The Problem of Bed Bugs for

Health Departments, Health Care and Social Service Providers

EPA Region 2, Pesticides Program

What are bed bugs?

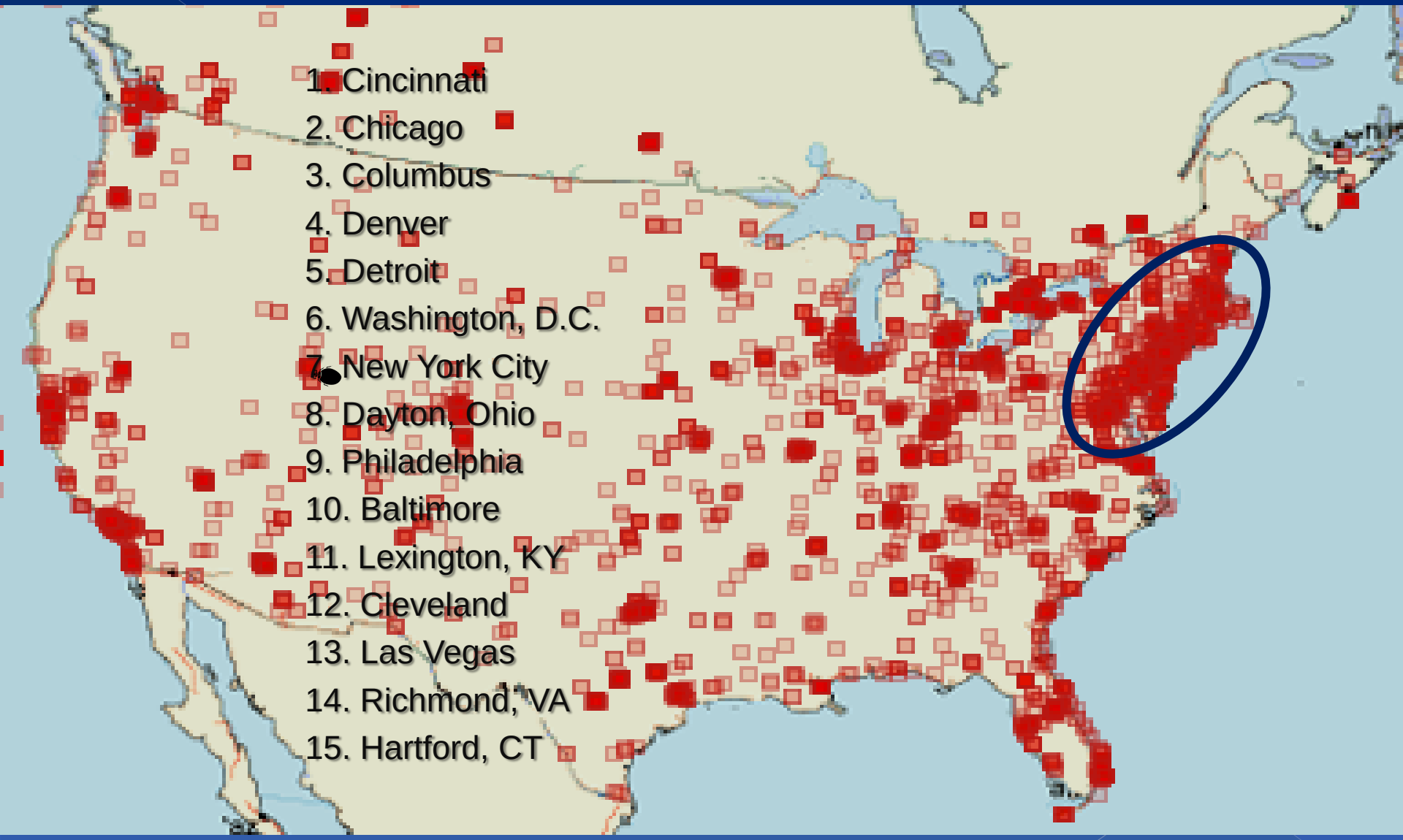
- Bed bugs are tiny parasites that seek out sleeping people or animals for a blood meal.

They're Back!

What is the Reason for the Resurgence of Bed Bugs?

- a) Rapid rate of reproduction
- b) Mass transportation (bus, train, taxi, plane)
- c) Hard to detect in small numbers
- d) Increased pesticide resistance
- e) Readily detect and avoid many chemicals
- f) Survive for long periods without a meal
- g) International Immigration

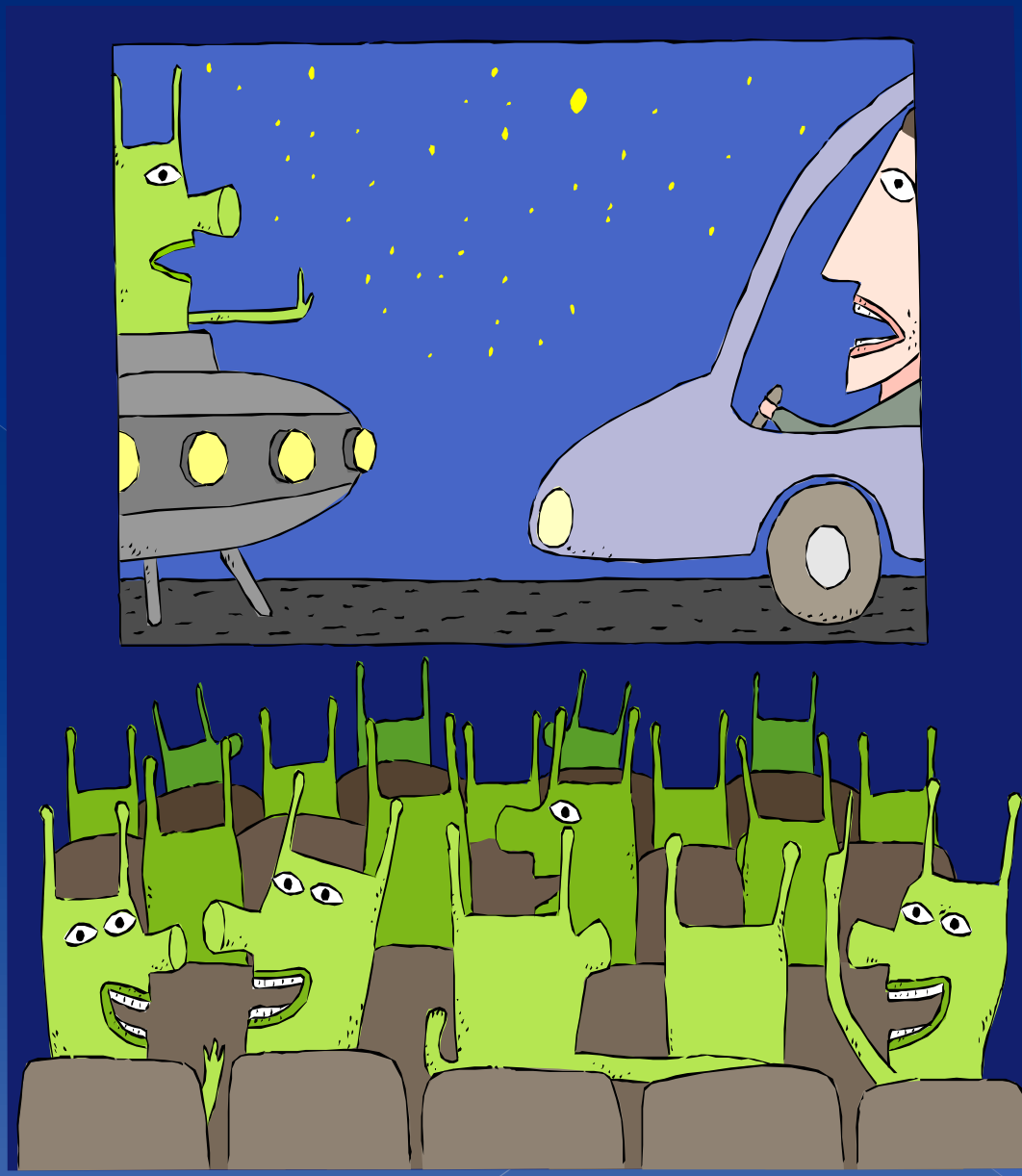
2011 U.S. Cities with Most Bed Bug Infested Hotels



