

Session Four of Integrated Pest Management for Multifamily Housing



STOP Pests
in housing
www.StopPests.org

While we wait, please tell us in the chat: What's the most useful, or most surprising, thing you've learned so far in this course?

Session Four - Meet Your Host



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Session One Introduction


- Priority Pests
- Why IPM
- Pesticides & Health

Session Two Cockroaches

Session Three Rodents

- What they are
- Associated Health Hazards
- What they eat & drink
- Where they live
- Prevention & Control

Session Four Bed Bugs



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Session Four of Integrated Pest Management for Multifamily Housing



When you complete this session, follow the link to the questionnaire to earn your certificate
<http://stoppests.org/go/usvi>


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Session Four - Meet Your Trainer




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Any Questions from Session Three
Rodents





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Raise your hand to un-mute, or send to
 Susannah K. Reese <sck27@cornell.edu>

Homework from Session 3 Rodents – **Who Does What?**

- Encourage Reporting
- Sanitation
- Exclusion
- Placing/Emptying Traps
- Checking/Cleaning Appliances

Homework from Session 3 Rodents – **Contract Language?**

- Cleaning Rodent Residual
- Mouse (appliance) Cleanout
- Traps: Placement and Monitoring
- Rodenticides

What's Missing?

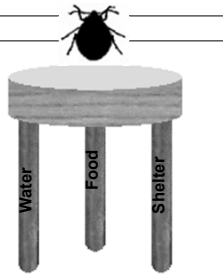
Please
chat or
un-mute!

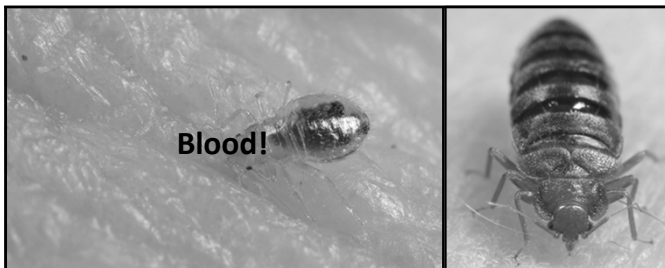
What challenges
did you encounter
in your discussions?
Did you add any
responsibilities to
the list?

(Raise your hand to be un-
muted)

What All Pests Need

- Food
- Water
- Shelter





Eliminate Food & Water?
This time, it's different.

Know Your Priority Pests

- **Cockroaches** cause asthma in infants, trigger asthma attacks, and contaminate food
- **Rodents** such as mice and rats carry diseases, bite, destroy property, may cause fires, and may trigger asthma attacks
- **Bed Bugs** and their bites are a nuisance, are expensive to eliminate, and in rare cases can cause allergic reaction or anemia.

Poll: On average, what level of bed bug presence have you seen at your property?

- What's a bed bug?
- Minimal activity, under control
- Moderate complaints and activity
- The place is crawling with them
- Don't know

Select one.

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What is a Bed Bug?

- Flat



An adult bed bug feeding on a human

- Range in size from a sesame seed to an apple seed
- Light brown to dark red
- Depends on when they last fed

Bed Bug Behavior

- Most active at night
- Cannot fly, jump, or burrow into skin
- Can crawl to other apartments
- Hitchhike on coats, bags, and used furniture



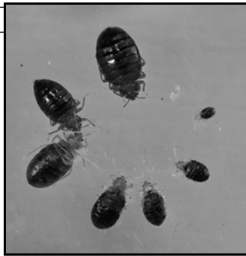
Bed bugs like small dark spaces to hide, like behind outlet covers



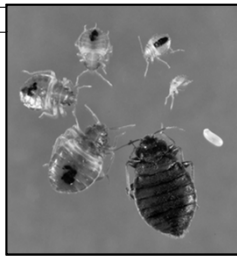
Bed Bug Biology

- Female lays about 200-250 eggs in a lifetime
 - 1-5 eggs per day
- Egg to adult:
 - 5 weeks to 4 months
- Molt 5 times; feed before each molt

Bed Bug Life Cycle



Fed



Not recently fed



Bed Bugs are a Pest of Public Health Significance

- Stress
- Loss of Work
- Loss of Productivity
- Loss of Sleep
- Financial Burden








