

# What NOT To Do If You Have Bed Bugs

Dr. Susan C. Jones  
Professor of Entomology



**DON'T** expect bed bug control practices to be identical to methods for controlling cockroaches and other household insects.



# INTEGRATED PEST MANAGEMENT (IPM) PROCEDURES :



Correctly identify the pest

+



Conduct a thorough inspection

+

Use sanitation measures

+

Use non-chemical measures

+

Apply insecticides to targeted sites



DON'T treat for bed bugs  
when you aren't sure that  
you have them.



**BED BUGS**  
(*Cimex lectularius*)



female bed bug



male bed bug



immature bed bugs



bed bug shed skins



bed bug fecal spotting

**MISCELLANEOUS HOUSEHOLD PESTS**



cockroach nymphs



tick



stored product beetles



spider beetle  
(*Mezium americanum*)



carpet beetles



carpet beetle larva



carpet beetle shed skins



flea



multicolored Asian lady beetle  
(*Harmonia axyridis*)



brown marmorated stink bug  
(*Halyomorpha halys*)



**DON'T use bug bombs  
for bed bugs!**



# *Bug bombs can worsen the bed bug problem!*



- "Bug Bombs" work very poorly against crawling insects
- Few bugs will be killed!
- "Bug Bombs" can cause bed bugs (and cockroaches) to scatter!!!



# Ineffectiveness of Over-the-Counter Total-Release Foggers Against the Bed Bug (Heteroptera: Cimicidae)

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J. Econ. Entomol. 105(3): 957–963 (2012); DOI: <http://dx.doi.org/10.1603/EC12037>

**ABSTRACT** Field-collected bed bugs (*Cimex lectularius* L.) showed little, if any, adverse effects after 2-h direct exposure to the aerosolized pyrethroid(s) from three over-the-counter total-release foggers ('bug bombs' or 'foggers'); Hotshot Bedbug and Flea Fogger, Spectracide Bug Stop Indoor Fogger, and Eliminator Indoor Fogger. One field-collected population, EPM, was an exception in that there was significant mortality at 5–7 d when bugs out in the open had been exposed to the Spectracide Fogger; mortality was low when these bugs had access to an optional harborage, a situation observed for all field-collected populations when exposed to the three foggers. Even the Harlan strain, the long-term laboratory population that is susceptible to pyrethroids and that served as an internal control in these experiments, was unaffected if the bugs were covered by a thin cloth layer that provided harborage. In residences and other settings, the majority of bed bugs hide in protected sites where they will not be directly contacted by the insecticide mist from foggers. This study provides the first scientific data supporting the position that total-release foggers should not be recommended for control of bed bugs, because 1) many field-collected bed bugs are resistant to pyrethroids, and they are not affected by brief exposure to low concentrations of pyrethrins and/or pyrethroids provided by foggers; and 2) there is minimal, if any, insecticide penetration into typical bed bug harborage sites. This study provides strong evidence that Hotshot Bedbug and Flea Fogger, Spectracide Bug Stop Indoor Fogger, and Eliminator Indoor Fogger were ineffective as bed bug control agents.

— OSU Research —

## Over-the-Counter Foggers (“Bug Bombs”)

“Kills on contact”  
“Effective long-term control”



“Kills on contact”  
“Kills flying, crawling, and biting insects”



“Kills on contact”  
“Kills bugs you see, kills bugs you don't see!”



- Pyrethroid-resistant bed bugs did not die or become severely affected (statistically the same as controls).
- Nymphs and adults showed a statistically similar lack of response.
- Even pyrethroid-susceptible bed bugs were unaffected if they were in a harborage.
- There was a lack of insecticide penetration into harborages.



