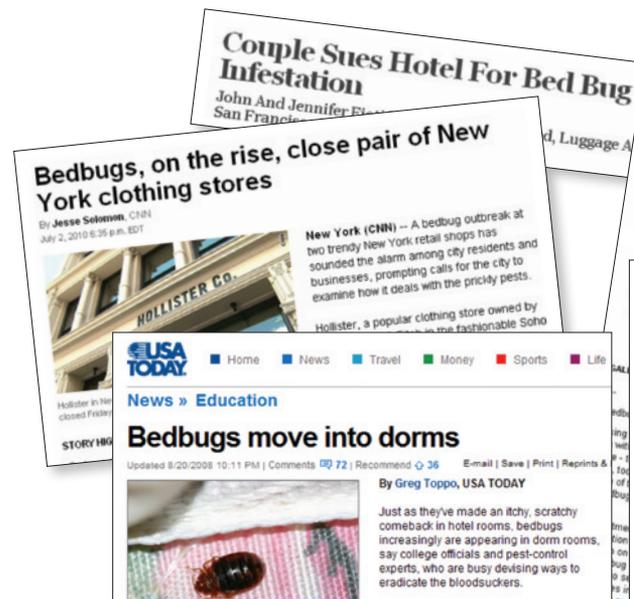
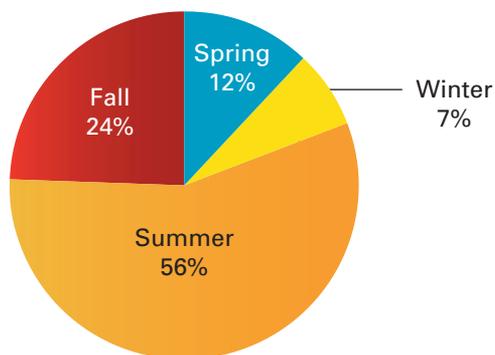


FIGURE 4. DO YOU RECEIVE MORE BED BUG CALLS AT CERTAIN TIMES OF THE YEAR? IF YES, WHICH SEASON TENDS TO BE THE BUSIEST?



South (74%) felt that bed bugs were increasing, than respondents in the Northeast (53%).

About half (49 percent) of respondents indicated that their company received more bed bug calls at certain times of the year. Although pest managers were divided on whether there is a “peak season” for bed bugs, more than half (56%) who notice seasonal differences receive more calls during summer—the same trend reported in 2011 (Figure 4). Travel, relocation, and other activities tend to increase during the summer months, which could boost the chances of encountering bed bugs. During summer, the ambient temperature of some dwellings also tends to be higher, which could result in a faster development time for some populations.

Just About Everywhere

Bed bugs continue to be most common in residences, with 98% and 96% of respondents, respectively, encountering them in apartments/condominiums and single-family homes. About 90% of those we polled in 2010 and 2011 reported finding the bugs in residences. Other locations where respondents reported finding bed bugs in recent years include:

- Hotels/motels—75% reported encounters this year, versus 80% in 2011, and 67% in 2010
- College dorms—47% this year (54% in 2011; 35% in 2010)
- Shelters—47% (47% in 2011; 31% in 2010)
- Nursing homes—46% (46% in 2011; 25% in 2010)
- Schools and day care centers—41% (36 percent in 2011; 10 percent in 2010)
- Office buildings—36% (38% in 2011; 18% in 2010)
- Hospitals—33% (31% in 2011; 12% in 2010)
- Doctor/outpatient clinics—26% (23% in 2011)
- Transportation (trains/buses/taxis)—21% (18% in 2011; 9% in 2010)
- Movie theaters—10% (17% in 2011; 4% in 2010)

In the current survey, fewer respondents reported finding bed bugs in retail stores (15% compared to 21% in 2011), but more mentioned finding them in libraries (12% compared to 8% in 2011). Bed bug encounters in Laundromats (9%) and restaurants (7%) were relatively unchanged.

