

Bed Bug Basics – Identification, Prevention, Control

Dr. Susan C. Jones
Professor of Entomology



THE OHIO STATE UNIVERSITY

COLLEGE OF FOOD, AGRICULTURAL,
AND ENVIRONMENTAL SCIENCES

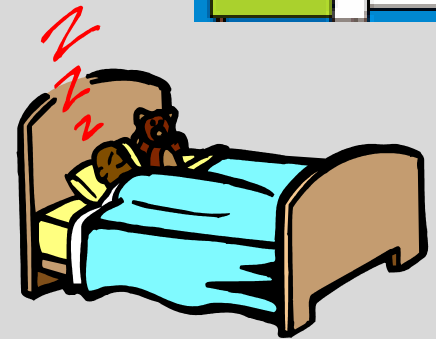
The Common Bed Bug

(*Cimex lectularius*)

Hemiptera: Cimicidae

Insects (true bugs)
Temporary external parasites
Feed only on blood
Prefer to feed on humans
Alternate hosts:

rodents, bats, birds,
pets (cats, dogs, etc.)



Not caused by bad housekeeping!!
BED BUGS CAN HAPPEN TO ANYONE!

Bed Bugs Make Their Way To the Americas

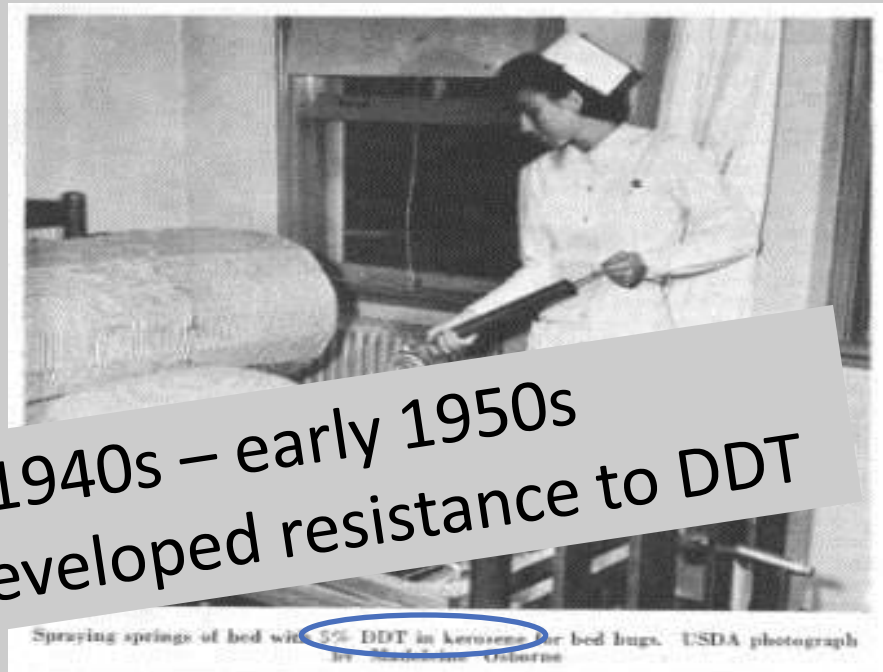


- Bed bugs are not native to the Americas
- Introduced by the early colonists
- Sailing ships had severe bed bug infestations
- Early 18th century--severe bed bug problems in the English colonies and Canada

1940s

“Live Better Through Chemistry”

DDT and other synthetic insecticides with long-lasting residual were very effective in controlling bed bugs.



late 1940s – early 1950s
Bed bugs developed resistance to DDT

Worldwide Resurgence of Bed Bugs Since Late 1990s



Aumenta la presencia de chinches en Barcelona

SPAIN

Las empresas de control de plagas descartan su desaparición y han incrementado las actuaciones contra estos insectos en

★★★★★ 10 votos | 42 comentarios

mardi 26 octobre 2010 à 18H38

Montréal: épidémie de punaises de lit confirmée

CANADA

THE TIMES THE SUNDAY TIMES

Archive Article

Please enjoy this article from The

From The Times

April 14, 2004

Bedbugs invade London's

By Valerie Elliott, Consumer Editor

LONDON'S smartest hotels are among a string of residential properties throughout the country which are facing an infestation of "super" bedbugs. The numbers of bloodsucking bugs have increased tenfold in a decade and pest control experts have commissioned a study to identify the cause of the invasion.

ENGLAND

guardian.co.uk

Bed bugs eat into tourism

Bernard O'Riordan in Sydney
The Guardian, Wednesday 6 April 2005 01.43 BST

[A larger font](#) [smaller font](#)

The saying "don't let the bed bugs bite" has taken on new significance for Australia's burgeoning backpacker industry, which is facing an epidemic of the bloodsucking insects. The bugs, which can survive for months without feeding and are renowned as hitchhikers, travelling the world hidden in luggage, shoes and clothing, could cost the country's tourism industry tens of millions of pounds after they were found to have infested eight out of 10 backpacker hostels in Sydney's eastern suburbs alone. Many bedsits, particularly at Bondi Beach and Kings Cross, rely almost exclusively on British and Irish customers.

AUSTRALIA



inefficaces, la

minateurs.

sont pas

gagent

The Most Bed Bug-Infested Cities in the U.S.


2012

Press Room January 2013

Chicago Replaces Cincinnati As Orkin's Number One Bed Bug City

Bed bug business up more than 32 percent nationwide




- 
1. Chicago (+1)
 2. Detroit (+1)
 3. Los Angeles (+2)
 4. Denver
 5. Cincinnati (-4)
 6. Columbus, Ohio
 7. Washington, D.C. (+1)
 8. Cleveland/Akron/Canton (+5)
 9. Dallas/Ft. Worth (-2)
 10. New York (-1)
 11. Dayton, Ohio (+4)
 12. Richmond/Petersburg, Va. (-2)
 13. Seattle/Tacoma (+14)
 14. San Francisco/Oakland/San Jose (-2)
 15. Raleigh/Durham/Fayetteville, N.C. (+4)

2013



Cincinnati ranks No. 1 in list of calls to an extermination company as top bedbug infested cities

July 2013

- 
- 1) Cincinnati
 - 2) Philadelphia
 - 3) Detroit
 - 4) New York
 - 5) Columbus
 - 6) Los Angeles
 - 7) Dallas
 - 8) Chicago
 - 9) Houston
 - 10) Baltimore

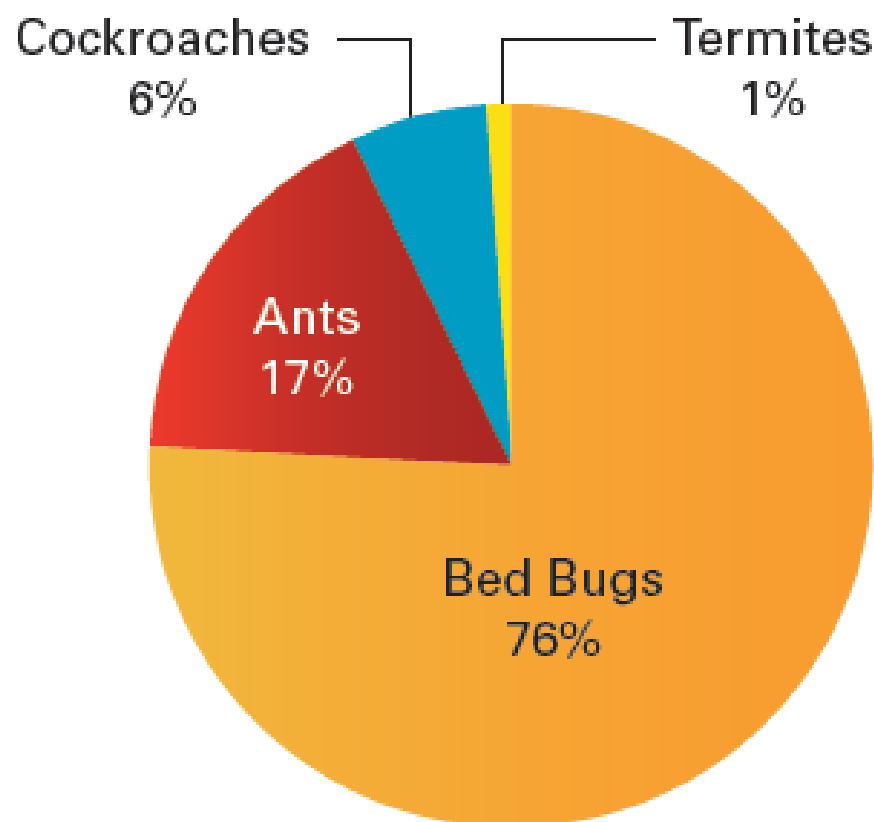


BED BUG NATION

Are We Making Any Progress?