Bed Bugs are a Pest of Public Health Significance

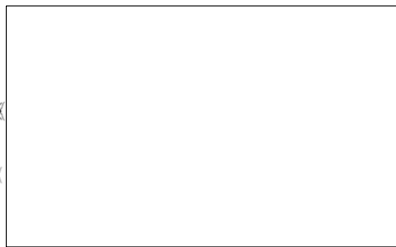
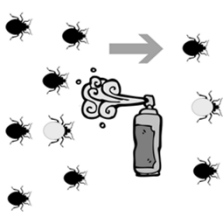
- Secondary infections after people scratch their bites
- Rare, allergic reaction or anemia
- Unwelcome in our homes and workplaces

Bed bugs do not transmit disease under normal living conditions

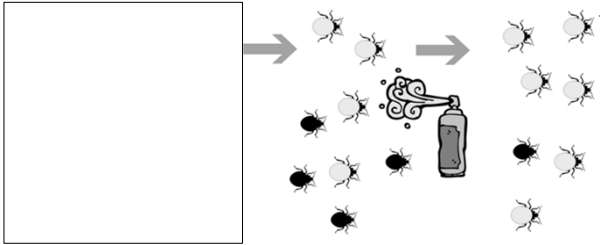
Why They're Back

-  Change in pesticide availability
-  Change in pesticide use patterns
-  More travel/mobility of people
-  More infested locations
-  Lack of preparedness of society in general

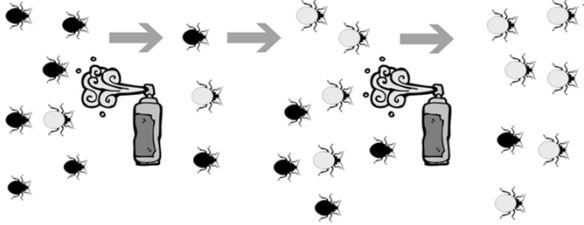
Pesticide Resistance



Pesticide Resistance



Pesticide Resistance



Signs of Bed Bugs

- Bites
- Fecal spots
- Shed skins
- Dead bed bugs
- Live bed bugs

Photo: Susan Roth-Rosen

Photo: Susan Roth-Rosen

Photo: Susan Roth-Rosen

Bed Bug Bites



- Prefer feeding during darkness
- Bites often painless
- Many people don't exhibit an obvious reaction

Bed Bug Bites

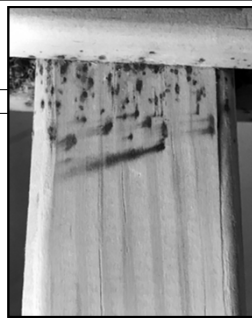


- Prefer feeding during darkness
- Bites often painless
- Many people don't exhibit an obvious reaction
- May not know they have an infestation

Fecal Spots

Bed bug droppings
Small, dark dots
Different from cockroach frass

- Frass is gritty, fecal spots are smooth



Bed bug droppings on a bed frame

Shed Skins



Bed bug signs on a mattress seam

Dead Bed Bugs



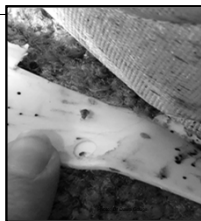
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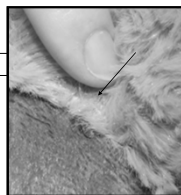
Top

Where Bed Bugs Live

- Only inside homes and buildings
- Any item near where people rest



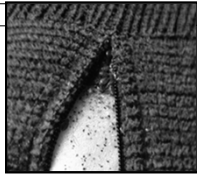
Mattress edges



Bedding & Stuffed animals

Where Bed Bugs Live

- Only inside homes and buildings
- Any item near where people rest



Couch cushions



Outlets

Photo: Dr. Dawn Gange

Where Bed Bugs Live



- Hide in cracks and crevices, often in groups
- Can crawl to other apartments

Photo: Dr. Dawn Gange

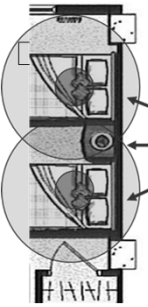
Signs of Bed Bugs

Please chat!

What signs of bed bugs have you seen?

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How Bed Bugs Spread



What's on the other side of the wall?