Hospital shuts for fumigation after bed bugs infest wards



33% OF RESPONDENTS reported finding bed bugs in hospitals (31% in 2011; 12% in 2010)

SUBWAYS' BLOOD-BUG INVASION

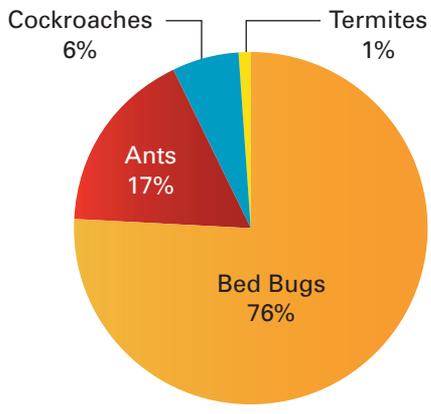


IN THE CURRENT SURVEY, fewer respondents reported finding bed bugs in retail stores (15% compared to 21% in 2011)



Discovering bed bugs in such locations isn't so surprising, considering their close (and clingy) association with humans. It is likely this trend will continue now that the pests are thoroughly entrenched in people's homes.

FIGURE 5. WHICH OF THE FOLLOWING PESTS DO YOU CONSIDER MOST DIFFICULT TO CONTROL?



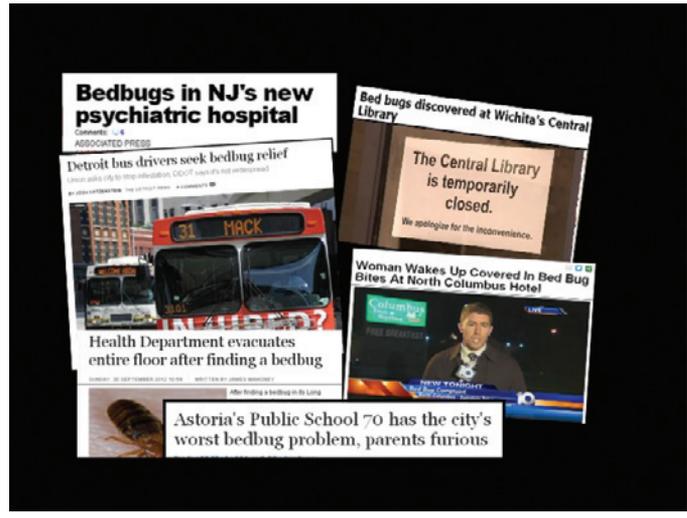
Managing Infestations

Most professionals continue to find bed bugs harder to control than other key pests (Figure 5). In 2013, 76% of respondents felt bed bugs were the most difficult to control pest. Ants were considered "most difficult" by 17% of respondents, cockroaches by 6%, and termites by only 1%. This opinion has not changed from previous surveys, despite many more educational seminars, workshops, articles, research, new products and technology.

The time initially spent treating an "average size bed bug infestation" in a residential setting, ranged from less than one hour to more than five hours. (Estimated median 3.4 hours, compared to 2.9 and 2.7 hours, respectively in 2011 and 2010 surveys.) Most respondents (94%) said their company spends more than one hour on the initial service. Thirty percent said one to two hours were spent, while 64% said more

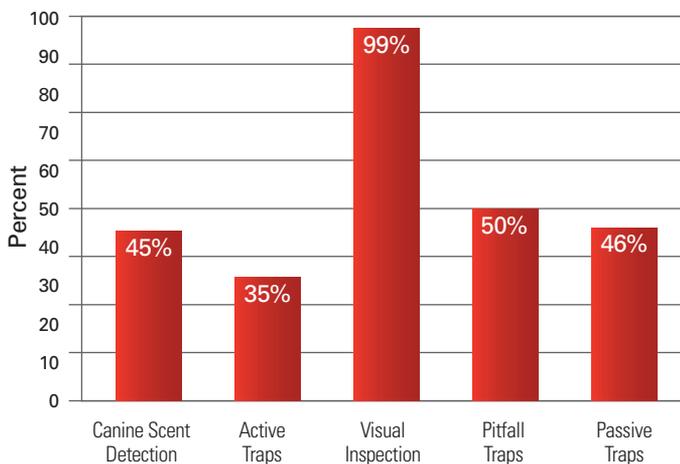
than two hours were typically spent on the initial service. The majority of respondents (69%) said two or three services were typically needed to control infestations (16% said one visit was satisfactory, while 12% said more than three visits were typically needed). A previous industry bed bug survey showed that more treatments are usually needed in cluttered environments—a point worth remembering when pricing work and educating customers on the need for cooperation (Potter 2008). When asked "What are the biggest customer-oriented challenges in treating bed bugs?" 67% said homeowner clutter while 58% said customers not following advice (16% mentioned re-introduction).