BY MICHAEL F. POTTS
JIM FREDERICKS AND

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



Some Reasons For the Resurgence of Bed Bugs

- International travel and commerce
- Housing with high tenant turnover
- Pesticide use has changed
 - Pesticide bans
 - Failure to re-register insecticides
 - Baits to control ants & cockroaches
- Insecticide resistance

Non-pyrethroid Insecticides For Use Against Bed Bugs

Active Ingredient (insecticide class)	Product Name(s)
Imidacloprid + β-cyfluthrin (neonicotinoid + pyrethroid)	Temprid® SC
Chlorfenapyr (halogenated pyrrole)	Phantom® SC Phantom® PI
Acetamiprid + bifenthrin (neonicotinoid + pyrethroid)	Transport® Mikron Transport® GHP
Thiamethoxam + λ-cyhalothrin (neonicotinoid + pyrethroid)	Tandem®
Dinotefuran + diatomaceous earth (neonicotinoid + silica dioxide)	Prescription Treatment Alpine® Dust Alpine® PI

INTEGRATED PEST MANAGEMENT (IPM) FOR BED BUGS:

Correctly identify the pest

+

Conduct a thorough inspection

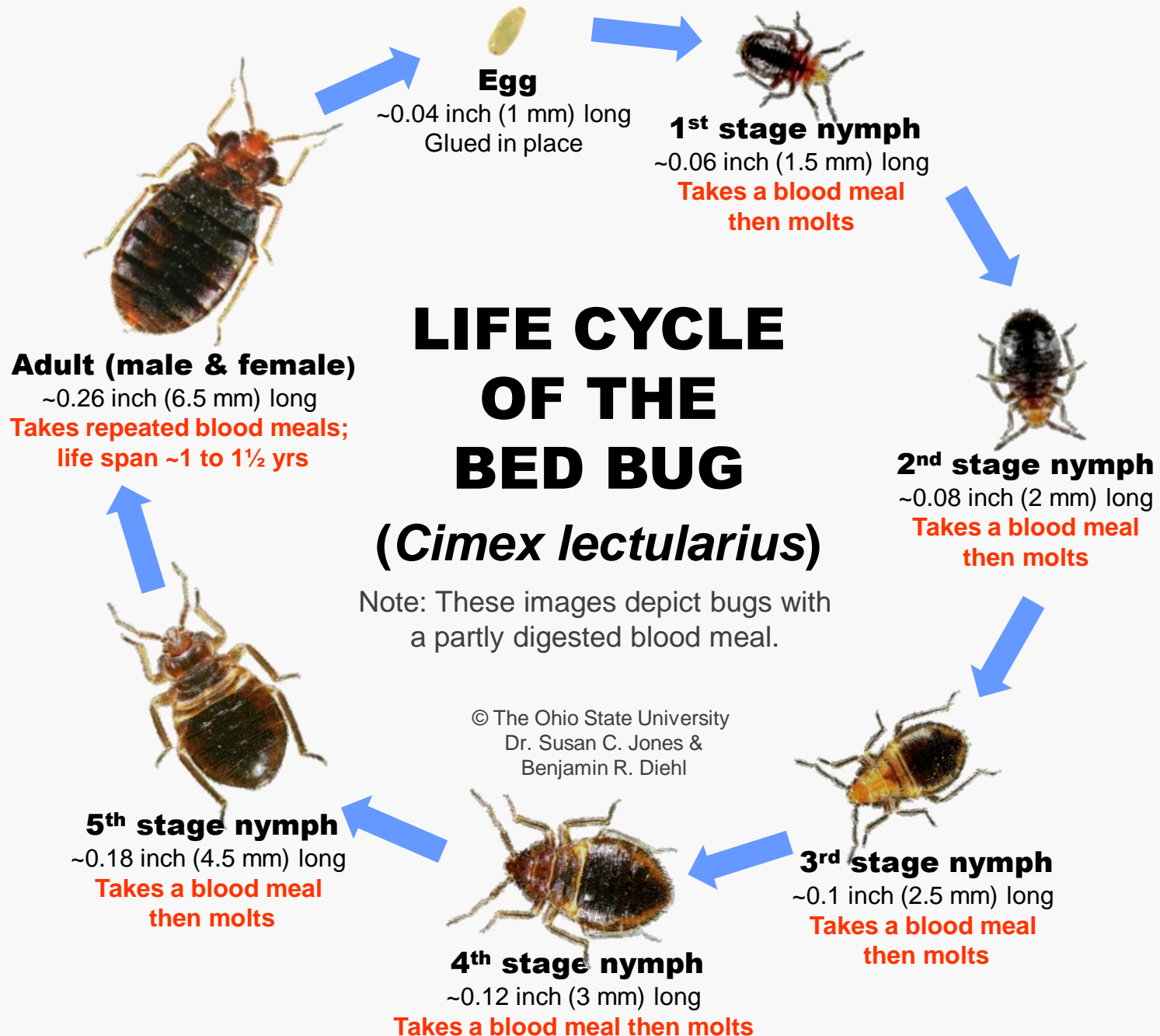
+

Use sanitation measures

+

Apply insecticides to targeted sites

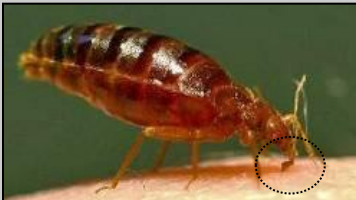




How to recognize if it's a bed bug

Shape and Size

- Beak-like mouthparts
- Oval shaped body
- Body flattened (unfed) to swollen (recently fed)
- Adults: ~1/4 to 3/8 inch long
- Youngest nymphs (immature bugs) are tiny (<<1/10 inch long)



How to recognize if it's a bed bug

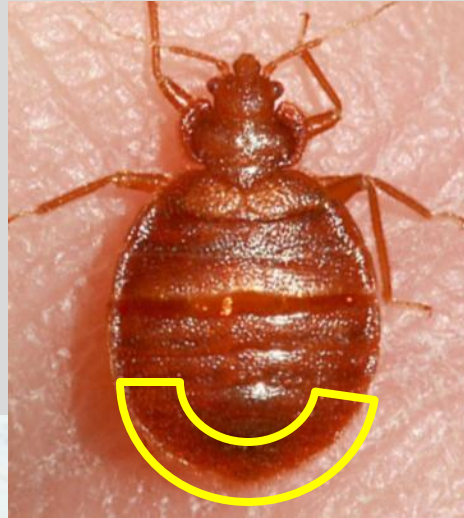
Color

- Youngest nymphs:
 - almost colorless (unfed)
 - crimson (recently fed)
- Older nymphs and adults:
 - various shades of brown (unfed)
 - reddish brown (fed)