*** = Orkin Survey of Service Accounts volume 2011; Map Source: www.bedbugregistry.com;**
Public reports (n=20,000) of hotel infestations as of March 2011

Where can we find Bed Bugs?

- a) theatres
- b) office buildings
- c) hotels
- d) dormitories
- e) apartments
- f) private homes
- g) restaurants
- h) busses/trains/ taxis/ planes
- i) shelters



How do bed bugs travel?

They are excellent hitchhikers!

- They can catch rides on:
- Clothes,
- Backpacks,
- Luggage,
- Bags,
- Furniture,
- Bedding,
- Family,
- Friends,
- Co-workers.

Other methods of bed bug introduction:

Active

Bed bugs also migrate by

- Walking from an infested area to new territory.
- From one apartment to another via pipes, telephone, cable or electrical wires.
- Down a hallway after dropping of an item being discarded.

Can you identify the bed bug?

1 Tick

2 Tick

3 Bed bug nymph

Carpet Beetle

4

Cockroach

5

Adult Bed bug

6

Cockroach nymph

7

Physical ID

- Oval Bodied, < ¼ inch.
- Adults: brown to red in color
- Wingless – they do not jump
- Six legs
- Nymphs are nearly colorless
  - Size of a poppy seed
- Eggs are white, 1-2mm
- Eggs glued to rough surfaces

Common Bed Bug Myths

Can you see bed bugs with the naked eye?

- You should be able to see adult bed bugs.

- Adults are a little smaller than an apple seed.
- 1st instar nymph is about the size of a period at end of sentence.

.