- Actively crawl along
- Wires
- Pipes
- Under doors

How Bed Bugs Spread




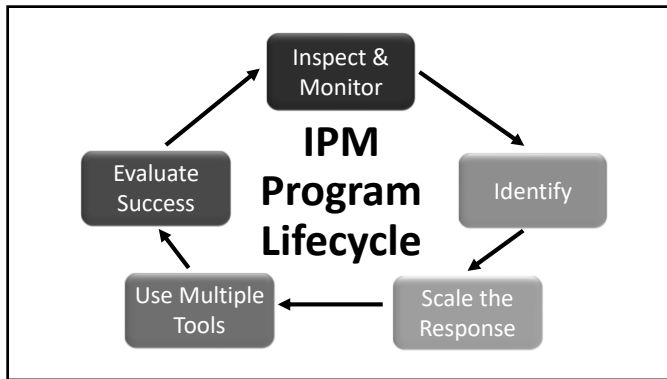
Are you sure you want to bring that furniture home?
BEFORE YOU BRING FURNITURE INTO YOUR HOME, REMEMBER, THERE MIGHT BE A REASON THE PREVIOUS OWNER GOT RID OF IT!

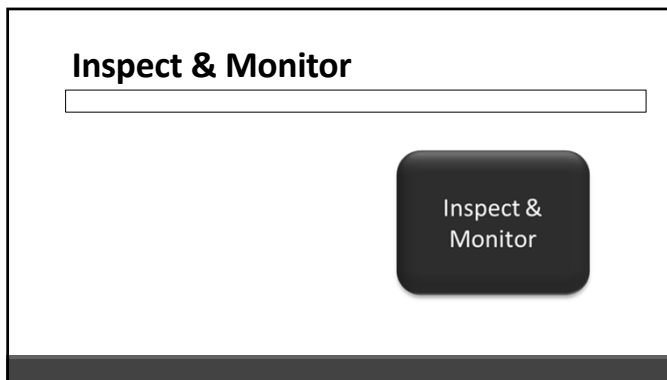
- Passively on anything coming from an infested unit
- Furniture
- Backpacks
- Laundry

What Bed Bugs Eat & Drink

Blood








Residents are the First Line of Defense

- Inspect with a flashlight
- Launder bedding
- Vacuum
- Maintain their unit according to housekeeping standards



Why Not Wait for Complaints?

Many don't report because:

- Afraid they will be charged \$ or evicted
- Embarrassed to complain
- Unaware of the signs
- May not react to bites

According to one study, if you rely on residents reporting you could be missing up to 71% of infested units (Wang, et al. Journal of Medical Entomology, 2016)





Early Detection is Key

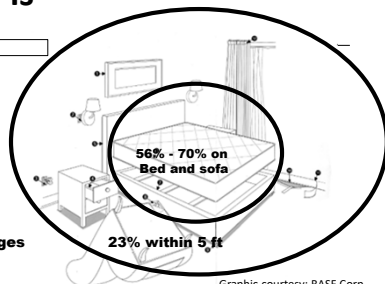
If found and controlled early in the infestation, the spread of bed bugs can be stopped

Early detection and rapid response are critical to building-wide bed bug management

Early Detection is Key

Early infestations are usually confined to bed or within 5 feet of bed

7% Other harborages

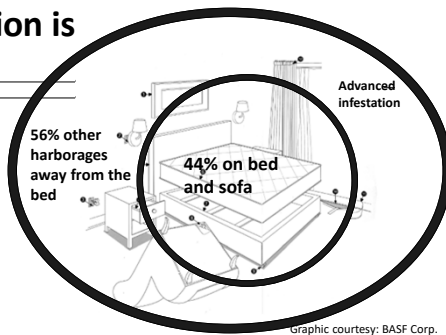


Graphic courtesy: BASF Corp.

