



USDA United States Department of Agriculture National Institute of Food and Agriculture

THE IPM TOOLBOX

Northeastern IPM Center STOP Pests in housing

Reducing Pest Infestations in Multifamily Housing: Research Updates on Mice and Cockroaches

May 6, 2021

1

Webinar Details

- Welcome
- A recording of this webinar will be available within a week at <http://www.neipmc.org/go/ipmtoolbox>
- If you are from the state of Maine and seeking pesticide applicator credits, email Susannah at sck27@cornell.edu, with your name and license number
- Visit <http://stoppests.org/go/IPMupdate> for a certificate of completion and pdf of the slides.

2

We Welcome Your Questions

- Please submit a question **at any time** using the Q&A feature to your right at any time
- If you'd like to ask a question anonymously, please indicate that at the beginning of your query.

3



4



5

**CONTROLLING COCKROACH
INFESTATIONS IN APARTMENT
BUILDINGS**

Changlu Wang, PhD, Rutgers University

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Importance of Cockroach IPM

- Prevalence of pests in homes
 - Cockroaches- 37%, mice- 16%, bed bugs- 9%
- Among the cockroach infestations
 - 98% are German cockroach
 - 2% are American cockroach and Oriental cockroach



German cockroach

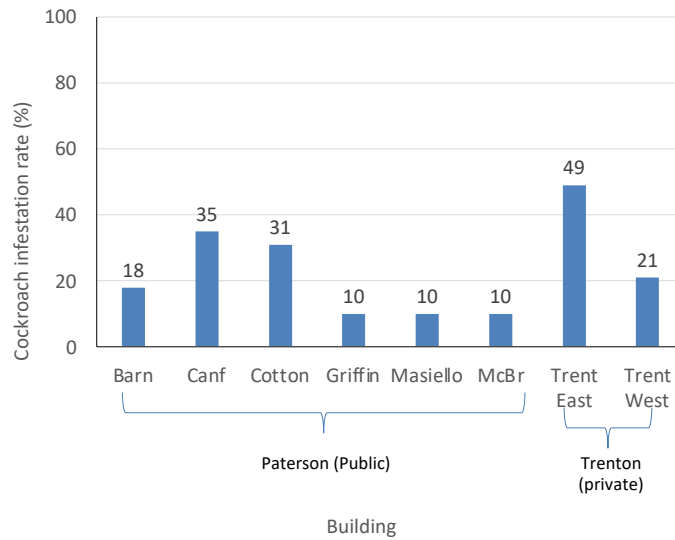


American cockroach



Oriental cockroach

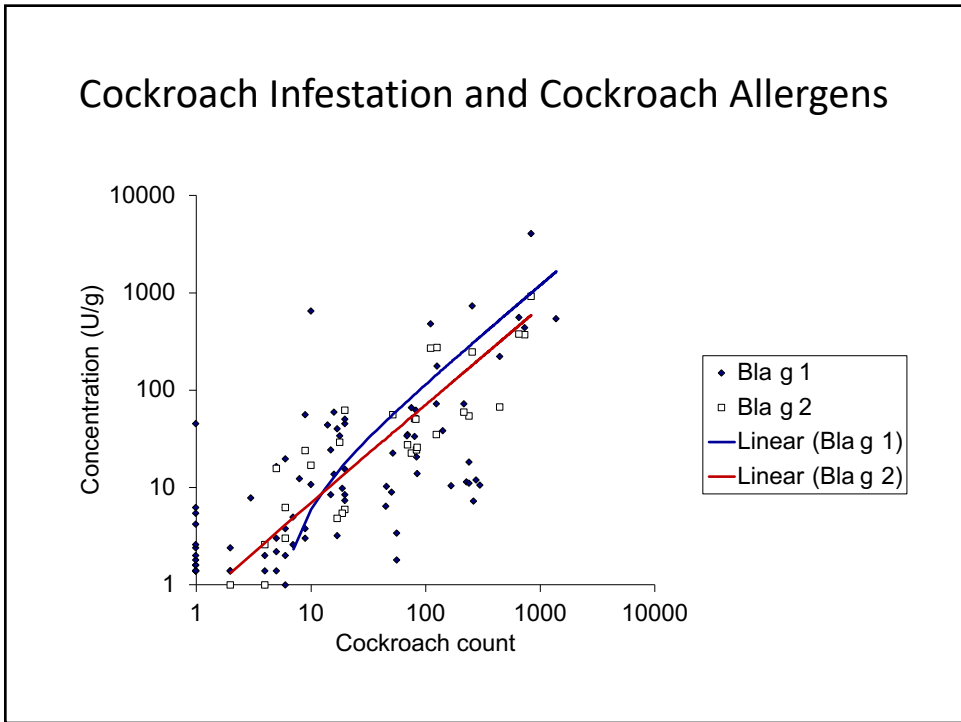
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10