When respondents were asked which methods they normally use to control bed bugs, 96% mentioned insecticides (down slightly from 99% in 2011). Encasing beds was also widely mentioned (by 85% of respondents), which was comparable to usage in 2011. Utilization of vacuums (by 70% of respondents) and steamers (by 43%) was also similar to 2011. Volumetric heating of rooms and buildings was used by 42% of this year's respondents—compared to 32% of those polled in 2011 and 17% in 2010. Other control methods used by respondents included container heat treatment (by 19%), pesticide-impregnated bed liners (by 4%), and spot freezing (3%).



Bed bugs now occur just about everywhere.

FIGURE 6. WHICH METHODS ARE YOU USING TO FIND BED BUGS?



Monitoring, Detection, Prevention

Vigilance and early detection have long been considered keys to managing bed bugs. While most companies do visual inspections, other methods are gaining in popularity (Figure 6). Half (50%) of this year's respondents mentioned using 'pitfall traps' (dish-shaped traps generally placed under the legs of beds and sofas), compared to 46% in 2011 and 25% in 2010. More than a third (35%) also said they were using 'active' traps emitting heat and/or carbon dioxide. Fewer respondents (27% and 14%, respectively) utilized active traps when the industry was surveyed in 2011 and 2010. Conversely, industry usage of 'passive' (glue boards or sticky traps) declined (59% in 2011 versus 46% in 2013). While glue-based traps may capture bed bugs, their reliability tends to be lower than for detecting cockroaches, spiders, etc. Part of the reason for this is that bed bugs tend to shun sticky surfaces. Also notable was the continued use of canine scent detection teams, either owned or sub-contracted through another company. In 2013, 45% of respondents said their company had used canines to find bed bugs, up slightly from 2011 (43%). Only 17% used bed bug dogs when the industry was surveyed in 2010. The industry will certainly see more bed bug detection devices in the future. Most promising will be those that reliably detect infestations at low levels, and are economical and inconspicuous.



Bed bug elimination requires time, effort and attention to detail.

More than two thirds of respondents (68%) felt that customers are very (16%) or somewhat (52%) interested in some form of preventative inspection service for bed bugs—unchanged from feelings expressed 2011. In respect to willingness of customers *to pay* for preventative inspections, 54% sensed they were very (7%) or somewhat (47%) willing to pay for prevention, while the rest felt their clients were not interested (31%) or were unsure (15%). Sixty percent of respondents indicated their company currently conducts some type of preventative/proactive service for bed bugs. Services performed by those that do include ongoing visual inspection (by 29%), monitoring/trapping (by 18%), canine inspections (18%), and insecticide applications (17%).

Bed Bug Insecticides

Insecticides continue to be the most universal control method for bed bugs. Ninety-six percent of those polled said they apply insecticide liquids, 90% dispense dusts, 52% use aerosols, and 22% employ impregnated resin strips—virtually the same use patterns reported in 2011. When asked which products they routinely use, Temprid was mentioned most (by 41% of respondents), followed by Phantom (32% overall; 28% liquid, 4% aerosol). Phantom was the most mentioned product in the 2011 and 2010 surveys, by 51% and 42% of respondents, respectively. Rounding out the third and fourth most-mentioned products in 2013 were Bedlam (a top-4 mentioned product since 2007), and Transport. Usage of Temprid and Transport for bed bugs has soared in recent years. In 2010, fewer than 5% of those polled routinely used either product. The 10 products most often utilized for bed bugs in 2013 are shown in Figure 7.