Early Detection is Key

Early infestations usually confined to bed or within 5 feet of bed

Advanced infestations spread away from bed, spreading the problem



Personal Protection

- Be informed if you are entering a home with bed bugs
- Use insect repellent before entering
- Wear booties
- Avoid sitting or placing items on potentially infested surfaces



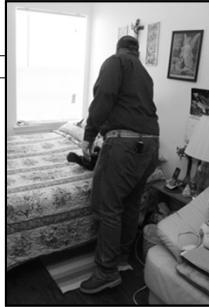
Personal Protection

- When moving infested items:
 - Wear a protective layer
 - Thoroughly wrap infested items before moving
- Inspect after leaving
 - Lint roller
 - Light clothing
- Confine any suspect items in a tote or leave outside until treated



Staff Quick Visual Inspection

- Routine check of as part of housekeeping inspection
- Inspect beds and sofas only
- Focus on signs which are easy to detect
- Visual – always use a flashlight



Visual Inspection Tools



Visual Inspection Tools

Extra-sticky lint rollers help with inspection





When Are Bed Bugs Most Active?

- When people are:
 - Sleeping
 - Resting
- They hide where people usually don't look

Bed Bug Monitors Can Help

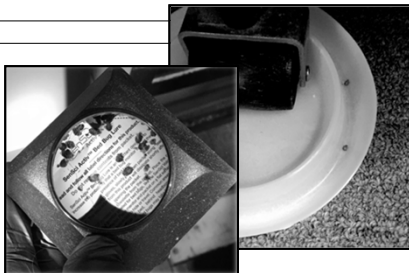
- Monitors help find bed bugs when and where people can't
- Trap and kill bed bugs
- Determine level of infestation



Bed Bug Monitors

Two types

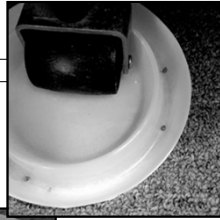
- Passive
- Active



Bed Bug Monitors

Passive Monitor

- Bugs can't climb out
- Must be placed where bugs will climb into them
- Sits under the legs of furniture, such as beds

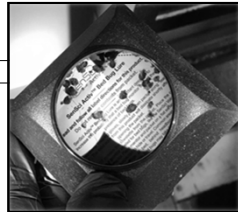
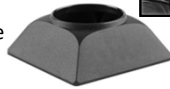


Passive monitor

Bed Bug Monitors

Active Monitor

- Chemical lure makes it active
- Bugs can't climb out
- Can be placed anywhere



Active monitor, includes lure

Visual Inspection PLUS Monitors

Research from Rutgers University has shown that combining:

- Visual Inspections
- Interceptor-type monitors is very effective at detecting even low-level infestations

One study found this approach to be 95% effective at finding infestations



Poll: What's the inspection schedule for bedbugs at your property?

- Wait for complaints
- Routine inspection
- Routine inspection plus monitors
- Don't know

Select one.

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PMP Full Inspection

Inspection: Bed Bug Detecting Canine

- Expensive
- Continual dog and handler training
- Saves lots of time
- When a canine alerts, ask for a live bug



Identify

Inspect and check your monitors:

- Is it a bed bug?

Identify

We Must Identify a Live Bed Bug



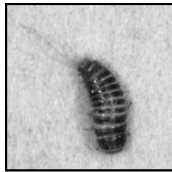
Mosquito Bites

- Other types of bug bites
 - Mosquitos
 - Fleas
- Allergic reactions

Mistaken Identity – Not Bed Bugs



Carpet Beetle and larva



Tick

Mistaken Identity - Not Bed Bugs



Cockroach Nymph



Bat Bug



Spider Beetle

Scale the Response

How many bed bugs do we have?

Scale
the Response

If a Bed Bug is Found

1

Document all observations

2

Do This:

- Save the insect
- Report the problem
- Have the PMP inspect unit/adjacent units

3

Don't Do This:

- Apply pesticides
- Move things around
- Carry the bed bugs to other places

If a Bed Bug is Found

Document all observations

- Where
- How many
- When
- Excessive clutter
- Vulnerable populations



The Role of the Professional

- Thoroughly inspects
- Provides site-specific preparation guidelines
- Selects the best treatment options and follows the pesticide label
- Follows-up until bed bugs are not found for at least two consecutive visits



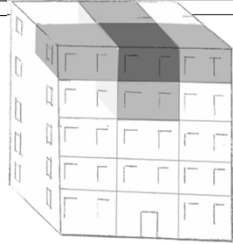
The Role of the Professional

- Thoroughly inspects
- The reporting unit
- Adjacent areas



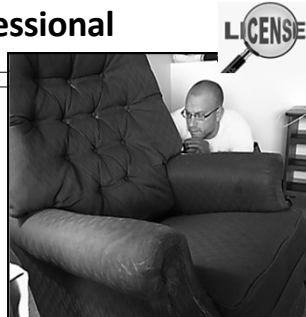
What About Neighboring Units?

