Detect Bed Bugs Sooner Using Monitors

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Purposes of Bed Bug Monitoring

1) Detect early infestations
   1) Are bed bugs present?

2) Evaluate treatment result
   1) Is it effective?
   2) Are bed bugs eliminated?

3) Guide treatment strategies
   1) Where to treat?
   2) What methods to use?
Types of Detection Tools/Methods

• Visual Inspection
  • Low cost
  • Provides information on bed bug infestation level and their distribution
  • Often needs two people
  • Requires knowledge and experience
  • Unreliable for detecting low level infestations
Types of Detection Tools/Methods

Passive Monitors
  Devices that do not contain a lure/attractant

Active Monitors
  Devices that possess one or more lures/attractants

Canine Scent Detection
  Uses dog’s olfactory senses to detect bugs
How to Conduct Visual Inspection?

• It’s always recommended before any treatment
Even most experienced inspectors will miss identifying the presence of small number of bed bugs!

1st Stage Immature
~ 1 mm & light colored
Desired Properties of Bed Bug Monitors

• Be able to detect low level infestations
  • Should be more accurate than visual inspections

• Easy to use
  • Requires less labor and experience than visual inspection

• Economical
Passive Monitors

BB Alert

Bed Bug Detection System
Climbup Insect Interceptor

Bedmoat
2 weeks after placement in an apartment
Comparison of Three Monitoring Methods

1. Resident interview
2. Visual inspection
3. Climbup™ interceptor
<table>
<thead>
<tr>
<th>Apartment</th>
<th>Interview result</th>
<th>Visual count</th>
<th>Interceptor count (7 days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>?</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>Yes</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>?</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>No</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>No</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>No</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>?</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>Yes</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>No</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>10</td>
<td>No</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>11</td>
<td>Yes</td>
<td>13</td>
<td>61</td>
</tr>
<tr>
<td>12</td>
<td>No</td>
<td>20</td>
<td>15</td>
</tr>
<tr>
<td>13</td>
<td>Yes</td>
<td>20</td>
<td>25</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td></td>
<td><strong>6.7</strong></td>
<td><strong>8.8</strong></td>
</tr>
</tbody>
</table>
Tips for placing interceptors

Two end tables – 27, Bed – 11.
Comparison between interceptors under bed legs and beside bed legs

<table>
<thead>
<tr>
<th>Apartment</th>
<th>Under bed legs</th>
<th>Beside bed legs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>16</td>
<td>7</td>
</tr>
<tr>
<td>5</td>
<td>23</td>
<td>16</td>
</tr>
<tr>
<td>6</td>
<td>39</td>
<td>8</td>
</tr>
<tr>
<td>Average</td>
<td>16</td>
<td>7</td>
</tr>
</tbody>
</table>
Tips for placing interceptors

Kitchen – 3, Sofa – 16.
8/26/11 installed, 9/7/11 inspected.
Detection infestation sooner using Climbups

- Visual Insp
- Climbups (Bed)
- Away From Bed

# of Bed Bugs

<table>
<thead>
<tr>
<th>Apartment</th>
<th>Visual Insp</th>
<th>Climbups (Bed)</th>
<th>Away From Bed</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>4</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0</td>
<td>11</td>
</tr>
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</table>
Comparison of 4 interceptors
Effectiveness of Passive Monitors

Mean count

<table>
<thead>
<tr>
<th>Monitor</th>
<th>Mean Count</th>
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</thead>
<tbody>
<tr>
<td>White Bedmoat</td>
<td>0</td>
</tr>
<tr>
<td>Black Bedmoat</td>
<td>2</td>
</tr>
<tr>
<td>Regular ClimbUp</td>
<td>15</td>
</tr>
<tr>
<td>Black ClimbUp</td>
<td>27</td>
</tr>
</tbody>
</table>
Principle of Active Monitors

- CO$_2$
  - Primary orientation cue for bed bugs
  - Release rate affects efficacy of a monitor
- Chemical lure
  - Attractive to bed bugs from a very short distance
- Heat
  - Not important when the CO$_2$ and chemical lure are present.
Graph showing the percentage of bed bugs trapped over hours after trap deployment, comparing CO2, heat, and chemical lure. 