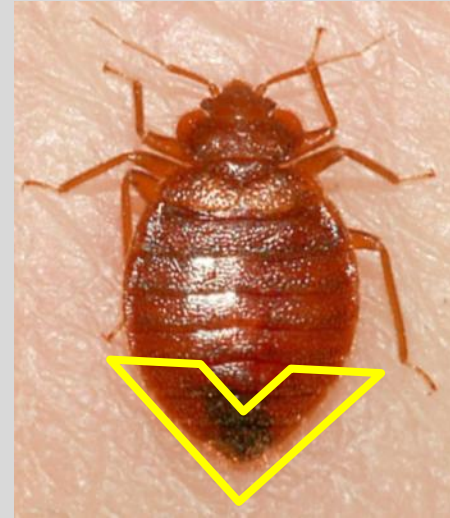


Adult Bed Bugs

Female



Male



Bed Bug

(*Cimex lectularius*)



Bat Bug

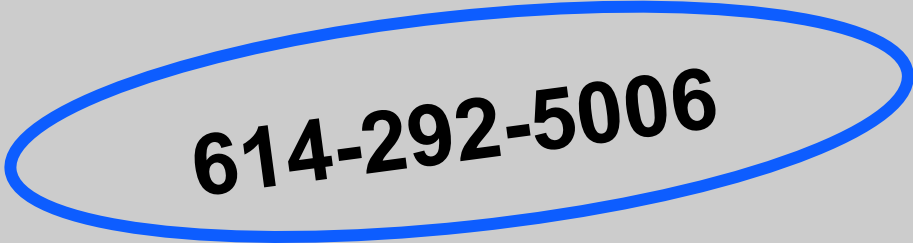
(*Cimex adjunctus*)



IDENTIFICATION SERVICES

Ohio State University Pest Diagnostic Clinic

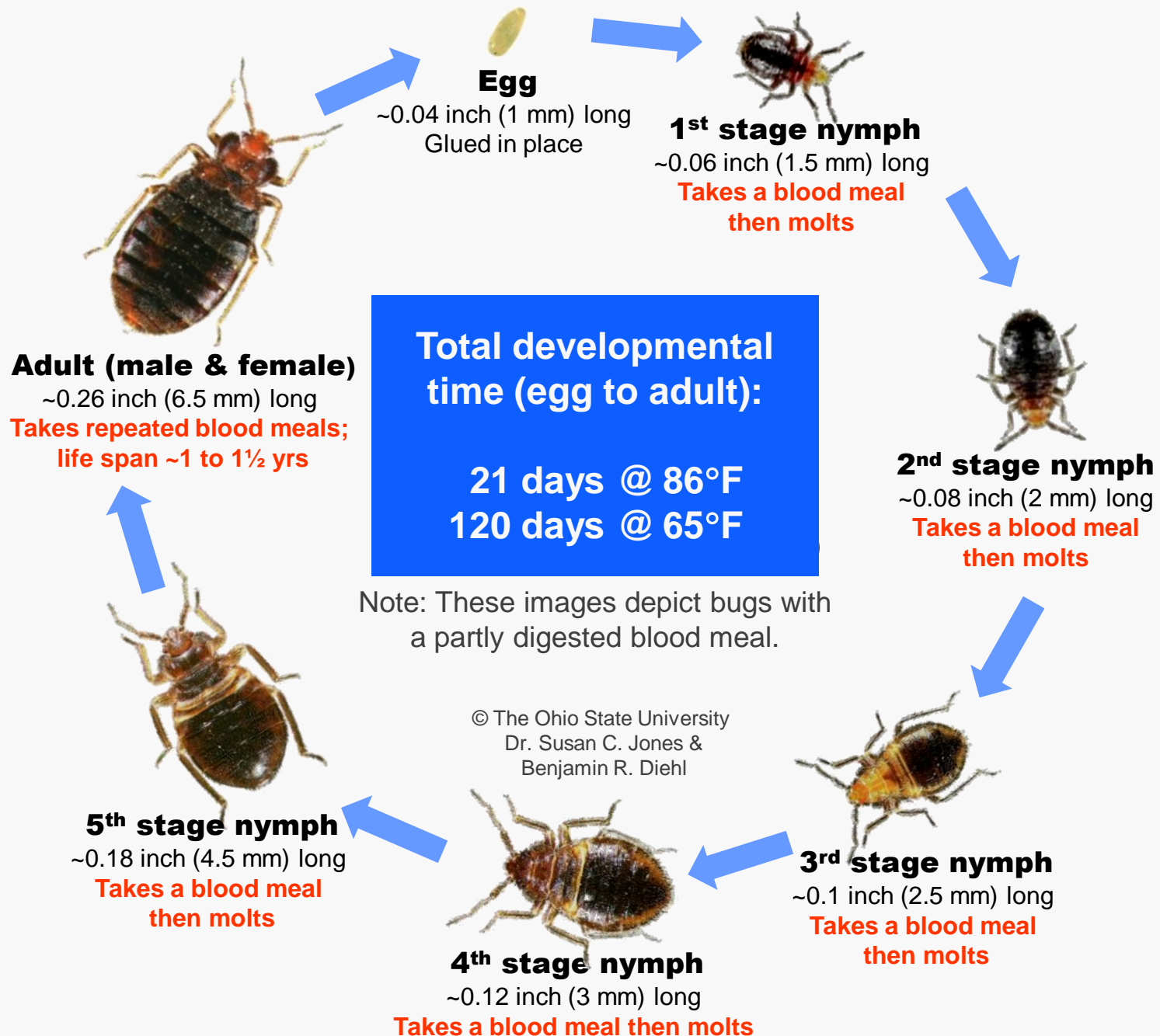
- Fee for identification services (\$20 per insect sample)
- ID wide variety of insects, arthropods, plant diseases, etc.
- Online submission form: <http://ppdc.osu.edu>



614-292-5006

Some Basics of Bed Bug Management

- **Early detection and treatment are very important.**
- **Bed bug control typically is much faster and less expensive when the infestation is detected early.**



Life History Characteristics Show That Bed Bug Numbers Can Quickly Increase ... (Early Detection and Treatment are Very Important)

❖ Eggs



- Glued in place
- 1 – 12 eggs / day / female
- A single female can produce ~150 eggs
- Hatch in 6 – 17 days



❖ Nymphs (immature bugs)

- Five nymphal stages
- Require a blood meal in order to grow



❖ Adults (males & females)

- Require repeated blood meals
- Can live 12 – 18 months
- Can survive months of starvation

Survivorship During Starvation for *Cimex lectularius* L.

Andrea M. Polanco, Dini M. Miller * and Carlyle C. Brewster

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OPEN ACCESS

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* Author to whom correspondence should be addressed; E-Mail: dinim@vt.edu;

Tel.: +1-540-231-4045; Fax: +1-540-231-2925.

Received: 09 February 2011; in revised form: 20 April 2011 /

Published: 11 May 2011

Test conditions:

79-80 °F (~26.5 °C)

69% RH

Abstract: Four bed bug strains (*Cimex lectularius*) with different levels of pyrethroid resistance were evaluated to determine their ability to survive extended periods of starvation. First instar bed bugs of all strains were the most vulnerable to starvation (13.8–36.3 days mean survival time). Fifth instars and adults survived the longest during starvation (41.5–142.6 days). Significant differences in survivorship during starvation were observed between resistant and susceptible strains of bed bugs. Overall, all immature and adult stages of the resistant bed bug strains had significantly shorter survival times than those of the susceptible strains ($P < 0.05$). <http://www.mdpi.com/2075-4450/2/2/232>

BED BUG HABITS



Cannot fly



Can walk very fast



Typically hide during the day in dark, protected sites (esp. cracks & crevices)



Prefer fabric, wood, and paper surfaces

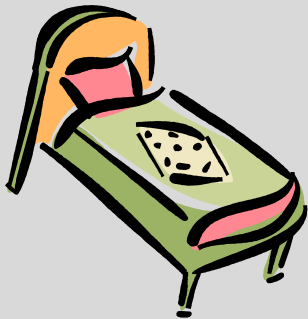


Can cling tightly to surfaces



Bed bugs are very good hitchhikers!