- Surrounding units should be inspected and monitored
- Consider diagonal units as well
- Surrounding units should be treated **if necessary**
 - No routine treatment of units without actual bed bugs

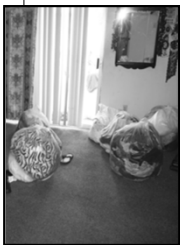


The Role of the Professional

- Thoroughly inspects
 - The reporting unit
 - Adjacent areas
- Provides site-specific preparation guidelines



Traditional Bed Bug Treatment Prep



- ☐ All furniture pulled 2' away from wall
- ☐ Empty all furniture of contents
- ☐ Stand mattress & box spring against the wall
- ☐ Empty closets & bag contents
- ☐ Remove & bag clothing from drawers
- ☐ Remove all window treatments
- ☐ Remove pictures & mirrors from walls
- ☐ Remove switch plates & outlet covers

Traditional Bed Bug Treatment Prep

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Please chat!

Is it reasonable to expect residents to accomplish this?

What are the consequences when they can't, or won't?

The Downside of Traditional Prep

- Scatters bed bugs
- Potential for reintroduction when bags are opened
- Difficult for many residents to accomplish
- PMP may deny treatment to a unit not prepped
- Provides an excuse for treatment failure
- Infestation can multiply and spread to neighboring units

Consider Individualized, Minimal Prep

- PMP gives individualized and realistic instructions based on level of infestation
- Avoid scattering bed bugs
- Best option for low and moderate infestations
- PMP guides customers on how to handle clothing, curtains, etc. after inspection

The Role of the Professional

- Selects the best treatment options and follows the pesticide label

- Follows-up until bed bugs are not found for at least two consecutive visits



Treatment Options

- Non-Chemical
- Pesticides

Use Multiple
Tools

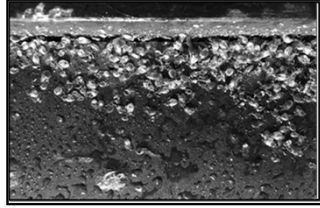
Non-Chemical Treatment Options

- Vacuum
- Exclusion & Encasement
- Heat
- Cold

Use Multiple
Tools

Vacuum

- Remove live bed bugs, dead bed bugs, shed skins
- Prepare the area for cleaning and treatment

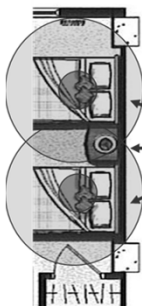


Vacuum

- Quickly reduce bed bug population



Exclusion



**What's on
the other
side of the
wall?**

- Painstaking but rewarding work
- Seal holes where bed bugs could fit
- Know your building construction

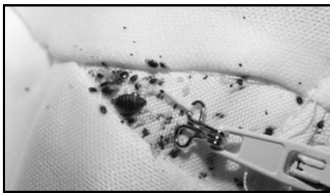
Mattress & Box Spring Encasement



- Fewer hiding places = easier inspection
- Encases any bed bugs (cannot bite)
- Any remaining bed bugs starve and die
 - No need for insecticides on mattress
 - No need to dispose of mattress
- Leave in place for 1 year

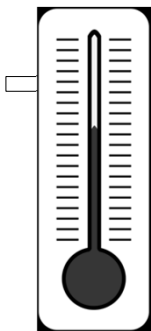
Mattress & Box Spring Encasement

- Not all covers protect
- Zippers and teeth are vulnerable
- Fabric covers
 - "For bed bugs"
 - More comfortable
 - "Bite-proof"
 - More Effective



Center for Integrated Pest Management epa.gov

Heat



Thermal Death Point:

- 122° F for eggs
- 118° for nymphs and adults

Must reach in deep, dark and hard to heat locations
Air temp irrelevant

High heat can cause damage

Steam

- Provides immediate kill of all life stages
- Penetrates into cracks and 1-2 cm into fabric, up to 6 cm in cracks
- No pesticide residue



Clothes Dryers

- 30 minutes on high
- Don't over-fill
- Not necessary to wash first
- Even "dry clean only" items can go in dryer