**Insecticides and
pest repeller
found in
apartments**

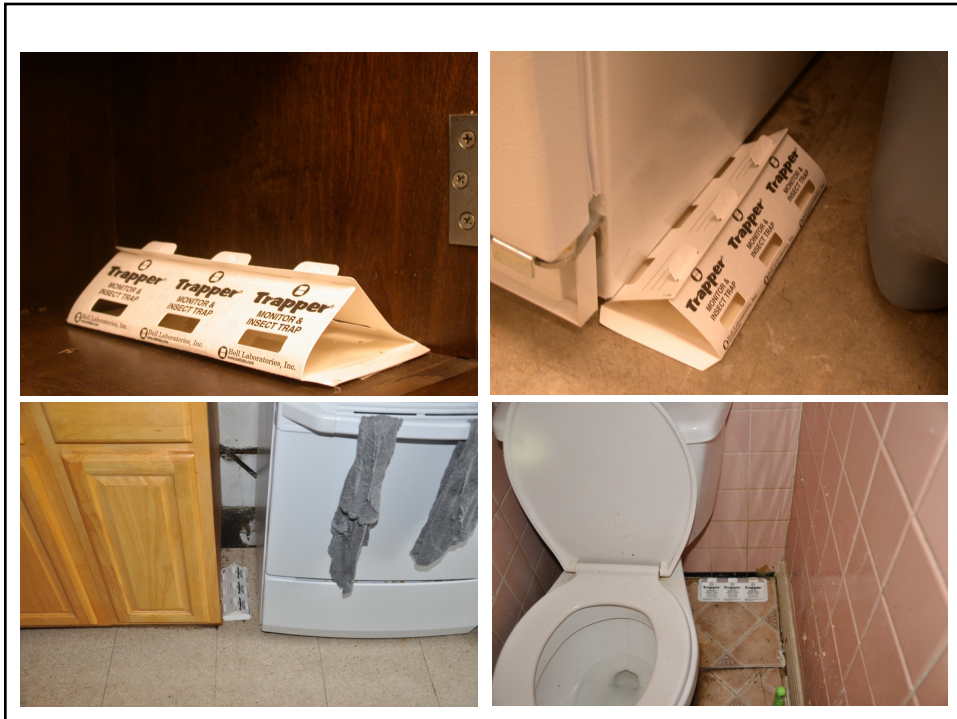
11

Non-chemical Control Methods

- Sanitation
 - Remove food and water sources
- Decluttering
- Vacuuming
- Trapping



12



13

Inorganic Insecticides

- Boric acid
 - a stomach poison



14

Commonly Used Insecticides by Consumers

- Aerosol spray
- Foggers
 - Hot Shot No-Mess Fogger2 with Odor Neutralizer
 - Hot Shot No-Mess Fogger3 with Odor Neutralizer
 - Raid Max Concentrated Deep Reach Fogger
 - Raid Fumigator



Devries et al. 2019. BMC Public Health

15

Results:

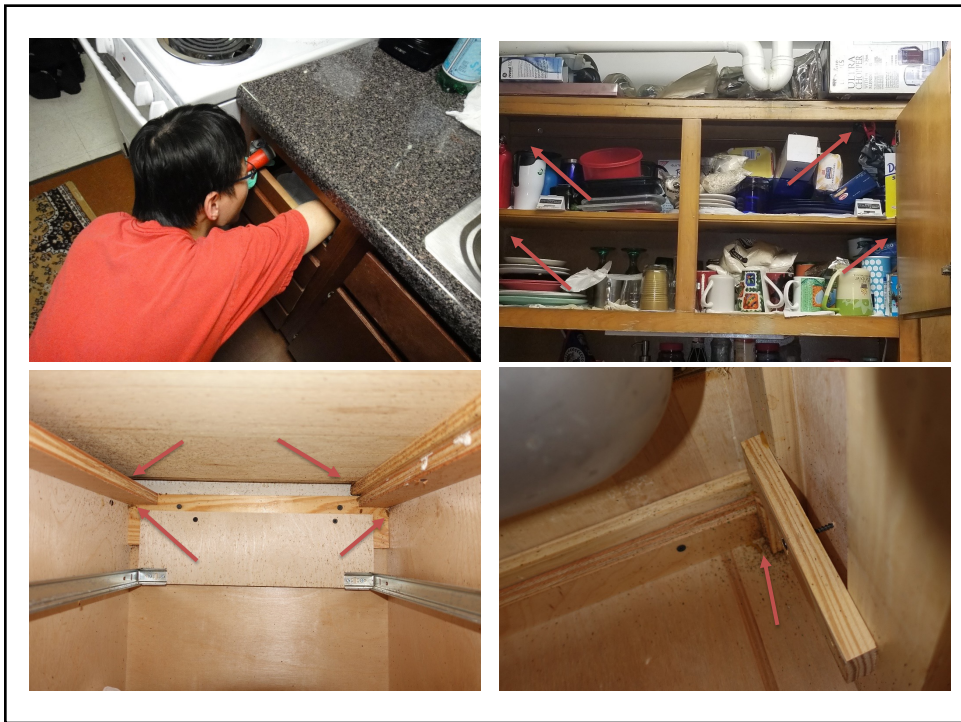
- TRFs failed to reduce cockroach populations, whereas gel baits caused significant declines in the cockroach populations
- Use of TRFs resulted in significant pesticide deposits throughout the kitchen

Devries et al. 2019. BMC Public Health

16



17



18



19

Insecticide Resistance Management

- Rotate chemicals with different mode of action (not different brands)
 - Different gel baits: fipronil, indoxacarb, dinotefuran
- Use a combination of different control methods
 - Boric acid, gel bait, insect growth regulator
- Use integrated pest management (IPM)

20

Integrated Pest Management (IPM)

Education

- Keep clean, avoid using sprays

Monitoring cockroaches using glue boards

Use effective materials (baits, boric acid dust, etc.)

Evaluation

21



Questions



German cockroach



American cockroach



Oriental cockroach



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22

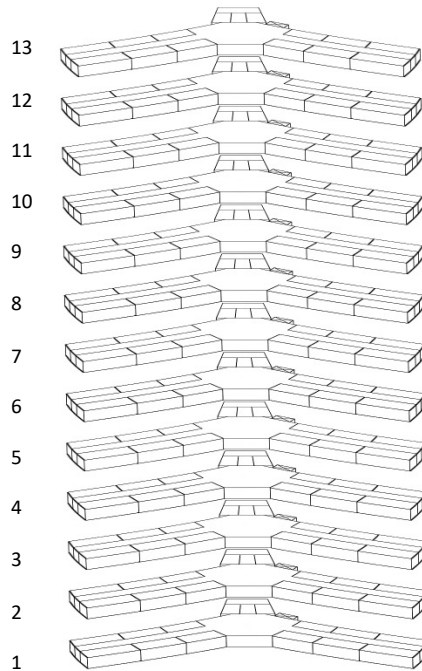


A Cockroach IPM Program (2016-2017)