# Misuse of OTC foggers ("bug bombs")



San Diego, CA

- 470 sq ft home
- 19 foggers
- Ignited by water heater pilot light
- >\$150,000 damages

# Alaska prohibits “bug bombs” for bed bugs

## MEMORANDUM

State of Alaska

Department of Environmental Conservation  
Pesticide Control Program

DATE: September 20, 2013

TO: File

FROM: Karin Hendrickson , Pesticide Control Program Coordinator

PHONE: 376-1856

SUBJECT: Product registration approval policies for total release foggers targeting bedbugs

Under 18 AAC 90.215, the Department may refuse to register a pesticide product. In making this decision, the Department must consider threats to human health, safety, and welfare that might result from distribution, sale, or use of the pesticide.

EPA has taken risk mitigation actions in the past to improve the safety of foggers, including modifying label instructions. However, in light of the ongoing reports of incidents and the lack of efficacy against bedbugs, these products present an unacceptable risk when used to control bedbugs.

### Decision

The Pesticide Control Program will deny registration to all total release fogger products that list bed bugs in the target species or include the terms “bedbug” or “bed bug” on the product packaging.

Currently, there are only eight products registered in Alaska that meet these criteria.

**DON'T** use ultrasonic repellent devices against bed bugs or other insects.



# Efficacy of Commercially Available Ultrasonic Pest Repellent Devices to Affect Behavior of Bed Bugs (*Hemiptera: Cimicidae*)

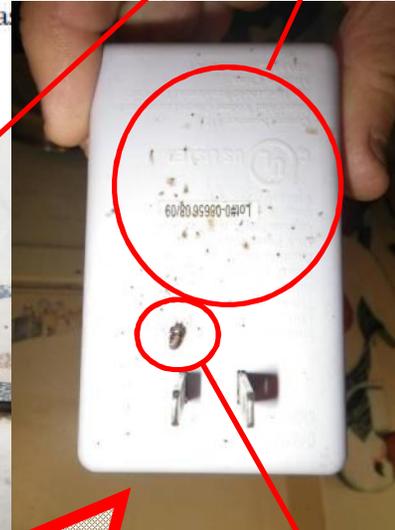
K. M. YTURRALDE<sup>1</sup> AND R. W. HOFSTETTER

School of Forestry, Northern Arizona University, 200 East

AZ 86011

J. Econ. Entomol. 100: 166-171 (2007)  
**ABSTRACT** Little is known about the behavior of bed bugs, *Cimex lectularius* L. (Hemiptera: Cimicidae), although many studies have shown that they are attracted to sound. Commercially available ultrasonic repellent devices are used on bed bugs. Female bed bugs were tested with or without sound during choice trials. However, the results of the trials showed that the ultrasonic repellent devices did not attract bed bugs. Our results confirm that ultrasonic repellent devices are not a promising tool for repelling bed bugs.

**KEY WORDS** bed bug



cockroach feces

bed bugs nearby

cockroach shed skin

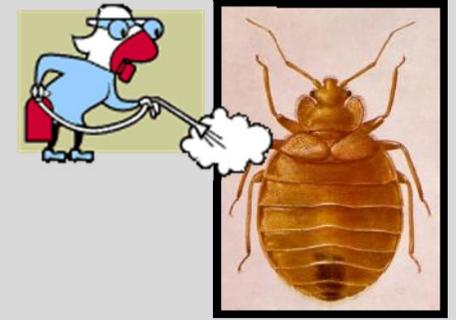
*Cimex lectularius*



**DON'T mis-apply  
insecticides.**



# Insecticides



- **DO NOT** apply insecticide sprays to
  - Human skin
  - Clothing
  - Bed linens
  - Bedding