Clothes Dryers

Consider:

- Designated machine "Bed Bug Treatment Only"
- Removable dryer shelf
- Providing free tokens



Whole Unit Heat Treatment

- Best by professionals
- Expensive equipment
- Verify temperature readings



Whole Unit Heat Treatment

- PMP will move objects around
- Use fans to circulate
- Some items can't take the heat



Portable Heat Chambers

Building staff at a property in Pennsylvania test out their new ZappBug portable heat chamber



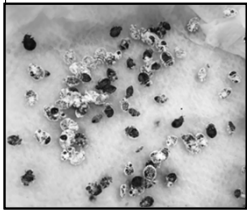
Non-Chemical Treatment: Freezing

- Freezer
 - Zero °F for at least 4 days
- CO2
 - Kills only the bugs it hits directly



A trained professional applies Cryonite Freeze treatment on a bed

Biological Treatment Option



- Beauveria bassiana (fungal spores)
 - Aprehend®
 - Need specialized spray equipment

Pesticides: Targeted Use by PMP



- Monitor first
- Only PMPs should use
- Bed bugs tolerant of many insecticides
- Housing staff can become licensed

Use Multiple
Tools

Pesticide Treatment Options



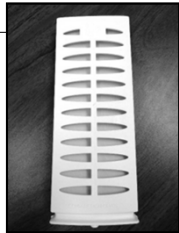
- Contact / Residual spray applications
- Desiccants, silica dusts, diatomaceous earth, or other pesticidal dusts
- Impregnated mattress liners
- Fumigants



Always Follow the Label

Dichlorvos-impregnated resin strips (DDVP pest strips)

- Some are approved for bed bug control
- PMP must use correctly
 - ONLY in enclosed, airtight spaces
- Resident should not use



Credit: UF/IFAS

Successful Treatments Involve a Combination of Approaches

- PMP will evaluate & instruct
- PMP will use a variety of treatments
 - May ask that space not be disturbed
 - May take apart furniture and apply pesticides
- Know your contract



Multiple Tools

Mechanical: Vacuum, mattress encasements

Heat: Steam, clothes dryer, whole-unit, heat chamber

Dusts: chemical, desiccant, combination

Insecticides: liquid residual spray, fumigant, biological



About OTC Aerosols or Total Release Foggers



Bed bug spray in this residence indicates the professional treatment is ineffective

- Bed bugs are resistant to the chemicals
- Over-the-counter (OTC) products kill only the bugs that are directly hit
- Toxic residue on surfaces
- Can cause bed bugs to scatter and hide, making it harder to treat

Be cautious of "green" treatments



If it sounds too good to be true, it probably is

Check the research

Most kill on contact, if at all

Some repel & scatter the bed bugs deeper into hiding

Rubbing alcohol is ineffective

Encourage a Community Response

Educate everyone – staff and residents

Consider how you can ease the financial burden for residents by providing:

- Mattress encasements
- Monitors
- Proper furniture removal and destruction



Successful Treatment

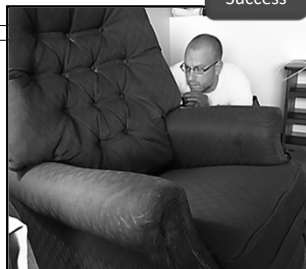
- Follow-up
- Confirmation
- Reinspection

Evaluate
Success

The Role of the Professional

• Selects the best treatment options and follows the pesticide label

- Follows-up until bed bugs are not found for at least two consecutive visits



Evaluate
Success



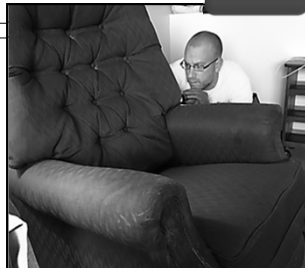
Confirmation

- Resident Interview
- Visual inspection
- Monitors

The Role of the Professional

• Follows-up until bed bugs are not found for at least two consecutive visits

- After elimination is confirmed, inspect unit **every three months** for the next year before returning to annual or biannual inspection