When pest managers were asked if they were satisfied with the performance of current bed bug insecticides, 24% said "very satisfied," 61% were "somewhat satisfied" and 15% were either "not very" or "not at all satisfied." Industry satisfaction with available products has increased modestly since we asked this question in 2010.

As in previous surveys, opinions differed on the extent to which bed bugs are insecticide resistant. About a third of respondents (34%) said they had encountered resistant populations, 42% felt they had not, and 24% were unsure. Laboratory studies consistently suggest resistance to pyrethroids is widespread (Romero et al. 2007, Fang et al. 2010). Yet when bed bug infestations are treated in the field, resistance can be less obvious. In commercial practice pest controllers often employ multiple tactics, which may 'compensate' for decreased effectiveness of insecticides. Encasing beds, for example, can often purge many of the bed bugs from a dwelling, especially when augmented by laundering, vacuuming, steam, etc.

Studies have shown that field populations have differing degrees of resistance. Even within those that are highly resistant, some of the bed bugs are more susceptible than others and may succumb to an application, especially at higher levels of exposure. This is one reason products tend to perform better when the bugs (even resistant ones) are sprayed directly. Aside from the active ingredient(s), bed bugs can be further impacted by solvents, propellants, synergists, and other 'inert' ingredients of the formulation. This is especially true with some aerosol and

MOST RESPONDENTS (94%)
said their company typically treats infested
beds with insecticides



Bed bugs can be transported elsewhere, including on tops and bottoms of shoes.

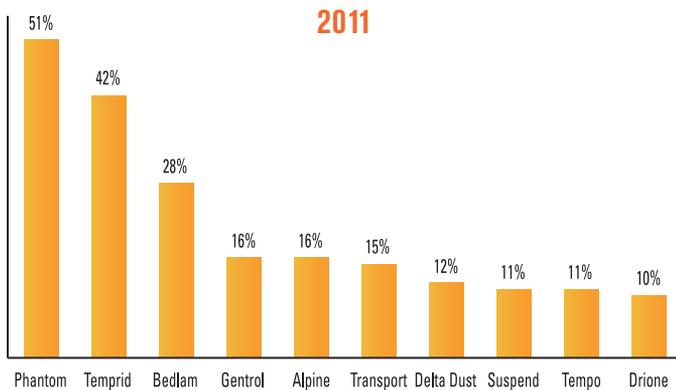
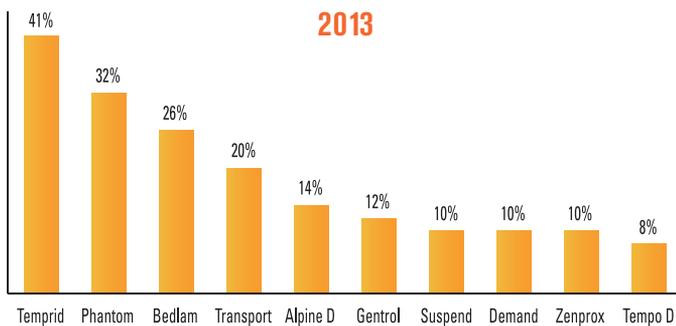


OF THOSE THAT DO TREAT BEDS,
78% treat the mattress, box spring and frame

Previous surveys showed that most pest managers were concerned about accidentally transporting bed bugs home, to the office, or to another account. In 2013, 27% of respondents indicated that someone in their company had already done so—**UP FROM 22% IN 2011 AND 15% IN 2010.**

oil-based materials. Increasingly popular products (e.g., Phantom, Temprid, Transport), with different modes of action, also perform better against pyrethroid resistant populations. Such factors could influence why many firms continue to report not encountering resistance in the field.

FIG 7. WHICH INSECTICIDES DO YOU USUALLY USE?



Treating Beds

Most respondents (94%) said their company typically treats infested beds with insecticides—up from 81% in 2011. Of those that do treat beds, 78% treat the *mattress, box spring and frame*. Before the resurgence, professionals would have cringed at the thought of treating a bed with pesticides. Companies today often find themselves “between a rock and a hard place” deciding when and how to disinfest such areas. The same goes for insecticide manufacturers striving to minimize liability while maximizing utility and marketability of their products.