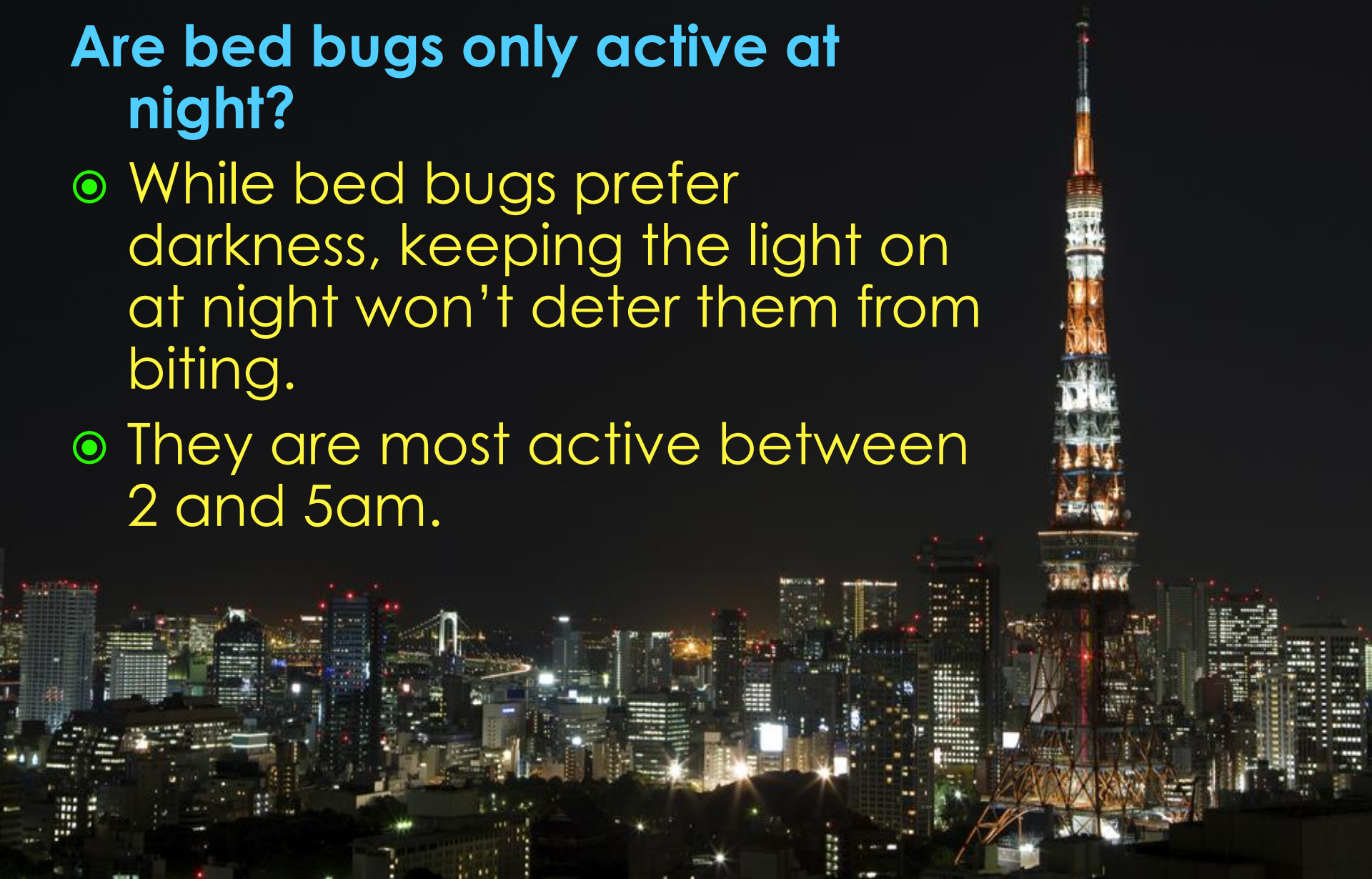
Bed bug characteristics

- Aggregate.
- Usually active at night.
- Attracted to exhaled CO_2.
- Attracted to body temperature.
- Most travel 15-20 ft to feed.
- Adults can survive >6 months without feeding.

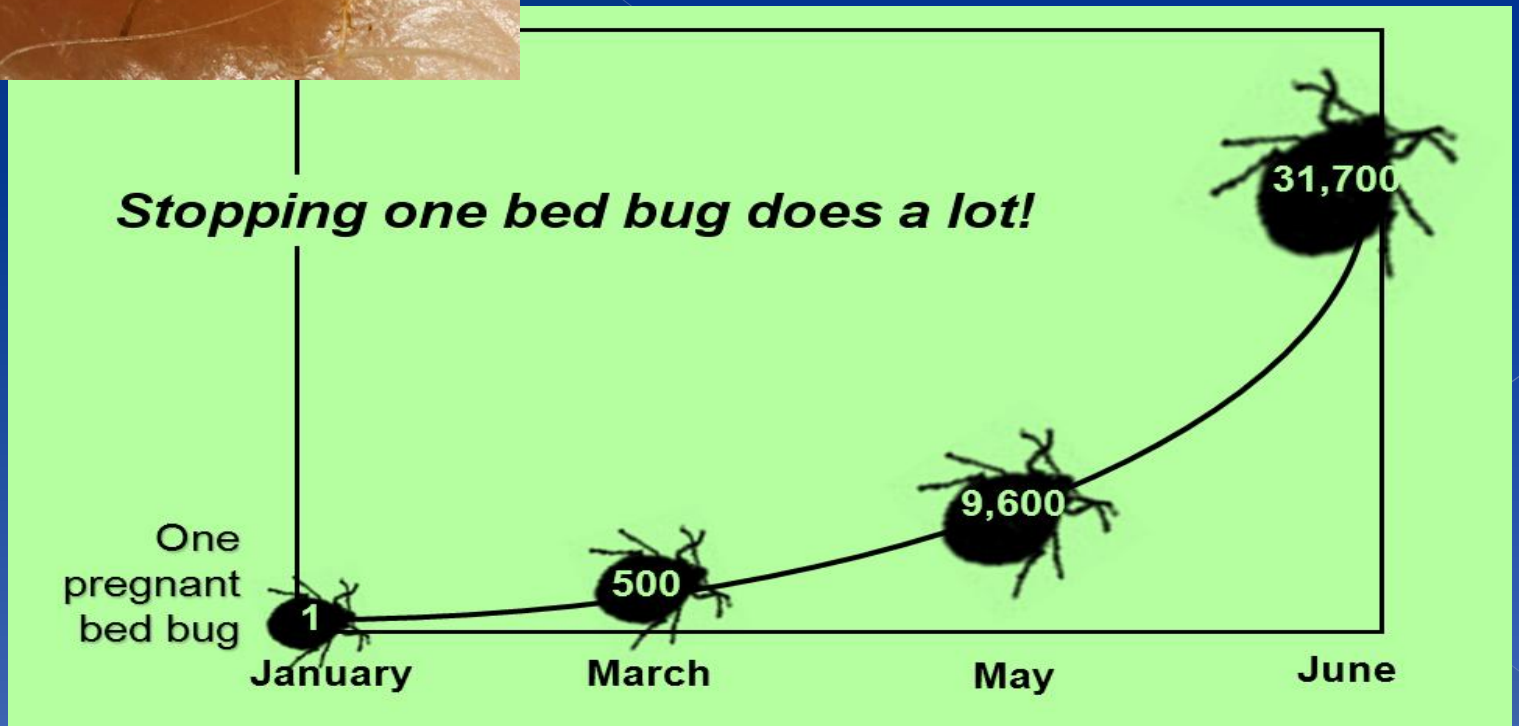
Common Bed Bug Myths

Are bed bugs only active at night?

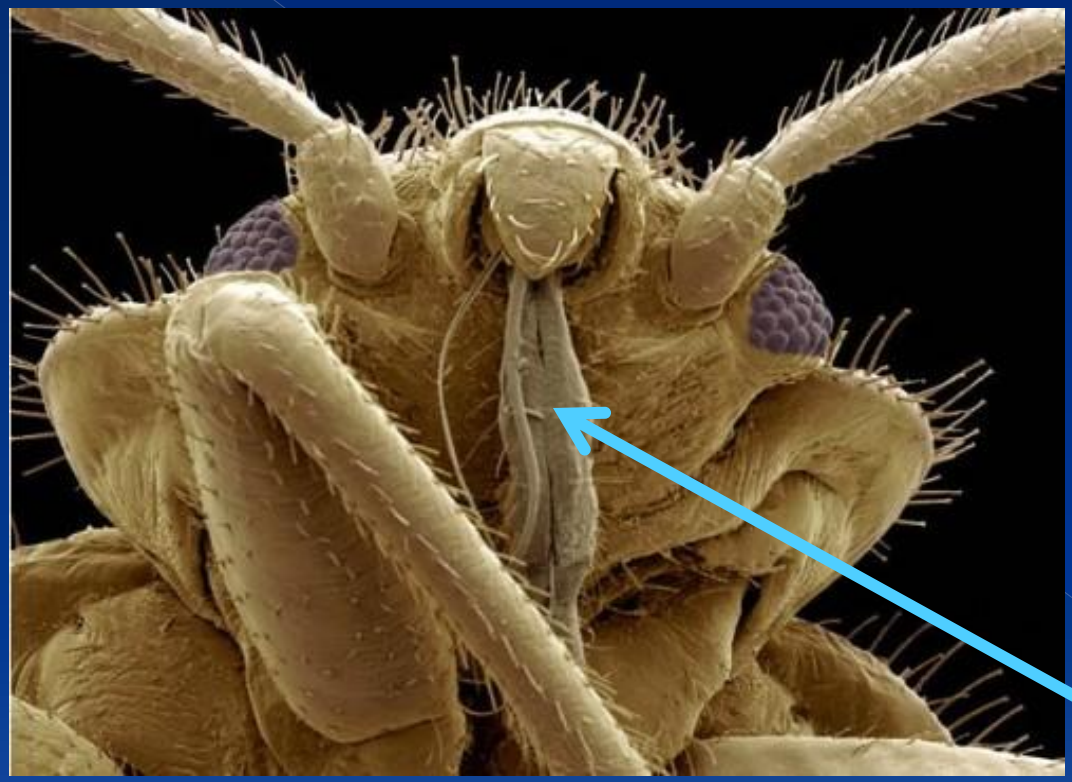
- While bed bugs prefer darkness, keeping the light on at night won't deter them from biting.
- They are most active between 2 and 5am.