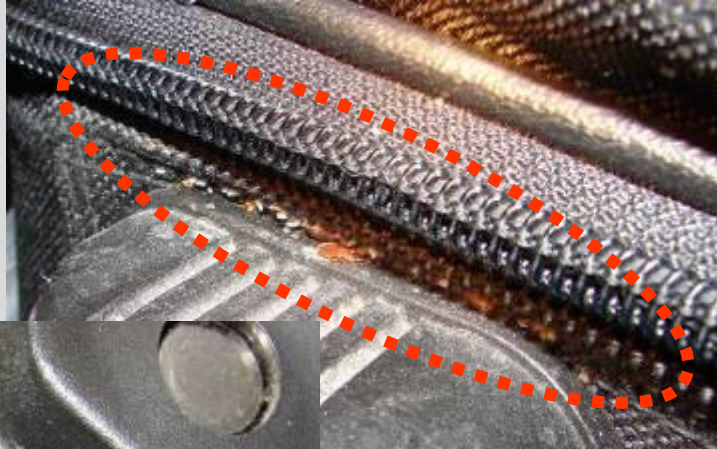
Bed bugs can be moved from one place to another by hiding in:



- luggage
- furniture
- bedding
- backpacks, purses, briefcases
- clothing
- ...



Bed Bugs Hiding in Luggage

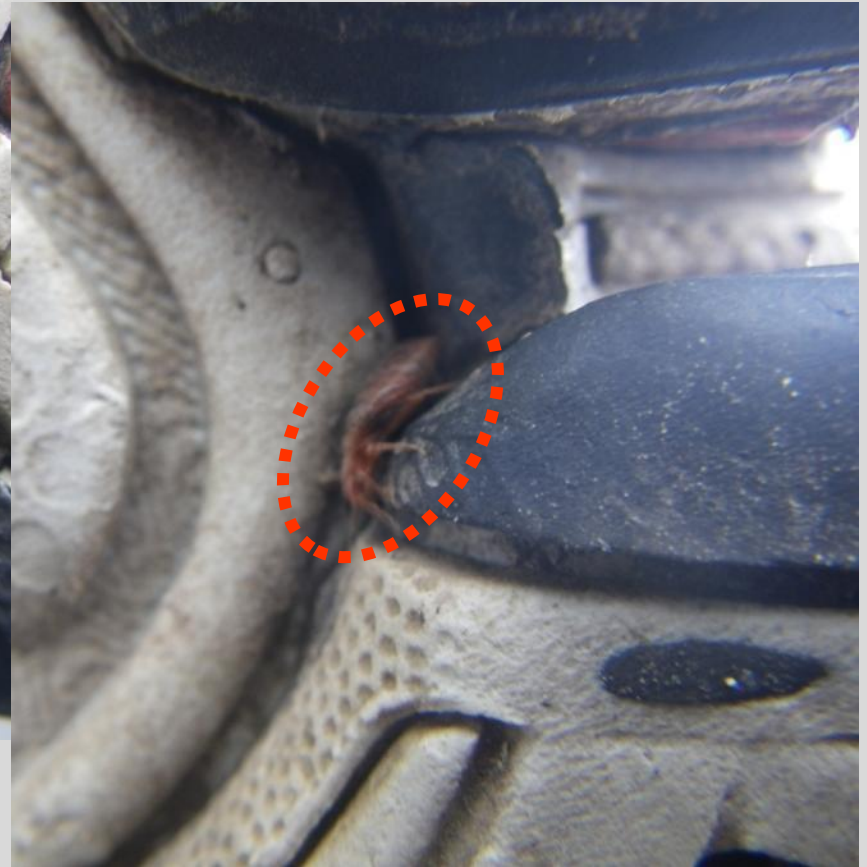


--Bed Bug Hitchhikers— in walker & wheelchair



Photos courtesy of General Pest Control Co.

--Bed Bug Hitchhikers— in shoe tread



How do bed bugs travel?

- **Hitchhiking**
- **Walking**
 - **down a hallway after dropping off an item**

What shouldn't you do for a bed bug problem?

Typically, you shouldn't dispose of furniture.

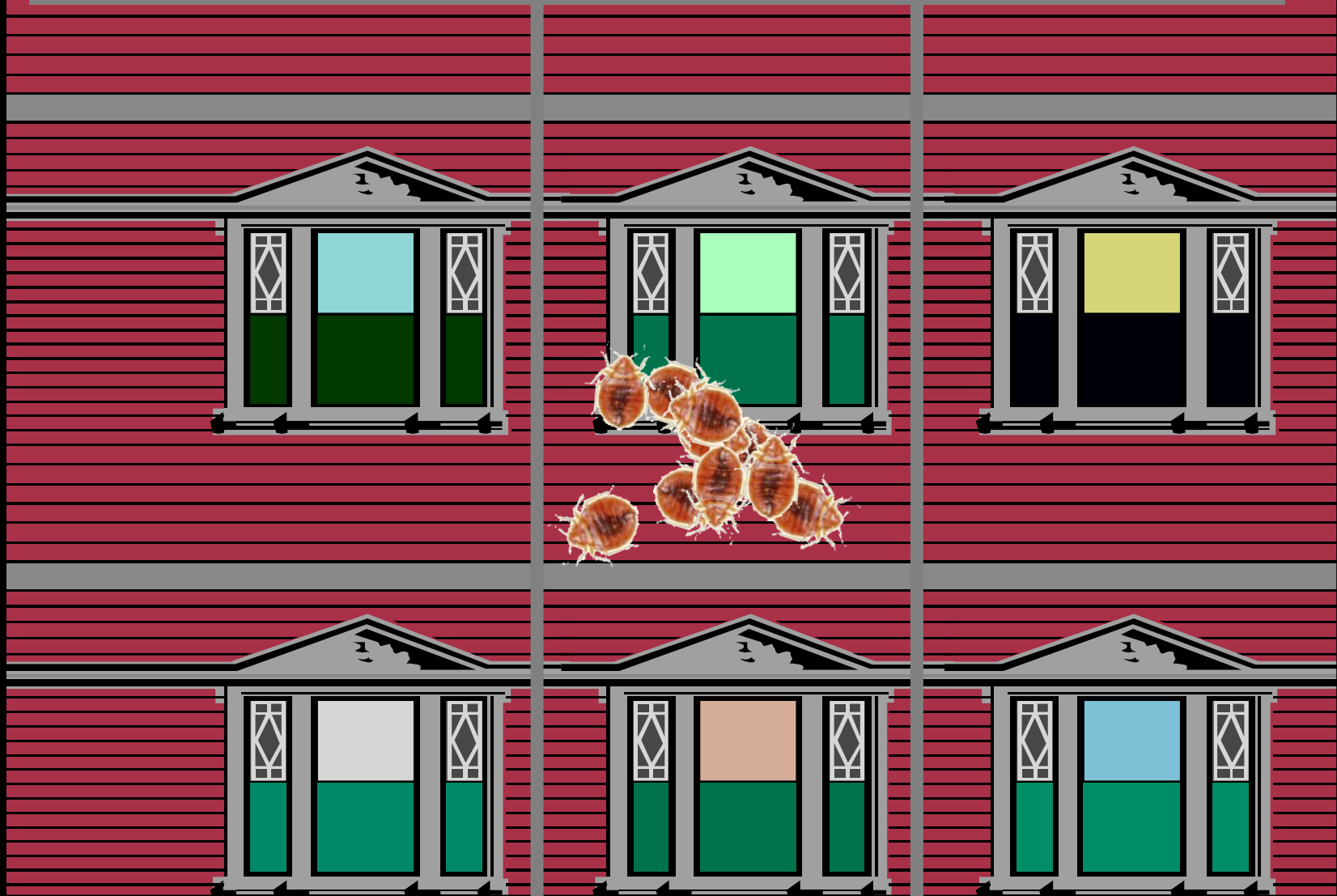
- Bed bugs will fall off the furniture as you are moving it, hence spreading the problem.
- Infested furniture usually can be treated.
- Bed bugs can quickly infest replacement furniture.
- Items placed on the curb often are picked up and reused, thereby spreading bed bugs to other households.