Products containing DEET  
have not been shown to  
repel bed bugs



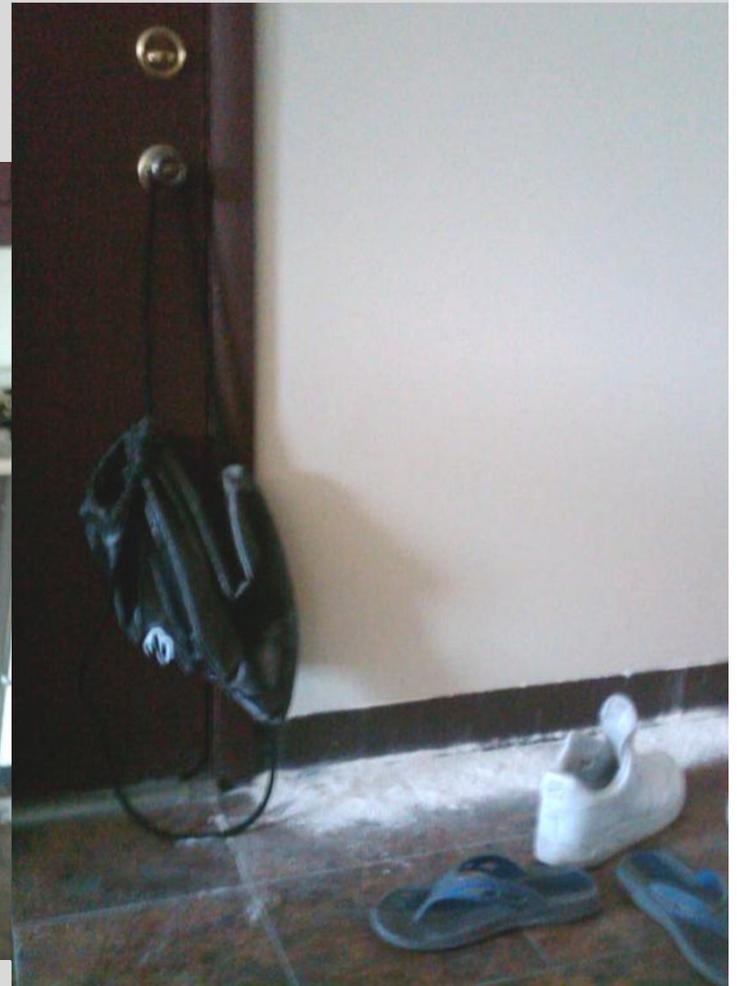
# The Labeling is the Law



## DIRECTIONS FOR USE

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

# Pesticide Misuse By Desperate Residents With Bed Bugs



Photos courtesy of Andrew Christman

# Pesticide Misuse By Desperate Residents With Bed Bugs



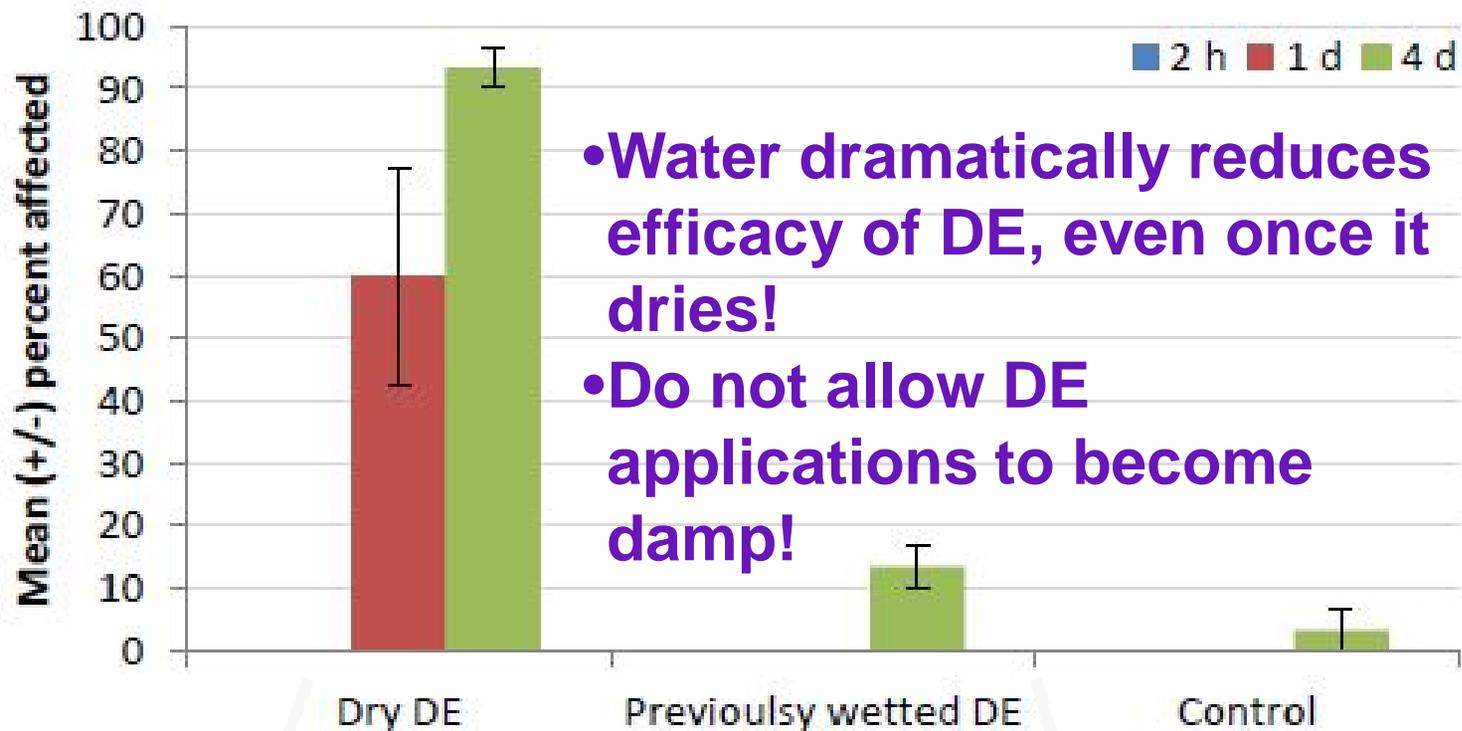
# Pesticide Misuse By Desperate Residents With Bed Bugs