Bed bug Propagation



How do Bed Bugs Feed?



- Bed bugs have piercing-sucking mouth parts. Penetrate skin with beak and inject an anesthetic.

Feeding

1. hungry

Flattened from top to bottom

2. Feeding

In 10 Minutes!

3. Full

Their bodies expand like an accordion.

Common Bed Bug Myths

- **Can bed bug bites be identified by professionals because they often show up in sets of three in a row:"breakfast, lunch, and dinner"?**

Bed Bug Bites

- Don't burrow under skin like ticks.
- Professionals cannot identify bed bug infestations by the bites alone.

Common Bed Bug Myths

Do bed bugs transmit diseases?

- There are no cases that indicate bed bugs pass diseases from one host to another.

However,

- Itchy bites and Inflammation
- Secondary skin infections
- Anemia
- Stress
- Sleeplessness
- Agitation
- Anxiety

Are common symptoms of bed bug infestations.

Health Issues

- Varying "sensitivity" to bites. (Itching, welts, rashes, secondary infection)

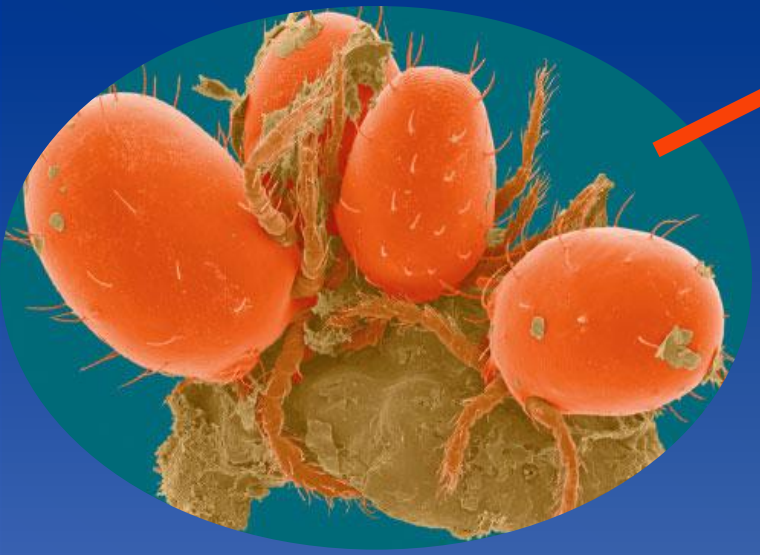
- 5 Reaction types:
  - no reaction;
  - delayed reaction;
  - both immediate & delayed;
  - immediate reaction only;
  - True hypersensitivity.

Other pest problems often confused with bed bugs…

- Scabies is a condition where mites burrow into the skin resulting in lesions and open sores.

Other pest problems often confused with bed bugs…

- Fleas
- Chiggers
- Bird mites
- Rodent mites



Chiggers above
Fleas right

Signs of Bed Bugs

Confirm bed bug Identification

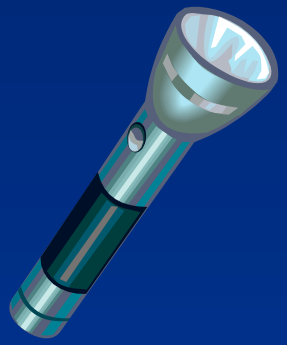
- Dark and rusty colored droppings.
- Shed skins.
- Blood stains from crushed bugs.

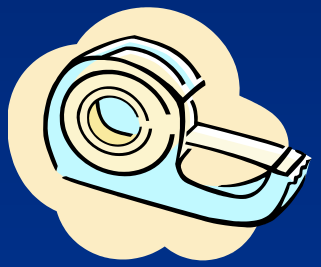
- Eggs and casings.
- Voided material - leaving tell-tale blood spots.
- Live bed bugs.
- An offensive, sweet, musty odor.

Inspect and Assess

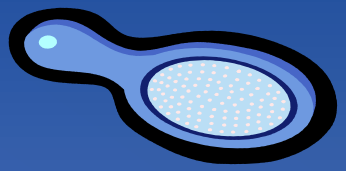
- The best way to get rid of bed bugs is to clean, disinfect and eliminate their hiding spaces.
- Inspect and assess the extent of the infestation to determine preparation needs and steps.