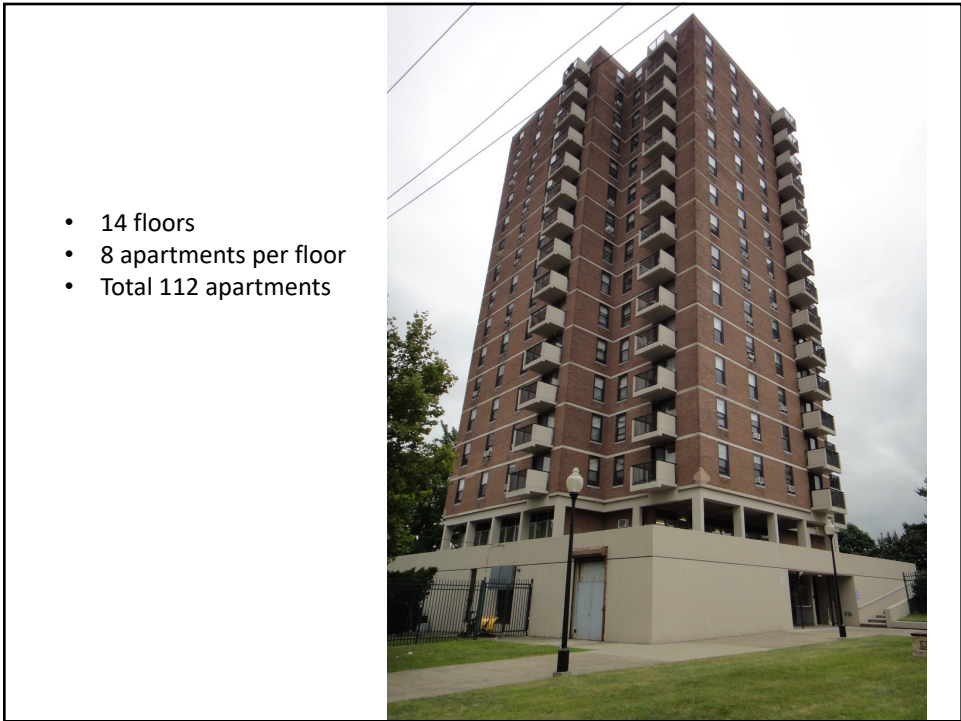
- Paterson, New Jersey
- Evaluate the effectiveness of a building-wide cockroach IPM program

23

- 13 floors
- 15 apartments per floor
- Total 188 apartments



24

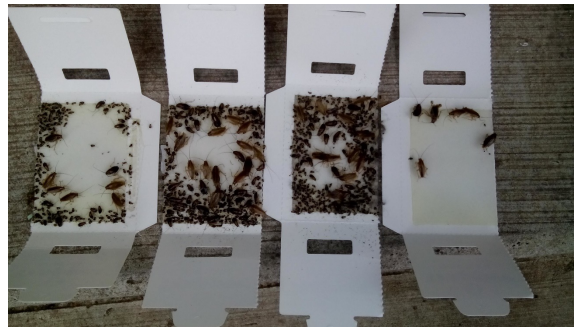


25



26




- Traps were examined after 2 weeks
 - Median trap count 11, range: 1-484
 - 49% of the apartments were infested