Effectiveness of active monitors

• High CO$_2$ release rate is essential:
  – CO$_2$ from sugar fermentation or chemical reaction is only effective for short distance.
  – Monitors using dry ice or CO$_2$ cylinders are much more effective than monitors using sugar fermentation.
NightWatch™
CDC 3000
Home-made Dry Ice Trap
Effectiveness of Monitors for Detecting Low Level Infestations (1 d operation)

Mean bed bug count per apartment

<table>
<thead>
<tr>
<th>Monitor</th>
<th>Mean Bed Bug Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry ice trap</td>
<td>a</td>
</tr>
<tr>
<td>CDC3000</td>
<td>b</td>
</tr>
<tr>
<td>NightWatch</td>
<td>b</td>
</tr>
</tbody>
</table>

Legend:
- a
- b
Relative Effectiveness of Monitors

Maximum catch per night: 1,365 by Dry ice trap.
First Response Bed Bug Monitor
## Trap Catch in a Heavily Infested Apartment

<table>
<thead>
<tr>
<th>Location</th>
<th>One day</th>
<th></th>
<th>12 days</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>First</td>
<td>Trapper</td>
<td>First</td>
<td>Trapper</td>
</tr>
<tr>
<td></td>
<td>Response</td>
<td></td>
<td>Response</td>
<td></td>
</tr>
<tr>
<td>Under bed</td>
<td>8</td>
<td>57</td>
<td>32</td>
<td>137</td>
</tr>
<tr>
<td>Beside TV stand</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>17</td>
</tr>
<tr>
<td>Under dining table</td>
<td>2</td>
<td>9</td>
<td>5</td>
<td>53</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>4</strong></td>
<td><strong>23</strong></td>
<td><strong>14</strong></td>
<td><strong>69</strong></td>
</tr>
</tbody>
</table>
Case Study 1: Using Climbup Interceptors to Detect Bed Bug Infestations

• 223-unit apartment complex:
  – In May 2010, the pest control contractor recorded 4 infestations in its monthly service report.
  – Within 10 days, Climbup interceptors were installed in 64 apartments.
  – After 2 weeks, interceptors detected 21 infestations.
Case Study 2: Using Climbup Interceptors to Detect Bed Bug Infestations

• 360-unit apartment building
• **19** known infestations
• Basic visual inspection found an additional **17** infestations
• Climbup interceptors detected **26** infestations that were missed by visual inspections.
• Total: 85% (43/62) of the infestations were not reported by residents.

*Source: Cooper Pest Solutions*
Case Study 3: Using Dry Ice Trap in a Vacant Apartment

• A heavily infested one bedroom apt was treated with a combination of hot steam and Phantom SC spray.
• All furniture were removed. The resident moved out of the apartment.
• A dry ice trap was placed in the apartment overnight
  – On 13th day: 505 bed bugs
  – On 21st day: 113 bed bugs
• The results indicate:
  – the treatment was not effective;
  – the apartment needs to be treated again before allowing new tenant to move in.
Summary

• Using Interceptors:
  – To detect new infestations and determine whether bed bugs are eliminated
  – Periodically place monitors in high risk units or areas to detect new infestations.
  • Placement period can be 1-4 weeks depends on whether the area is occupied.
Summary (continued)

• Using CO$_2$ based monitors
  – In un-occupied units for one or several nights to detect presence of bed bugs.
Summary (continued)

• A combination of visual inspection and monitors will provide the best evaluation about bed bug infestation level and distribution
  – Monitors cannot tell where the bed bugs were hiding.
Acknowledgements

• Manufacturers
  – Susan McKnight, Inc. Atlantic Paste & Glue, Inc., MidMos Solutions, SpringStar, Inc.

• Dog detection companies

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  – Indianapolis, Bayonne city, Jersey city.