Recommended Inspection Tool Kit

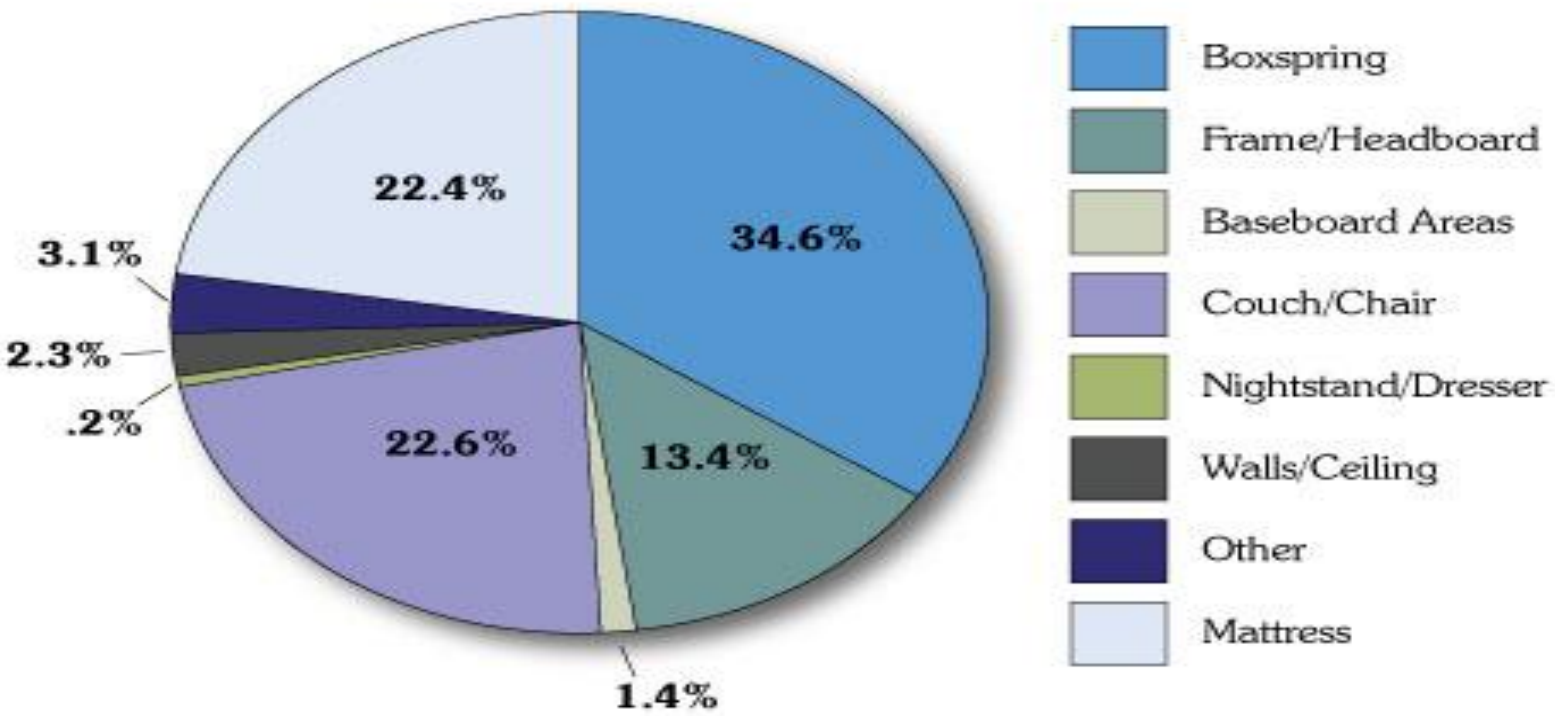




- Magnifying glass
- Strong flashlight
- Plastic zip-bags or scotch tape
- A probe
- Tweezers
- Screwdrivers
- Small tool kit
- Cleaning wipes
- Alcohol and Cotton swabs
- Mirror



Where are most Bed Bugs Found?



Distribution of bed bugs found in 13 infested apartments
Source: University of Kentucky

Mattress Inspection

- Top and bottom seams
- Along the piping,
- Under mattress handles,
- Along air holes,
- Under buttons, handles,
- Around and under label,
- Between mattress and box spring platform or frame.

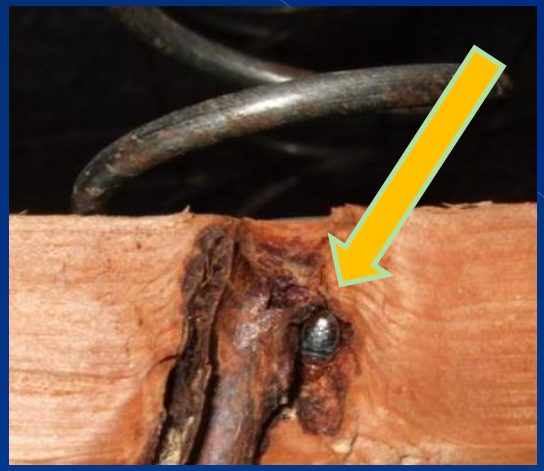
Box Spring Inspection

- Remove the thin cloth layer under box springs.
- Use a flashlight, a hand
- Check the spaces between box spring frame parts.
- Look around staples and tacks.

Bed Frame and Headboard Inspection

- Turn the frame over and inspect from the underside.
- Check screw and nail holes for bed bugs.
- Take the bed apart to check between parts.

Inspecting Furniture



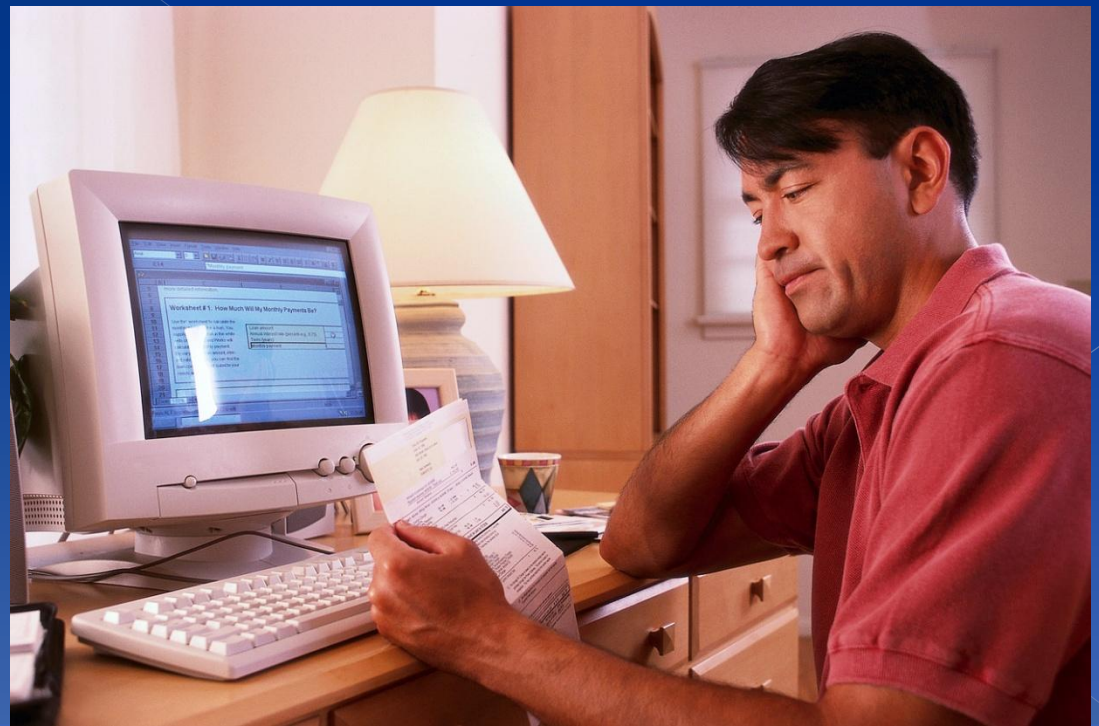
- Empty drawers and shelves.
- Inspect drawer corners,
- Inspect the underside.
- Inspect all screw and nail holes.