Evaluate
Success

IPM Practice

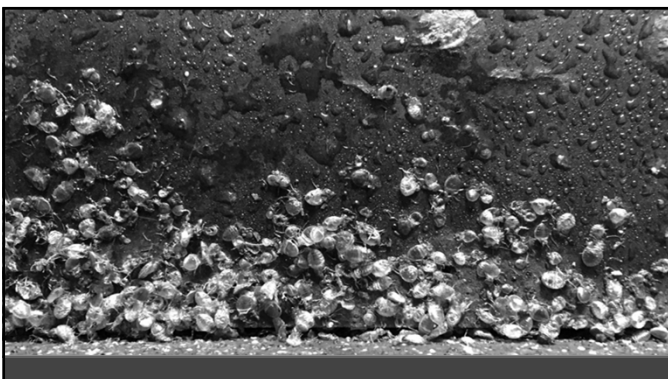
Please chat!

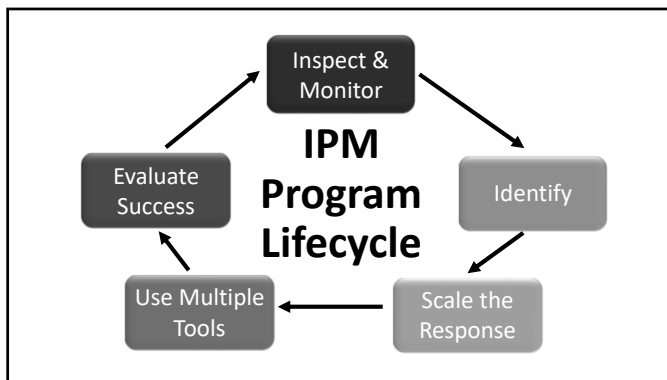
Examine each photo, then tell us:

- What's the problem here?
- How would you fix it?
 - Who is responsible?







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Your Workplan - What Will You Do Now?

Contract Language to Consider

Pesticides

Contract language to consider

• Insure and schedule

• Service scheduling

• Costs other than apply

• Educational materials by residents

Cockroaches

Contract language to consider

• No roaches tolerated

• No roaches during

• Unit monitoring at all units

• Street level on monitor counts

• • Apartments

• • Streets

• Follow up schedule (2-4 months)

• Start roach schedule

Rodents

Contract language to consider

• Chemical control method

• Mouse chamber

• Traps, bait stations, chemicals

Bed Bugs

Contract language to consider

• Monitor in all or typical units

• Inspection of neighboring units

• Approved based on pest, instructions

• Use of non-chemical treatments

• • Steam

• • Vacuum

• • Heat of units

• • Heat of units

• Follow up treatments scheduled

• Confirmation of elimination

Don't forget about Your IPM Workplan

- IPM & Pesticides
- Cockroaches
- Rodents
- Bedbugs

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"Homework" for Session 4

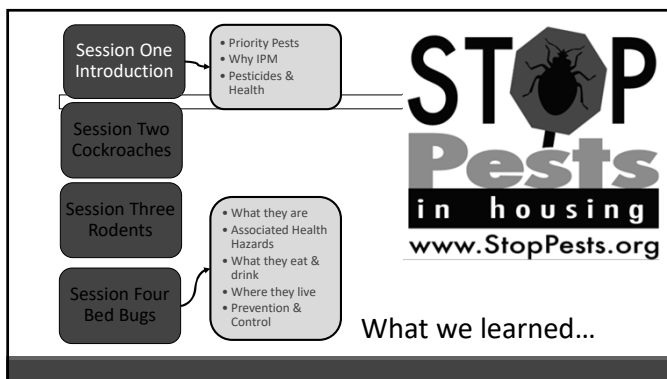
Bed Bugs - Who Does What?

- Education
- Monitoring
- Preparation
- Laundry
- Encasements
- Visual Inspections
- Furniture Removal
- Review Records

"Homework" for Session 4

Bed Bugs – Contract Language?

- Monitors in all or High-Risk Units
- Inspection of Neighboring Units
- Assessment-Based Instructions
- Use of Non-Chemical Treatments (which ones?)
- Use of Dusts, or Sprays
- Follow-Up Treatment Schedule
- Confirmation of Elimination







Posttest

Now, a Review....

Follow this link to the questionnaire to earn your certificate

<http://stoppests.org/go/usvi>

Questions? Email stoppests@cornell.edu

?