# CimeXa



— OSU Research Study —  
Efficacy of Diatomaceous Earth  
Against Bed Bugs



- Water dramatically reduces efficacy of DE, even once it dries!
- Do not allow DE applications to become damp!



## ***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)**

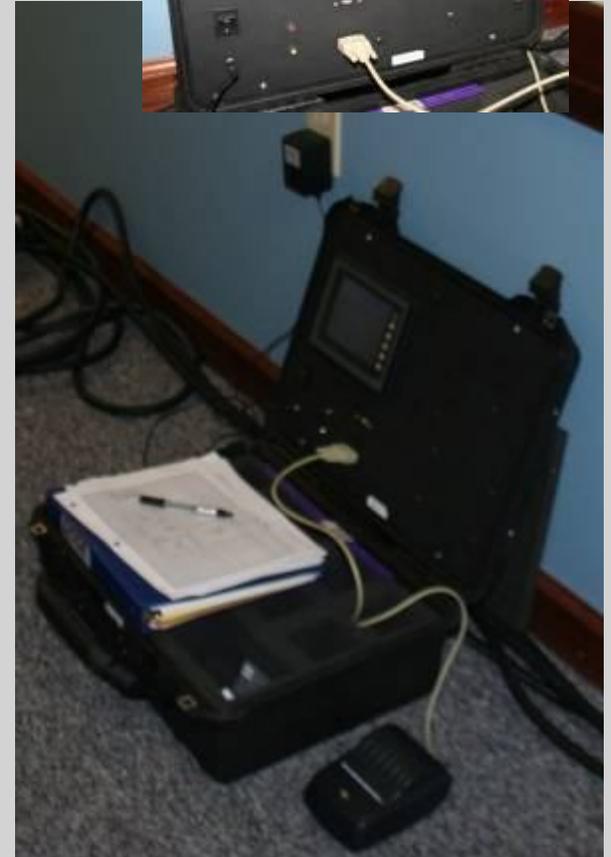


**DON'T** attempt a do-it-yourself  
heat treatment by raising the  
temperature on your home's  
thermostat.



# Professional Heat Treatment

- Typically a 6-8 hour process
- Temperature: 135°F [57.2°C]





DON'T throw away  
your bed and other  
furniture when you  
have bed bugs.