Inspecting Plush Furniture

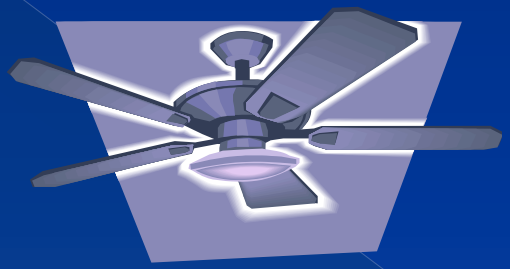
- Turn over the furniture and remove the thin cloth backing.
- Examine where material is stapled to the frame.
- Check all wood parts.
- Inspect all pillows and cushions.
- If the piece is highly infested, disposing of it properly.

Where else can bed bugs hide?

- Television and other remote controls.
- Telephones, cell and cordless phones.
- Lamps and alarm clock.
- Computers and other electronics.



Other places bed bugs can hide…



- Children's toys and stuffed animals
- Brick walls and "popcorn" or other textured ceilings
- Books, magazines, newspapers and files
- Ceiling light fixtures, smoke detectors
- Heating units, air conditioners and ducts

Unusual Harborages

20 bed bugs were found here !

Unusual Harborages

Simple Bed Bug Isolation and Control Methods- DIY

Laundry

- The easiest bed bug control method.
- Bag items.
- Keep the 'infested' items separate from the clean items.
- Wash on the highest heat that the fabric can stand for 60 minutes.
- Either use dissolvable bags or seal and throw away the used plastic bags.

Source: M. Anderson, EPA R2

DRYERS

- The heat in a clothes dryer is extremely effective at killing bed bugs and eggs. Clothes dryers are accessible to almost everyone.
- Clothing, linens and other items that cannot be washed - dry on high heat for 20-30 minutes.

Source: M. Anderson, EPA R2

Prevention & Control Vacuuming

- Vacuum daily
- Steam clean floors regularly.
- A HEPA-type vacuum is preferred.
- Vacuum curtains, walls, closets, and upholstered furniture.
- Vacuum talcum powder to inhibit bugs from crawling out of vacuum bag.
- Properly dispose of filter / bags. (seal in plastic bag)

Vacuuming is an effective control method.

Additional Controls: Seal Cracks

- Use silicon caulk to seal.
- Create a perimeter barrier.
- Target walls that are shared with other homes.
- Plates covering wall openings should be sealed.

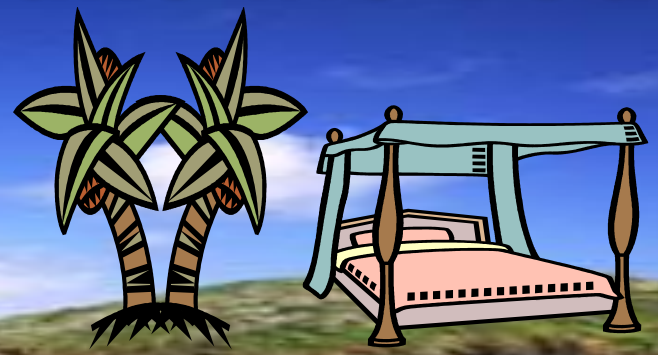
Control and Prevention: Bed Encasements

- Use encasements on both mattress and box springs!
- Encasements trap bed bugs and eggs.
- They are escape proof.
- Encasements make inspection easier.
- Must be kept on for at least one year.
- They eliminate the need to apply pesticides on bedding.
- Encasements also limit exposure to dust mites.

Control & Prevention: Moat – Style Interceptors

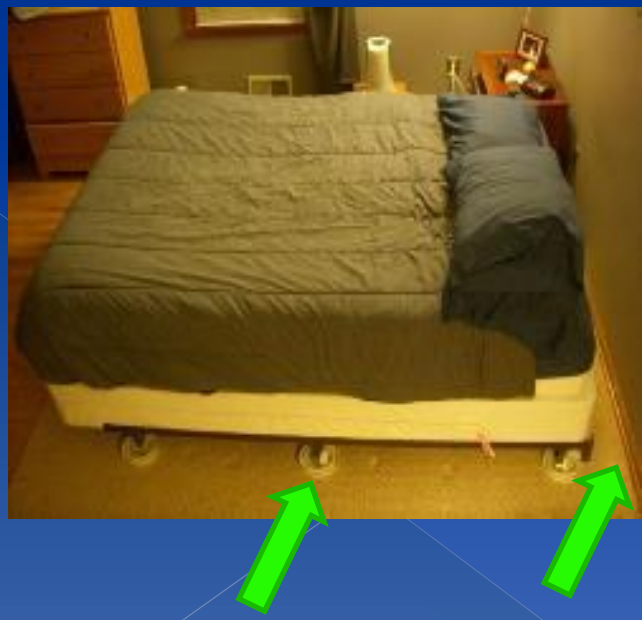
- Designed to trap bed bugs
- when placed under furniture legs.
- Furniture must be away from the wall.
- Used as a complement to other methods.
- Most effective with a little talcum powder on the bottom of tray.

Make the Bed an Island



Isolated the bed by pulling it away from walls and other furniture.

- Put mattress and box spring into encasements.
- Keep bedding from touching the floor.
- Put each bed leg in an interceptor.



Containing possessions to limit bed bug introduction.

- Figure out what will work in your facility.
- Contain essential possessions in clear plastic storage containers.
- Contain non-essential belongings in plastic bags o containers or bags and place in a storage room.
- Label bags and containers to prevent frequent opening.
- The smooth interior of the plastic container is difficult for the bed bugs to climb.

Clutter Management is Essential in Shelters

- Limit the belongings that a client can bring into a shelter.
- Provide some "safe" (bed bug free) toys, books, and a play space for children.
- Any items brought into long term facilities should be inspected and/or heat treated.
- In short term shelters where the clients move every week, move the clients' belongings in a plastic storage container along with them to each facility.

Non-Chemical Professional Treatments

Steam Kills Bed Bugs!

Steam Clean

- Steam kills bed bugs and eggs.
- A short period of heat exposure can kill all stages of bed bugs instantly.
- Time consuming. A rate of 20 seconds per linear foot.
- *The steamer should not “blow” air forcefully or it may cause bed bugs to scatter.
- Steam temperature must be 160° F or greater.
- *Do not apply steam to electrical outlets (not a DIY!).