Transporting Them Home

Bed bugs are capable of crawling onto or into just about anything. Previous surveys showed that most pest managers were concerned about accidentally transporting bed bugs home, to the office, or to another account. In 2013, 27% of respondents indicated that someone in their company *had already done so*—up from 22% in 2011 and 15% in 2010. Some firms are providing clothes dryers for employees



Detection devices (like this pitfall trap) are being used more frequently.



IN 2011, the National Pest Management Association developed “Best Management Practices” (BMPs) to help the industry control bed bugs safely and effectively.

61% SAID THEIR COMPANY is following or plans to follow the BPM guidelines 

to run their uniforms, shoes, etc. through at the end of the day. Others have even begun wearing disposable shoe covers to lessen the chance of transporting bugs to other accounts. Technicians have likewise learned to be wary when moving beds and sofas or working in cramped quarters; situating jackets and gear away from heavily-infested areas, and checking their shoes (tops and bottoms) after inspecting badly infested accounts.

State of the Business

In terms of growth, 81% of pest managers indicated their bed bug service work grew during the previous year; the rest reported no change (13%) or a decline (6%). More pest managers reported sustained growth from the Midwest (89%), West (83%), and South (79%), than did respondents from the Northeast (68%).

Bed bugs occupy substantial time and resources of the pest management industry—yet still represent a rather modest percentage of overall revenue. Almost half (49%) of this year’s respondents said bed bug work generated five percent or less of their firms’ income



DON'T BECOME COMPLACENT

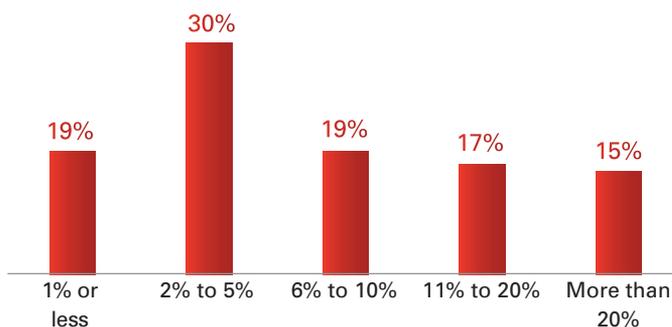
Despite mixed opinions regarding levels of resistance encountered in commercial practice, history has shown that diminished effectiveness of insecticides, over time, should be expected. Recent studies show that bed bugs are endowed with diverse toxicological defenses to fend off insecticides. Laboratory studies on freshly collected field populations indicate resistance to pyrethroids is widespread. Although combination products containing both pyrethroid and neonicotinoid ingredients are performing better, resistance to these products was reported recently as well (Potter et al. 2012, Gordon et al. 2013 in review). Companies should be watchful for declining insecticide performance in the field, and vary their tools and approaches to preserve current materials.

(Figure 8). Nonetheless, in the Midwest, Northeast, and West, 43%, 35%, and 33% of respondents, respectively, mentioned that more than 10% of their annual revenue came from bed bug-related services. In the Northeast, West and Midwest, 26%, 24%, and 11% of respondents, respectively, reported revenues *exceeding 20%*. Bed bug business remained slower in the South, where 17% and 6%, respectively, reported the bugs comprising more than 10% and 20% of their pest control revenue. Pest managers also weighed in on the average amount customers spent last year treating for bed bugs. Two-thirds (67%) of respondents said residential customers in single-family homes spent between \$500 and \$1500, with a median expenditure of about \$1000 (Figure 9). The amount that apartments and condominiums spent treating their buildings for bed bugs ranged from less than \$1000 to more than \$50,000. About three fourths (78%) of those polled said property managers spent an average of \$5000 or less treating their buildings for bed bugs (estimated median expenditure \$2918). Similar figures were reported for commercial customers such as hotels and motels (estimated median \$2831).