***Reasons why you should  
not dispose of furniture,  
mattresses, etc:***



- **Bed bugs will fall off the furniture as it is being moved, hence spreading the problem.**
- **Infested furniture usually can be treated.**
- **Bed bugs can quickly infest replacement furniture.**
- **Items placed in dumpsters often are picked up and reused, thereby spreading bed bugs to other households.**



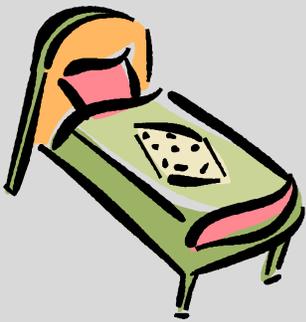
**DON'T** move from a bed-bug infested residence trying to escape the bugs.



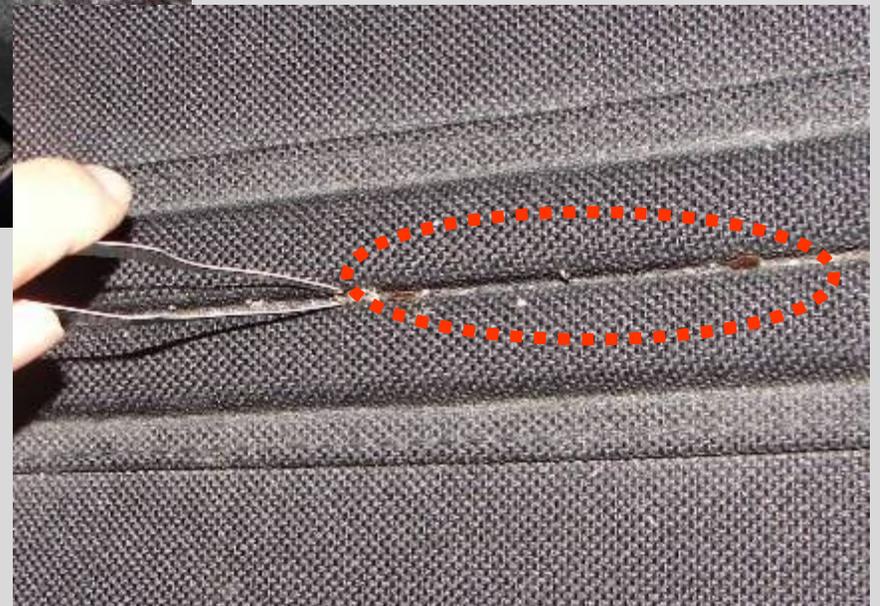
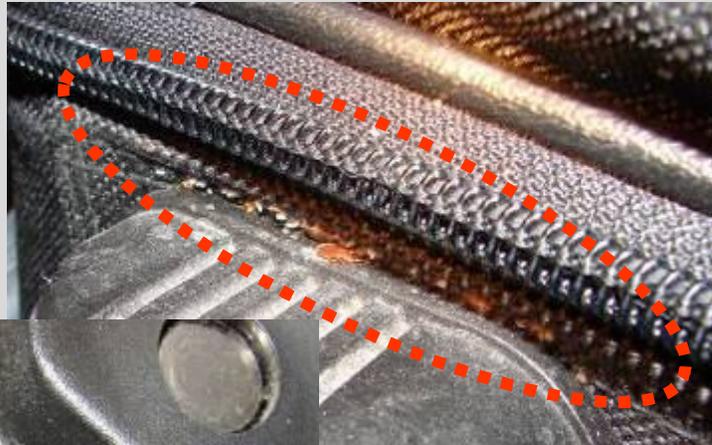
# Bed bugs are very good **hitchhikers!**

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

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



# Bed Bug Hitchhikers in Luggage





If your bedroom has bed bugs, DON'T move to another room to sleep.