Ambient Heat Treatments can kill bed bugs in:

- an entire structure,
- part of a structure,
- a single room,
- a box truck,
- a storage area.

- Use fans and a heat source to heat a space to 135°F to 140°F
- Hold temperature for 3 hours to heat all areas over 120°F.
- These treatments are best for cases where the resident is unable to prepare the unit.
- Ambient Heat can provide complete control.
- Contact your pest professional.

Ineffective Heat Alternatives

- **Increasing heat in the infested area by boosting thermostat…**
  - Cannot achieve high heat through all items and behind walls.
- **Putting Items in black plastic bags and leaving them in the sun or in a hot car…**
  - May work on small items, such as shoes, or a few books, however bed bugs need to be exposed to temperatures above 120°F for an extended period of time to be killed.
- **Using home propane space heaters or fireplace…**
  - May cause fires.

Freezing Kills Bed Bugs!

Freezing

- Liquid CO_2 is an effective method of killing bed bugs and eggs.
- Cryonite systems shoot dry ice flakes into bed bug harborages.
- Extreme low temperatures (-98°F) will kill bed bugs and eggs on contact.
- CO_2 can be applied to most surfaces, including toys and books.
- Usually costly.

What items need to be thrown out from an infested location?

a.) mattresses
b.) box springs
c.) furniture
d.) clothes
e.) shoes
f.) curtains and drapes
g.) books
h.) stuffed animals
i.) only severely infested items

Have a Plan to Prevent and Eliminate Bed Bugs

- Don't Panic!
- Have a bed bug action plan.
- Educate your staff and clients.
- Assess the situation.
- Think through your treatment options.
- The best way to get rid of bed bugs is to clean, disinfect and eliminate their hiding places.
- Do not immediately reach for the spray can.
- Turn to professionals if needed.

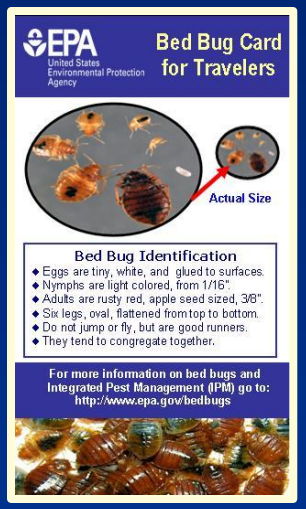
Educate your staff and clients:

Tell your clients that bed bugs are common in low income and multi family residences and shelters.

- Some intake question suggestions are:
- Have you stayed in a place where you may have been exposed to bed bugs in the past three months?
- Has anyone in your family been bitten by bed bugs?
- Do you have bites or blisters that you're concerned about?
- Bed bugs, lice, scabies and other pests can cause medical concerns. Do you need help with any pest issue?

Bed Bug Awareness

- Provide verbal and physical informational on bed bugs to clients.
- Inform clients they need to report any bed bug sightings to a facility employee immediately.
- Increase bed bug awareness in the facility with posters.
- Instruct about the importance of using a dryer to treat the client's belonging.



What are the first things you should do if you think you see a bed bug?

a) SCREAM!
b) call custodial staff and management
c) inspect the surrounding area
d) close the facility for the rest of the day
e) call a Pest Control Company
f) capture it for proper identification
g) kill it and forget it, because it is only one

Bed bugs in Low Income and High Turnover Locations

- Bed bug prevention is different for each type of facility.
- High turnover locations are at risk for developing bed bug infestations.
- These facilities are at risk of having bed bugs arrive on every client that walks in the door.

On-the-job Protection

- Do you visit places that you know or suspect have bed bugs:
- Have dedicated set of clothes (or pants) for working in the field.
- Have a change of clothes in a zip bag.
- Wear simple clothing when visiting a client's.

Jackets and Shoes

- Jackets
  - Keep your jacket in your vehicle .
  - Never place it on the back of a chair.
  - Have a dedicated large plastic bag for your jacket when you leave the location.

- Shoes
  - Have a dedicated pair of work shoes.
  - Wear shoes that can be treated in a hot dryer.
  - Have minimal tread on shoes.

On-the-Job Prevention Tips

If you suspect Bed Bugs in a location you are working in:

- Ask whether a room or space has bed bugs.
- Do not bring personal items into the facility.
- Keep personal items in your vehicle.
- Try using a fanny pack.
- Inspect your work space.
- Use insect repellant.
- If you find a bed bug capture it for proper ID.

How do I keep from bringing bed bugs back home?

- At the end of the day:
- Place all outer clothes in a plastic bag. Seal tight.
- Inspect clothing and bottom of shoes before entering your vehicle.
- Place work shoes in a sealable bag. Do not re-open until ready to treat.
- When at home: Wash and/or dry clothes on highest setting for 30 minutes.
- Discard all plastic bags used for bed bug prevention.
- Vacuum/ wipe down any equipment from an infested site.

Transporting Someone Who Has Bed Bugs

Transporting or removing a person from a bed bug infested location:

- Use drum liners to bag clothes and personal items.
- Wrap the infested wheel chair, in drum liners.
- Use drum liners as seat covers during transport.
- Or use Tyvec ® coveralls and booties.

COMMON BED BUG MYTH

Pesticide applications alone will easily eliminate bed bug infestations.

- Proper use of pesticides may be one component of a bed bug control strategy, but may not eliminate bed bugs alone.
- Bed bugs have developed resistance to many kinds of pesticides.

Bed bug control can only be maintained through a comprehensive Integrated Pest Management (IPM) treatment strategy that incorporates a variety of techniques and vigilant monitoring.

What is bed bug IPM?

- A multifaceted control approach that combines:
- Knowledge
- Education
- Sanitation
- Maintenance
- Creating barriers
- Monitoring
- Careful inspection
- Non-chemical treatments
- Pesticides, if needed

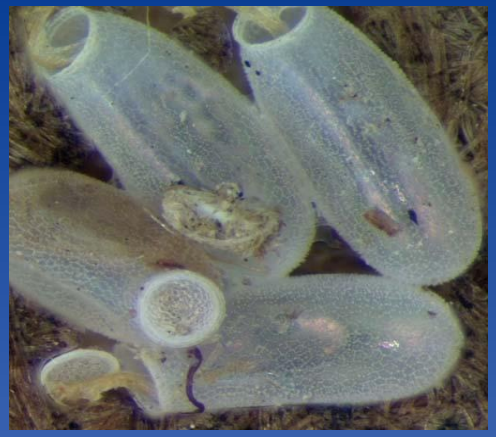
What is Bed Bug IPM?

a) Controlling pests with pesticides first.
b) Controlling pests with only pesticides.
c) Controlling pests with no pesticides.
d) Using a combination of non-chemical strategies such as maintenance, sanitation, barriers, monitoring, non-chemical controls, followed by pesticides, if other methods are not as effective as desired.