How do bed bugs travel?

- Hitchhiking
- Walking
 - down a hallway after dropping off an item
 - from an infested room to new territory
 - from one apartment to another via pipes, electrical wires, cables, ...

In multi-family housing, bed bugs readily spread to units that are adjacent, below, and above the infested unit.



Bed Bug Feeding Habits



Typically feed at night



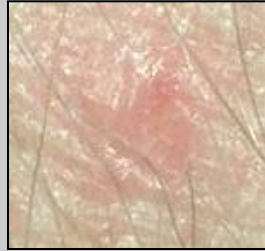
Locate their host using cues such as carbon dioxide, heat, and odor



Recognizing Bed Bug Bites

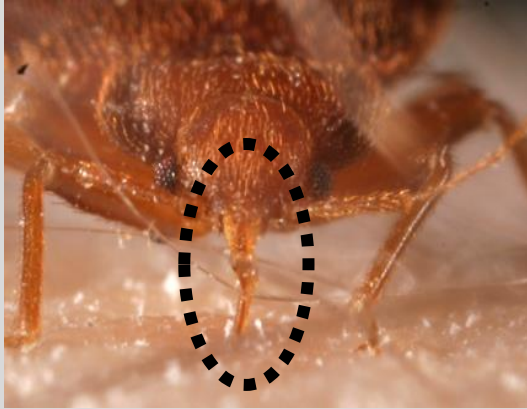
- Skin reactions (avg = 7 of 10 people)

- Redness
- Welts
- Itching



- Resemble bites from other insects & arthropods
- Typically no red spot at the center (such as with fleas and black flies)
- Typically occur on exposed skin
 - Neck and face; shoulders and arms; back; etc.
- Rarely occur on the palms or soles (such as with scabies mites)
- Often occur in rows or groups
- Confirmation based on finding bed bug evidence

Health Effects from Bed Bugs



- Skin reactions in 7 of 10 people
 - Redness
 - Welts
 - Itching
- Secondary bacterial infections
- Anemia
- Asthma
- Anaphylactic shock
- Psychological effects
- Sleeplessness
- Agitation
- Anxiety ...

August 2010



Joint Statement on Bed Bug Control in the United States from the U.S. Centers for Disease Control and Prevention (CDC) and the U.S. Environmental Protection Agency (EPA)

Introduction and Purpose

The Centers for Disease Control and Prevention (CDC) and the U.S. Environmental Protection Agency (EPA) developed this document to highlight emerging public health issues associated with bed bugs (*Cimex lectularius*) in communities throughout the United States.

Bed bugs (Photo 1) have been common in U.S. history. Although bed bug populations dropped dramatically during the mid-20th century (1), the United States is one of many countries now experiencing an alarming resurgence in the population of bed bugs. Though the exact cause is not known, experts suspect the resurgence is associated with increased resistance of bed bugs to available pesticides, greater international and domestic travel, lack of knowledge regarding control of bed bugs due to their

prolonged absence, and the continuing decline or elimination of effective vector/pest control programs at state and local public health agencies.

In recent years, public health agencies across the country have been overwhelmed by complaints about bed bugs. An integrated approach to bed bug control involving federal, state, tribal and local public health professionals, together with pest management professionals, housing authorities and private citizens, will promote development and understanding of the best methods for managing and controlling bed bugs and preventing future infestations. Research, training and public education are critical to an effective strategy for reducing public health issues associated with the resurgence of bed bug populations.

Impact of Bed Bugs on Public Health

Although bed bugs are not known to transmit disease, they are a pest of significant public health importance. Bed bugs fit into a category of blood-sucking ectoparasites (external parasites) similar to head lice (*Pediculus humanus capitis*). Bed bugs, like head lice, feed on the blood of humans but are not believed to transmit disease. Other ectoparasites, such as body lice (*Pediculus humanus corporis*), are known to transmit several serious diseases. Differences in the biology of similar species of pests, such as body lice and head lice (or bed bugs) can greatly impact the ability of pests to transmit disease.



Photo 1. Bed Bug. Photo courtesy of Dr. Harold Harlan, Armed Forces Pest Management Board Image Library

CDC & EPA Joint Statement

Bed bugs are a
pest of significant
public health
importance!

http://www.cdc.gov/nceh/ehs/Publications/Bed_Bugs_CDC-EPA_Statement.htm

<http://www.epa.gov/pesticides/bedbugs/>

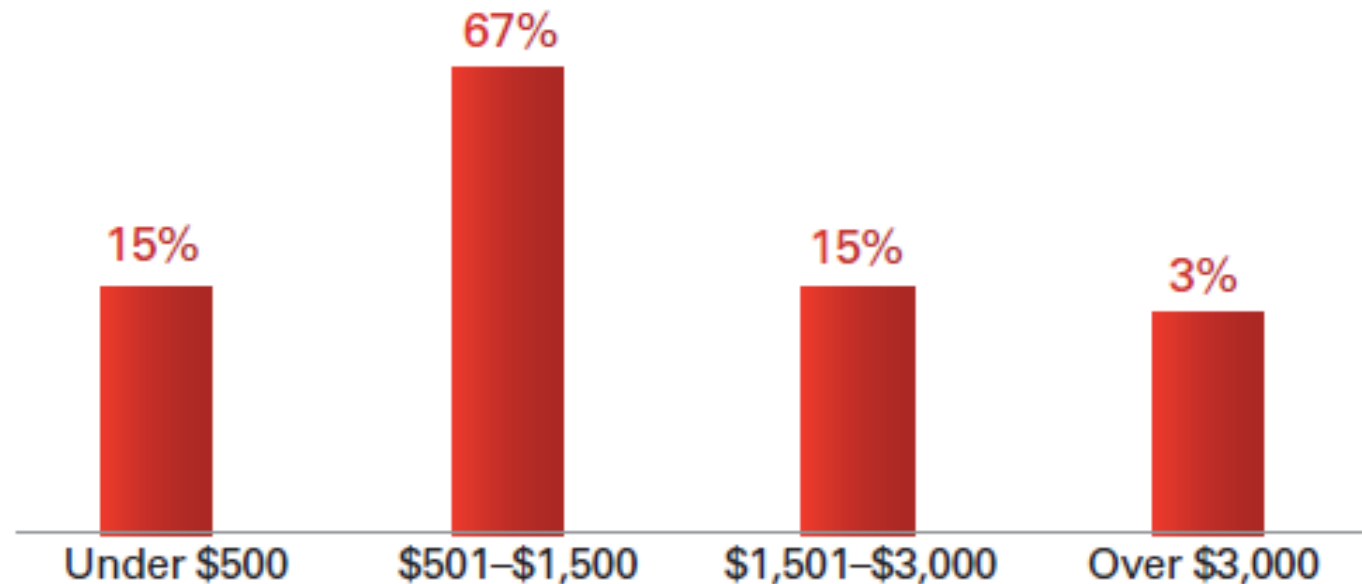
BED BUG NATION

Are We Making Any Progress?