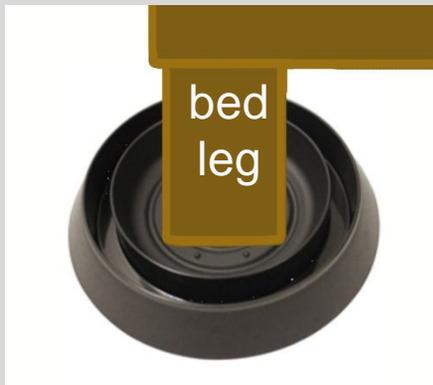


--Passive Monitoring Devices--

## Bed Bug Interceptors



**ClimbUp® Interceptor**



**BlackOut® Interceptor**

- Positioned under furniture legs
- Furniture must be kept in use—bugs are attracted to host's CO<sub>2</sub>
- 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



**DON'T** try to wait out  
bed bugs.



# Survivorship During Starvation for *Cimex lectularius* L.

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**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>



**DON'T** use the presence  
of red, itchy bites as  
confirmation of bed bugs.



# Bed Bug Bites (Cimicosis)

Wide range of skin lesions (with or without itching [pruritus]):



- Small macular spots
  - flat spots with surface color (<5 or 10 mm dia)



- Papules
  - solid skin elevations (<5 or 10 mm dia)

- Plaques
  - a broad papule or confluence of papules ( $\geq 1$  cm)



- Prominent wheals
  - rounded or flattened pale red papules or plaques that disappear within 24-48 hours
- Bullae (fluid-filled blisters)

If you wake up with itchy, red welts that weren't there when you went to bed, *perhaps* its bed bugs.



- Diagnosis of a bed bug bite is speculative.
- Confirmation is based on bed bug evidence.
- Resemble bites from other insects/arthropods
- Typically no red puncture spot at the center (such as with fleas and black flies)
- Rarely occur on the palms or soles (such as with scabies mites)
- ...



DON'T believe everything  
that you read on the  
internet about bed bugs.



## **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) Exempt Minimum Risk Natural Products

Must meet five conditions, including:

**Condition 4:** The label cannot include any false or misleading statements, and claims that minimum risk pesticides protect human or public health are prohibited.

## 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.**

# Potential of Essential Oil-Based Pesticides and Detergents for Bed Bug Control

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J. Econ. Entomol. 107(6): 000–000 (2014); DOI: <http://dx.doi.org/10.1603/EC14328>

**ABSTRACT** The bed bug, (*Cimex lectularius* L.), is a difficult pest to control. Prevalence of insecticide resistance among bed bug populations and concerns over human-insecticide exposure has stimulated the development of alternative bed bug control materials. Many essential oil-based pesticides and detergent insecticides targeting bed bugs have been developed in recent years. We evaluated the efficacy of nine essential oil-based products and two detergents using direct spray and residual contact bioassays in the laboratory. Two conventional insecticides, Temprid SC (imidacloprid and  $\beta$ -cyfluthrin) and Demand CS ( $\lambda$ -cyhalothrin), were used for comparison. Among the 11 non-synthetic insecticides tested, only EcoRaider (1% geraniol, 1% cedar extract, and 2% sodium lauryl sulfate) and Bed Bug Patrol (0.003% clove oil, 1% peppermint oil, and 1.3% sodium lauryl sulfate) caused >90% mortality of nymphs in direct spray and forced exposure residual assays. However, the efficacy of EcoRaider and Bed Bug Patrol was significantly lower than that of Temprid SC and Demand CS in choice exposure residual bioassay. Direct spray of EcoRaider caused 87% egg mortality, whereas the other nonsynthetic insecticides had little effect on bed bug eggs. EcoRaider and Bed Bug Patrol did not exhibit detectable repellency against bed bugs in the presence of a carbon dioxide source. These findings suggest that EcoRaider and Bed Bug Patrol are potentially useful pesticides for controlling bed bug infestations, but further testing in naturally infested environments is needed.

# www.centralohiobedbugs.org

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# INTEGRATED PEST MANAGEMENT (IPM) PROCEDURES :



Correctly identify the pest

+



Conduct a thorough inspection

+

Use sanitation measures

+

Use non-chemical measures

+

Apply insecticides to targeted sites

# Thank You!



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