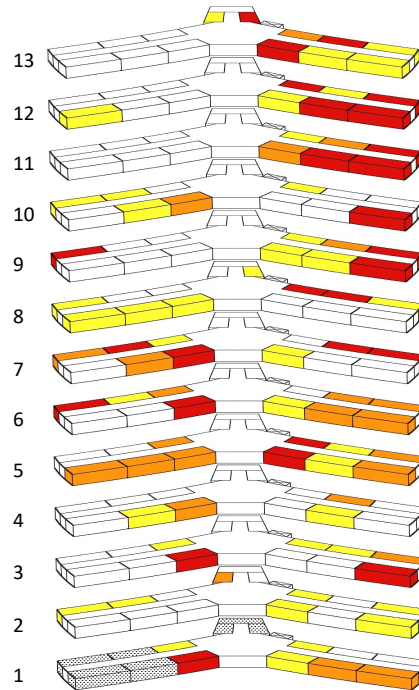


Under sink stove refrigerator toilet

27

Spatial distribution of German cockroach infestations

-  > 50 cockroaches
-  10-50 cockroaches
-  < 10 cockroaches



28

Initial Treatment

- Average of 16 g bait/apartment
- 6 g boric acid dust per apartment for those with more than 20 cockroaches



29

Educating Residents

- One page flyer
- Ask residents to keep the apartments clean, do not use sprays

30

Treating Common Areas

- Compactor room
 - Advion, Alpine, boric acid dust, Transport GHP
- Laundry room
 - Advion, Alpine
- Boiler room
 - Advion, boric acid dust
- Community room kitchen
 - Advion

31

Garbage disposal room



Fly pupae at corner of the floor



32

Bait Rotation

Period of use	Product name
0-15 week	Advion® Cockroach Gel Bait
17-22 week	Alpine® Cockroach Gel Bait
24-28 week	Maxforce FC Select Gel Bait
32-38 week	Avert® Dry Flowable Cockroach Bait

33

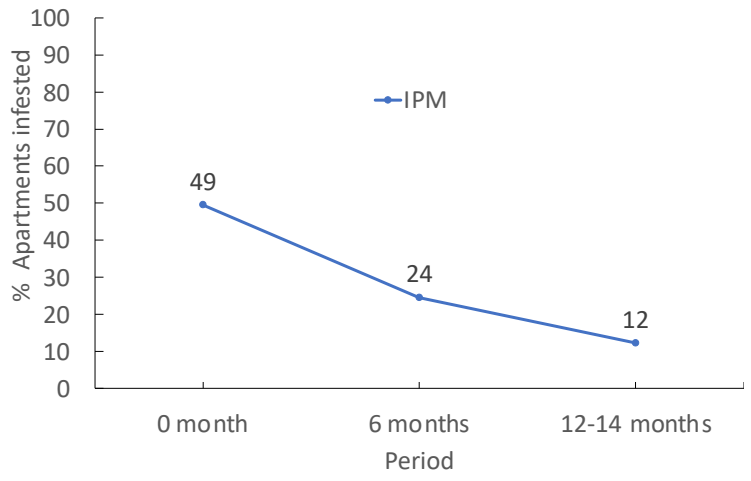
Bait Usage in Relation with Cockroach Population Level

Infestation Level	Average amount of bait used per apartments before elimination (g)	Mean number of treatments before elimination
Low 1-9	12	2
Medium 10-50	20	3
High > 50	53	6