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

Bed bugs also are responsible for severe economic hardships.

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



Recognize the telltale signs of bed bugs!

- Black fecal spots
- Shed skins & eggshells
- Live bed bugs (nymphs & adults)
- Blood stains from crushed bugs
- Welts on exposed skin
- Distinctive “buggy” odor (in severe infestations)

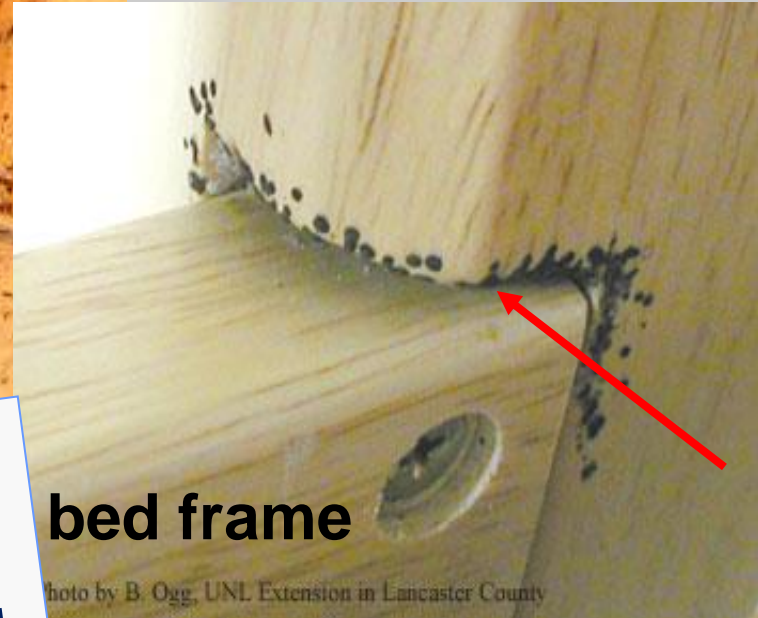


Bed Bugs Behind A Hanging Picture



It's important to
treat all
harborage sites!

Tell-tale Signs of Bed Bugs in Furniture



It's important to
treat all
harborage sites!

bed frame

photo by B. Ogg, UNL Extension in Lancaster County

Tell-tale Signs of Bed Bugs Behind Baseboards



**It's important to
treat all
harborage sites!**

Tell-tale Signs of Bed Bugs in Electrical Outlets



**It's important to
treat all
harborage sites!**

BED BUG PREVENTION FOR TRAVELERS

Make it STANDARD PRACTICE to check for bed bugs in hotel/motel rooms!

Look for black spotting and other bb signs as you examine:

- mattress & box springs, especially seams
- underside of the bed skirt
- headboard and bed frame
- nightstand drawers, particularly inner and outer edges
- baseboards

DON'T STAY IN A ROOM THAT HAS BB SIGNS



BED BUG PREVENTION FOR TRAVELERS

Reduce the chances of getting bed bugs from hotel/motel rooms!

- **Keep clothes in your zipped suitcase**
 - **Don't keep clothes in hotel chest-of-drawers**
 - **OK to hang clothes in closet**
- **Don't store your suitcase on the bed, floor, or upholstered furniture**
- **Keep your suitcase on the luggage rack (after first inspecting it for bb signs)**
- **The bathroom (tub) is the best place to store items!**

INTEGRATED PEST MANAGEMENT (IPM) FOR BED BUGS:

Correctly identify the pest

+

Conduct a thorough inspection

+

Use sanitation measures

+

Use non-chemical measures

+

Apply insecticides to targeted sites



Sanitation Measures

(Typically are used to supplement additional treatment measures.)

Some measures to help reduce the number of bed bugs:

Launder bedding, clothing, etc.!

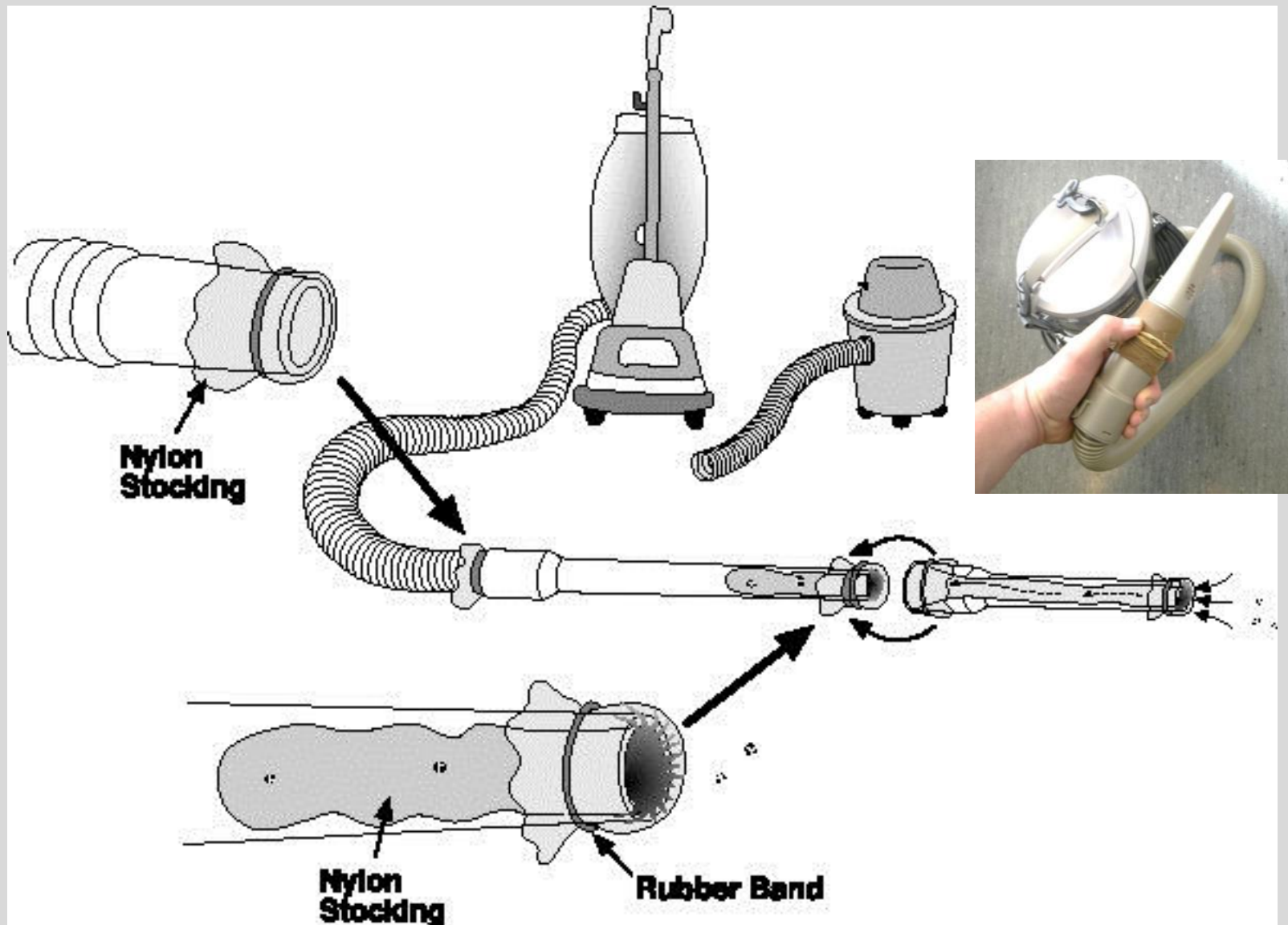
- Wash in hot water ($\geq 120^{\circ}\text{F}$, [50°C])

- ★★★ • Keep dry items in drier on medium to hot setting for ≥ 30 minutes.