Source: M. Anderson, EPA R2

Pesticides and Bed bugs

- The majority of available spray pesticide products (including pyrethroid based sprays) may not prove as effective as customers would like.
- **EACH INFESTATION IS DIFFERENT!**
- Assess each case separately and determine which method would be best in a particular location.
- Treatment decisions should be based on:
  - the degree of infestation,
  - vulnerability of population, and
  - ability of residents to complete pre-treatment procedures.



COMMON BED BUG PESTICIDES

What chemical pesticides are most effective in treating bed bugs?

a) boric acid
b) bug bombs
c) insect repellants
d) pyrethroid sprays
e) pesticide impregnated items
f) diatomaceous earth
g) pyrethroid and other dust mixtures

COMMON BED BUG MYTHS

Bed Bug Repellents

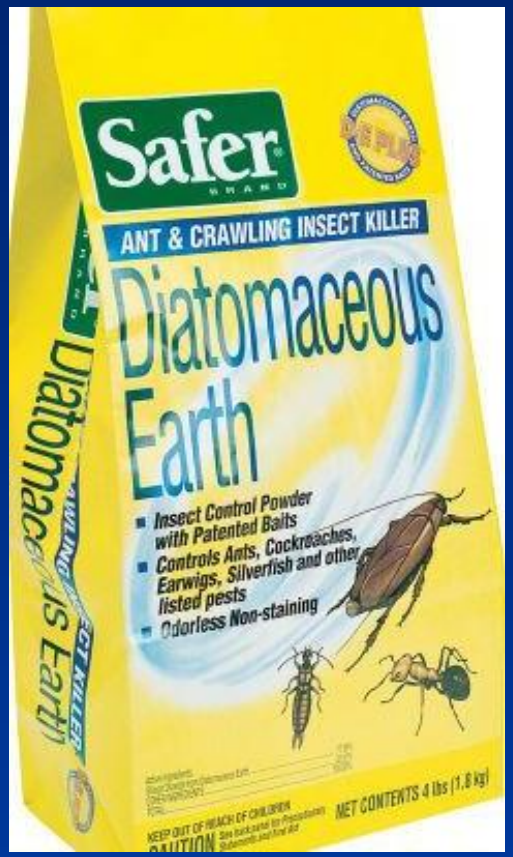
- When tested at Virginia Tech, bed bugs were not repelled by most insecticides, including the pyrethroids.
- These test results also indicated that bed bugs would not be repelled by pesticide treated mattress fabric.
- Field use of DEET by Rutgers Univ., when sprayed on pants legs and shoes, has shown notable effectiveness against bed bugs.

Bug Bombs

- Bug bombs or foggers may act as dispersants, initiating bed bugs to scatter into adjacent rooms or units.
- Bug bombs may also be hazardous to your health and the health of others if directions are not followed precisely.
- Setting off multiple bombs or foggers does not equal added efficacy.
- They are highly volatile and have caused fires.

Diatomaceous Earth

- DE is a natural, white, powdery substance that kills insects.
- When used properly, bed bugs crawl through DE.
- It can take up to 2 weeks to kill bed bugs; (useless if wet).
- Only use DE labeled for insects, and follow label instructions carefully.
- Apply DE to cracks & crevices in walls & behind wall plates.
- DE does kill chemical-resistant bed bugs, but it can't be applied as widely as other products.



Insecticides

- Many insecticides are ineffective in killing bed bugs because they have no means of being ingested.
- Always check the product label.

Diatom Earth

DIRECTIONS FOR USE

It is a violation of Federal Law to use this product in a manner inconsistent with its labeling.

INDOOR USE: COCKROACHES, ANTS, EARWIGS, SILVERFISH, CRICKETS, MILLIPEDES, AND CENTIPEDES. Lightly coat a thin layer of dust in the areas where these pests are found or may hide such as cracks and crevices, behind and beneath stoves, refrigerators, sinks, cabinets, garbage cans, around pipes and drains, window frames, and in attics and basements. Hit insects directly where possible. Repeat as necessary.

BEDBUGS: Take bed apart. Dust into joints and channels. If hollow, such as square or round tubing, see that the interior of the framework is well dusted. Mattresses should be dusted, especially tufts, folds and edges. Picture frame molding and all cracks and crevices in the room should be treated.

INDICACIONES PARA EL USO

El uso de este producto de modo
etiqueta constituye una violación a l

USO EN INTERIORES: CUCARAC
GRILLOS, MILPIES Y CIEMPIES.
áreas donde se encuentren estos ins
tal y como grietas, hendiduras
fregaderos, gabinetes, basureros,
de ventanas y en áticos y sótanos,
los insectos. Repita según sea nece

CHINCHES: Aleje la cama. Esparza
huecos, como tubos cuadrados
estructura esté bien esparcido. S
los cabos, los pliegues y los b
habitación deben ser tratados.

USO EN EXTERIORES: TIJERETAS,
Y CIEMPIES. Cubra con una capa
insectos nocivos o donde puedan e
puertas y soleras, y fuera de las vías

How to Hire a Pest Management Professional

- Call several companies.
- Insist on references for bed bug treatment. Check the references.
- Do they offer an Integrated Pest Management solution to the problem?
- Do they perform a pre-treatment inspection and give a pre-treatment check-list?
- Do they offer both chemical and non-chemical treatment options?
- Do they recommend encasements and interceptors.
- Do they use only pesticides recommended for bed bugs?
- Are they licensed and insured?

Who should be aware of and address bed bug issues?

a.) residents / tenants

b.) workers

c.) maintenance/ custodial staff

d.) building manager

e.) landlord / owners

f.) everyone

Facility Bed Bug Procedure Review

If an infestation develops, it just needs to be handled correctly.

- Post bed bug sighting procedures in the facility.
- if clients find a bed bug in the facility they must make an employee aware immediately.
- Identify the exact location where the bed bug(s) was found.
- Isolate the bed bug location.
- Capture at least one bed bug and save it in a plastic bag for positive identification.
- Crush all others.
- Discuss control options with your pest management professional.

Questions?

For more information go to:

www.epa.gov/bedbugs

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