Many firms made changes to their bed bug service last year. Two thirds (66%) of respondents said they have or would soon sell preventive inspections—the same number emphasizing greater emphasis on preventive inspections in 2011. It remains to be seen whether clients can be convinced to pay for pro-active inspections and other preventative services. With respect to heat treatments, 28% of those polled have or intend to use the technology (14% fewer than in 2011); 14% mentioned adding canine scent detection teams (13% fewer than in 2011); and 10% specified fumigation services (2% fewer than 2011). Another 13% of respondents said their companies have started or intend to start treating for bed bugs. Firms that do not treat for bed bugs increasingly risk losing new business and forfeiting existing accounts to others.

In 2011, the National Pest Management Association developed “Best Management Practices” (BMPs) to help the industry control bed bugs safely and effectively. The majority of survey respondents (61%) said their company is following or plans to follow the guidelines. Most remaining firms said they either were not familiar with the new BMPs (15%), or had not yet made a decision (23%).

FIGURE 8. WHAT PERCENTAGE OF YOUR COMPANY'S PEST CONTROL REVENUE CURRENTLY COMES FROM BED BUG SERVICE WORK?





More firms are offering proactive inspections to clients.

Parting Thoughts

As in previous surveys, respondents volunteered other thoughts and suggestions. Several stressed that the pest control industry cannot fix this problem alone, and that customers need to do their part in respect to cooperation and being vigilant. Others emphasized the need for effective and affordable solutions for the poor—pointing out that these accounts have become massive bed bug reservoirs that must be purged if society is to get ahead of this insect. Several respondents echoed the need for pro-active inspection and early detection. One suggested buildings should budget for bed bug prevention and stop putting PCOs “in the crosshairs” when they get sued. It was further suggested that NPMA/state associations develop a generic disclaimer for property managers to initial if they disregard the preventative program that has been recommended. Respondents also were concerned about the devaluation of bed bug services as the market matures and prices decline. Some lamented that firms should not be doing bed bug work if their treatment lacks thoroughness, since it misleads the public. A few also opined on the public’s misuse of bed bug pesticides, saying the situation has become “downright scary” and is putting both customers and employees at risk. Extreme use of foggers and diatomaceous earth were noted in particular.

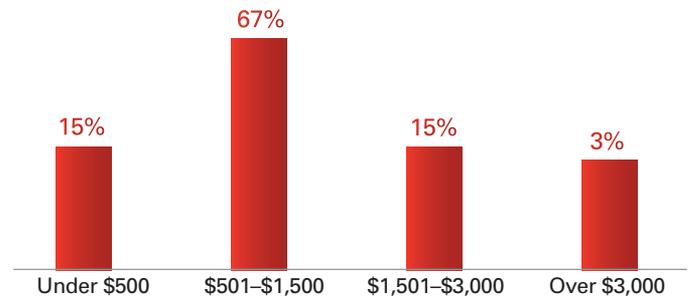
What is abundantly clear from the current survey is that bed bugs are not subsiding, as some news reports have suggested. Infestations



Pesticide misuse by the public is a growing problem.

continue to plague Americans wherever they live and gather. Lacking a coordinated, sustained, societal response, efforts to date have been akin to the repetitive, futile arcade game of ‘whac-a-mole.’ In the meantime, business is booming for many companies. Bed bugs are also starting to come on strong in smaller cities and throughout much of the

FIG 9. WHAT WAS THE AVERAGE AMOUNT YOUR RESIDENTIAL CUSTOMERS (SINGLE FAMILY HOMES) SPENT TREATING BED BUGS IN 2012?



South, which have until recently lagged behind other areas of the country. Pest managers in markets already overrun with bed bugs are seeking ways to grow the sector without taking too much time and resources away from the rest of their business. (A growing refrain of some firms is that bed bugs produce 10% of the revenue, but require 50% of their effort.). The cost of bed bug extermination is busting the budgets of households and businesses—yet convincing clients to invest in pro-active inspections and other preventative measures remains elusive.

Bed bugs continue to be the most challenging pest, by far, in the industry. Pest managers are becoming more experienced and have better tools for treating infestations. Still, there are no ‘silver bullets’ or easy fixes and the threat of resistance continues to be a global predicament. As a nation, we’re making progress, but the lowly bed bug is proving a formidable adversary. ◀◀

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