Trap count is based on total of 4 traps per apartment and **14 days placement**

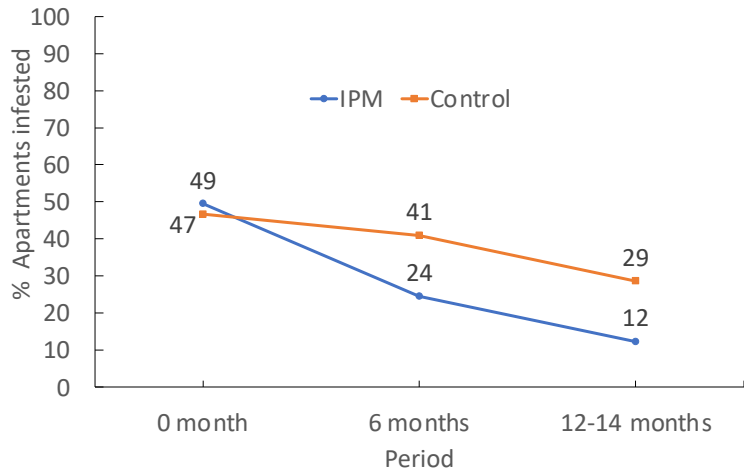
34

Comparison of IPM and conventional cockroach management programs



35

Comparison of IPM and conventional cockroach management programs

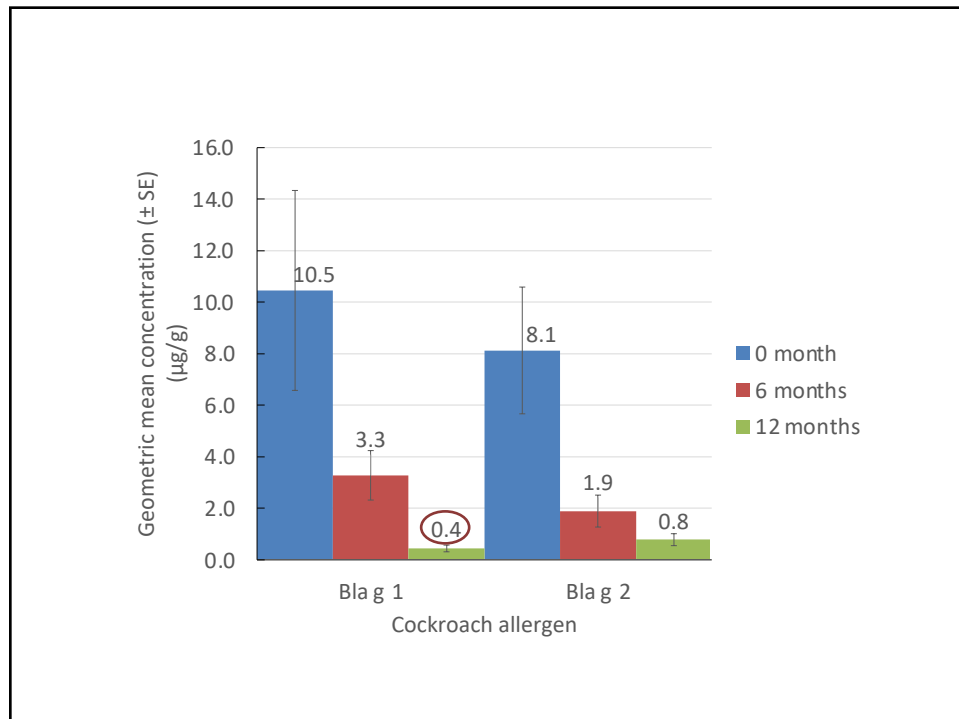


36

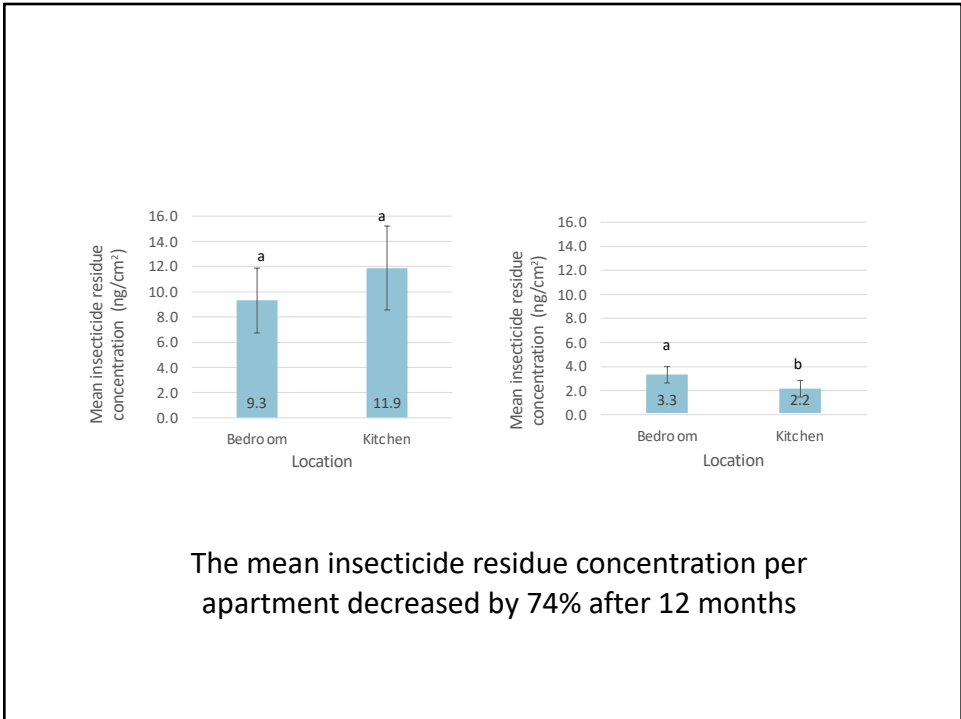
Resident Awareness of Cockroaches

- At 6-month, 54% of resident were unaware of the presence of cockroaches while their apartments were infested with cockroaches