It is important to keep disinfected items bagged while bed bug eradication efforts are on-going at your residence.



Vacuuming to contain bed bugs



Some measures to help reduce the number of bed bugs:

Steaming

- Commercial steam unit preferable
- Dry steam preferable (less moisture)
- Surface temperature should be ~176°F (80°C)
- Steam immediately kills bed bugs & eggs
- Requires working slowly and thoroughly
- Steam can penetrate many fabrics & padding
 - Some materials too thick for heat transfer
- Prolonged drying time (use fan, dehumidifier, natural ventilation)
- No residual protection



Some measures to help reduce the number of bed bugs:

Install encasements

- Be sure to encase both the mattress & box springs
- Specialized encasements trap bed bugs and eggs
 - May take 1 year to “starve bugs out”
 - Bug activity is restricted to the exterior of the encasement, where bugs can be more easily treated
- Be careful not to tear or damage encasements and make sure the zipper stays closed
- Some exs: Clean Rest, Mattress Safe, National Allergy Supply, Protect-A-Bed, ...



ActiveGuard™ Liner



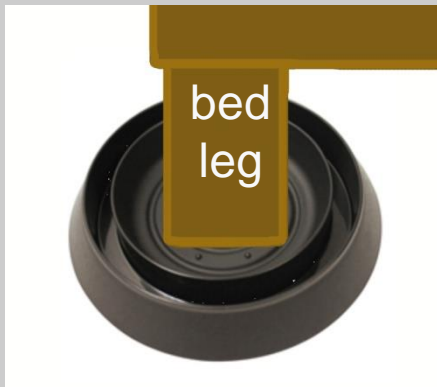
The liners consist of finely woven polyester fabric impregnated with 1.64% permethrin. The liners are kept in place on mattresses and box springs beneath bedding.

--Passive Monitoring Devices--

Bed Bug Interceptors



ClimbUp® Interceptor



BlackOut® Interceptor

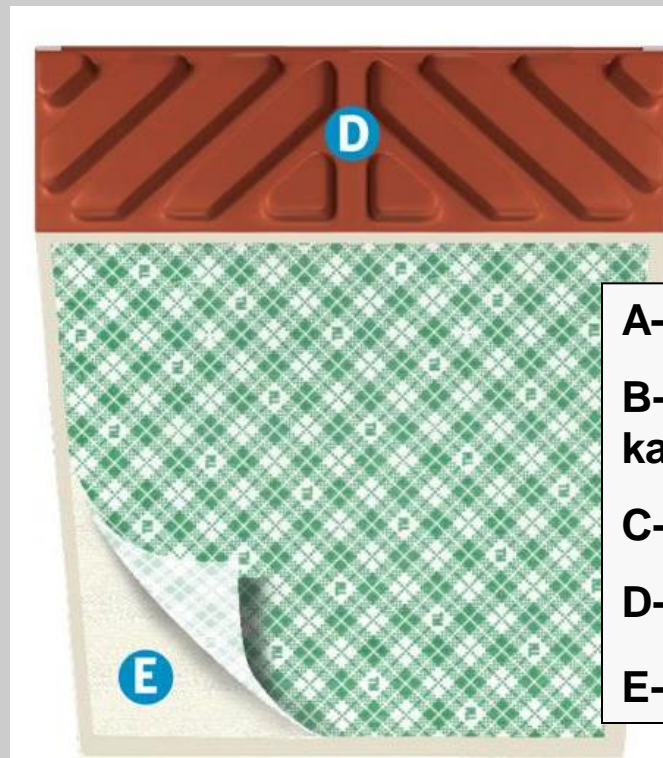
- Positioned under furniture legs
- Furniture must be kept in use—bugs are attracted to host's CO₂
- Pitfall trap—bed bugs climb in and cannot escape*
 - *Inner walls of ClimbUps must be kept lubricated with talcum powder or bugs can escape
- Eliminate alternative ways for bugs to access furniture (don't let bugs bypass interceptors)
 - Keep furniture several inches away from walls
 - Don't let bed linens, dust ruffle, & bedding contact the floor or walls

--Active Monitoring Device--

FMC Verifi™ Bed Bug Detector



Front view (with cut away revealing interior components)



Rear view

- A- CO₂ booster pack**
- B- lures (pheromone + kairomone)**
- C- pitfall trap area**
- D- harborage area**
- E- self-adhesive sticker**

Contact a professional pest control company to treat for bed bugs

- ODA web site lists licensed pest mgt. companies and applicators

The screenshot shows the Ohio Department of Agriculture website. The header includes navigation links: Home, Newsroom, Contacts, Ohio.gov, and Department of Agriculture. Below the header is a banner image of a red barn with solar panels and wind turbines. A secondary navigation bar lists: Divisions, Forms, Regulatory Programs, Promotional Programs, Laws & Rules, Licensing, Meetings & Notices. The main content area is titled "Ohio Department of Agriculture Pesticide & Fertilizer Regulation Section". It features a table with two columns: "Programs and Information" and "Pesticide & Fertilizer Regulation Section". The "Pesticide & Fertilizer Regulation Section" column lists "Ohio Department of Agriculture Division of Plant Industry" and "Pesticide & Fertilizer Regulation Section". A large, tilted, grey callout bubble with a black border is overlaid on the page, containing the text: "OH Dept. of Agriculture Pesticide Regulation Section 614-728-6987; 800-282-1955 http://www.agri.ohio.gov". In the "Online Services" section on the left, the link "Licensed Company Search" is circled.

Home | Newsroom | Contacts | Ohio.gov | Department of Agriculture

Divisions | Forms | Regulatory Programs | Promotional Programs | Laws & Rules | Licensing | Meetings & Notices

Ohio Department of Agriculture Pesticide & Fertilizer Regulation Section

Programs and Information	Pesticide & Fertilizer Regulation Section
	Ohio Department of Agriculture Division of Plant Industry Pesticide & Fertilizer Regulation Section

Online Services [-]

- Applicator Search
- Licensed Results Search
- Licensed Company Search
- Exam Results Lookup
- Exam Registration
- Recert Information
- Recert Classes

Private P.E.P.

- Study Materials
- Study Materials
- Recertification Opportunities

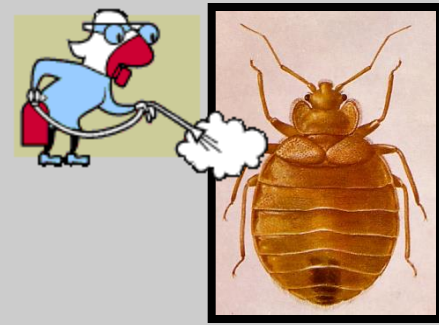
Valid 24(C) Registration
Restricted Pesticides List
Fungicides For Soybean Rust

Contact a professional pest control company to treat for bed bugs

Once you've made sure they are properly licensed to apply pesticides:

- It's advisable to obtain at least 3 estimates.
- Check for satisfied customer references that relate to bed bug control.
- Recognize that bed bug control typically takes several insecticide treatments.

Treatment Options



- Heat treatment (whole structure, container)
- Cold (usefulness is limited)
- Insecticides
 - Residual products (dust, liquid, aerosols)
 - Fumigation (sulfuryl fluoride)

Whole Room Heat Treatment



Containerized Heat Treatment

$\geq 120^{\circ}$ F for several hours



HE TTA
SOLUTIONS

Portable Thermal Chamber

Cold Treatment



CRYONITE



Some Basics of Bed Bug Management Using Insecticides






- There is no single “magic bullet”.
- A residual insecticide is necessary.
- Control of a bed bug infestation typically takes several treatments.
- It is important to use several different formulations, and often, several different insecticides.
- Don’t keep using the same insecticide (rotate insecticide use)

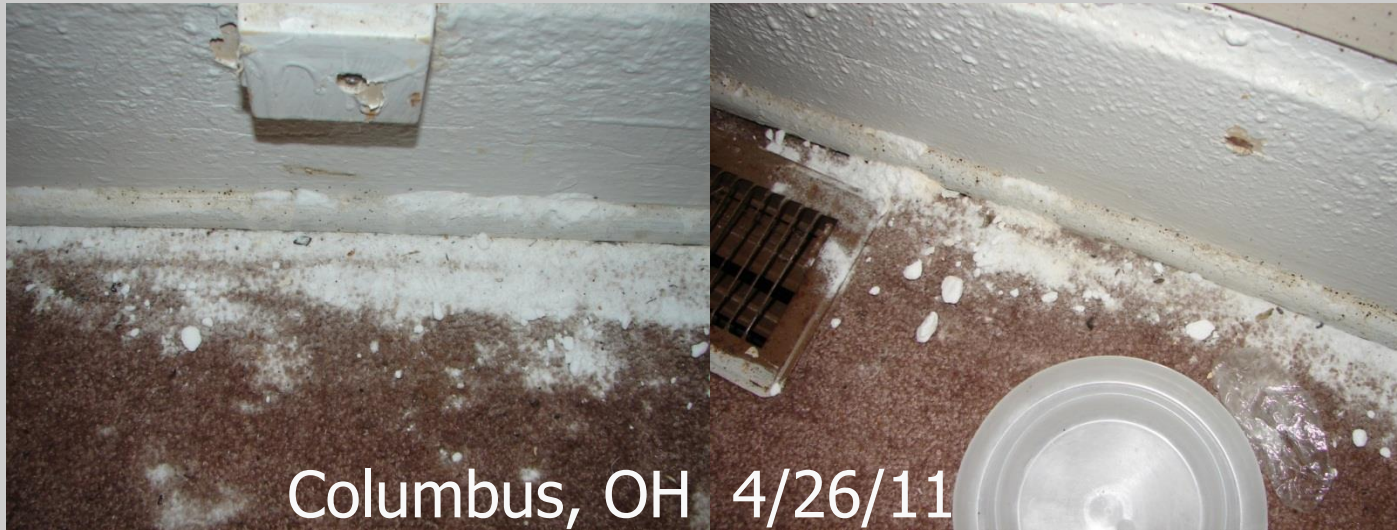
Non-pyrethroid Insecticides With Residual Activity Against Bed Bugs

Active Ingredient (insecticide class)	Product Name(s)
Imidacloprid + β-cyfluthrin (neonicotinoid + pyrethroid)	Temprid® SC
Chlorfenapyr (halogenated pyrrole)	Phantom® SC Phantom® PI
Acetamiprid + bifenthrin (neonicotinoid + pyrethroid)	Transport® Mikron Transport® GHP
Thiamethoxam + λ-cyhalothrin (neonicotinoid + pyrethroid)	Tandem®
Dinotefuran + diatomaceous earth (neonicotinoid + silica dioxide)	Prescription Treatment Alpine® Dust Alpine® PI

Some Insecticides Registered For Use Against Bed Bugs

Active Ingredient	Product Name	Miscellaneous Label Notes
<p>Diatomaceous earth (=silicon dioxide)</p>   	<p>Natural Guard Crawling Insect Control</p> <p>Safer® Brand Ant & Crawling Insect Killer</p> <p>MotherEarth™ D</p>	<ul style="list-style-type: none"> - Crack & crevice applications - Slow-acting - Residual (long-lasting) activity - Dusts should be applied in thin layers - DO NOT allow product to get wet or it will lose its effectiveness - Caution: Avoid inhalation; wear a dust mask during application - Pool grade DE should NEVER be used for pest control. Pool grade DE contains crystalline silica and can be a respiratory hazard. - Mattresses mentioned on label

Pesticide Misuse By Apt. Residents



Columbus, OH 4/26/11



Columbus, OH 6/28/12

BUYER BEWARE:

Grocery store insect sprays won't eliminate a bed bug infestation!



- **Must be sprayed directly on the bed bugs ('kills on contact')**
- **Most bugs are hiding and WILL NOT be killed**
- **Little or no residual activity (the chemical breaks down quickly)**

DO NOT use "bug bombs" against bed bugs!



- **"Bug Bombs" don't work**
- **Few bugs will be killed!**
- **"Bug Bombs" can cause bed bugs to scatter!!!**



"Bug Bombs" may worsen the bed bug problem!!

Words of caution regarding over-the-counter 'natural products' for bed bug control:

- Exempt from Environmental Protection Agency (EPA) registration
- EPA requires no efficacy data
- Claims often based on “satisfied customers”—be sure to ask for their research data and evaluate it carefully
- Botanical (plant based) products often have a strong odor
- Botanical products often have limited, if any, residual activity

25(b) Natural Products (exempt from EPA registration)

FTC takes action

The FTC complaint charges that the **Cedarcide** defendants make:

- false claims that scientific studies prove **Best Yet! is effective at stopping and preventing bed bug infestations, and that it is more effective than synthetic pesticides** at doing so;
- a false claim that the **Environmental Protection Agency has warned consumers to avoid all synthetic pesticides** for treating bed bug infestations;
- ...
- false claims that **Best Yet! was invented for the U.S. Army at the request of the U.S. Department of Agriculture**, and that the USDA has acknowledged the product as the **number one choice of bio-based pesticides**

The FTC complaint charges that the RMB Group defendants make

unsupported claims that **Rest Easy kills and repels bed bugs**, and that a consumer can **create a barrier against them by spraying the product around a bed.**

--Presentation Summary--



Bed Bug Basics

- **Myths**
- **Historical perspective**
- **Identification**
- **Bed bug habits**
- **Prevention**
- **Self-protection**
- **Control**

For More Information

<http://ohioline.osu.edu>



OSU Extension Fact Sheets:

- **HYG-2105 (Bed bugs)**
- **HYG-2105A (Bat bugs)**



CENTRAL OHIO
BED BUG
TASK FORCE

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Aug 11, 2012

Bed Bugs 101

- About Bed Bugs
- Getting Rid of Bed Bugs

Guidance for Professionals

- Police, Fire & EMS
- Schools
- Health Professionals
- Social Services
- Landlords & Realtors
- Hospitality
- Retail/Business



**call
2-1-1**
for bed bug
answers

Call (614) 221-2255 if
211 doesn't work from
your phone.

**BED BUG
101
SLIDESHOW**

**PICTURES
TRAVELING TIPS
EXTERMINATION
... AND MORE!**

**2012
BED BUG
SUMMIT**



REGISTRATION OPEN!

Bug Bombs



Don't Work

Hello!
My name is: *bed bug*

in the workplace



UPDATE 6/21/2012: When suspecting items have bed bugs and eggs, it is now recommended items be washed in hot water and dried at the highest dryer setting for AN ADDITIONAL 30 minutes AFTER THE ITEM IS DRY to kill bed bugs.

**Presentations
available for
group trainings**

Thank You!



Sleep tight,
and don't let the ...
... well, you know the rest