- At 12-month, 88% were unaware of presence of cockroaches

37



38



39




MEDICAL ENTOMOLOGY

Cost and Effectiveness of Community-Wide Integrated Pest Management for German Cockroach, Cockroach Allergen, and Insecticide Use Reduction in Low-Income Housing

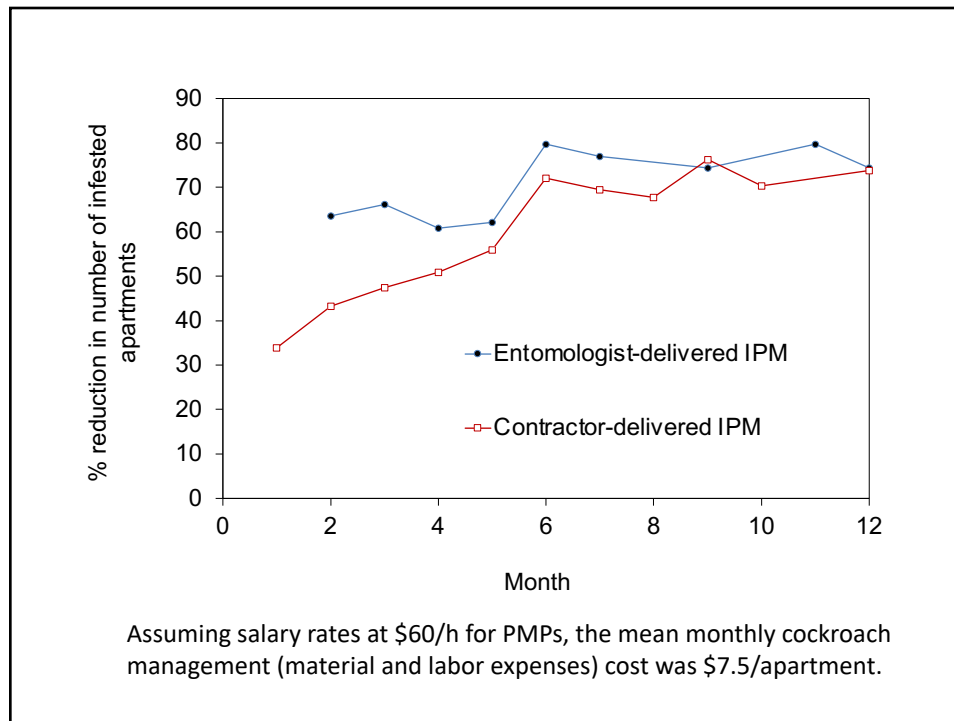
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Center for Urban and Industrial Pest Management, Department of Entomology, Purdue University, West Lafayette, IN 47907

J. Econ. Entomol. 102(4): 1614-1623 (2009)



40



41

Summary

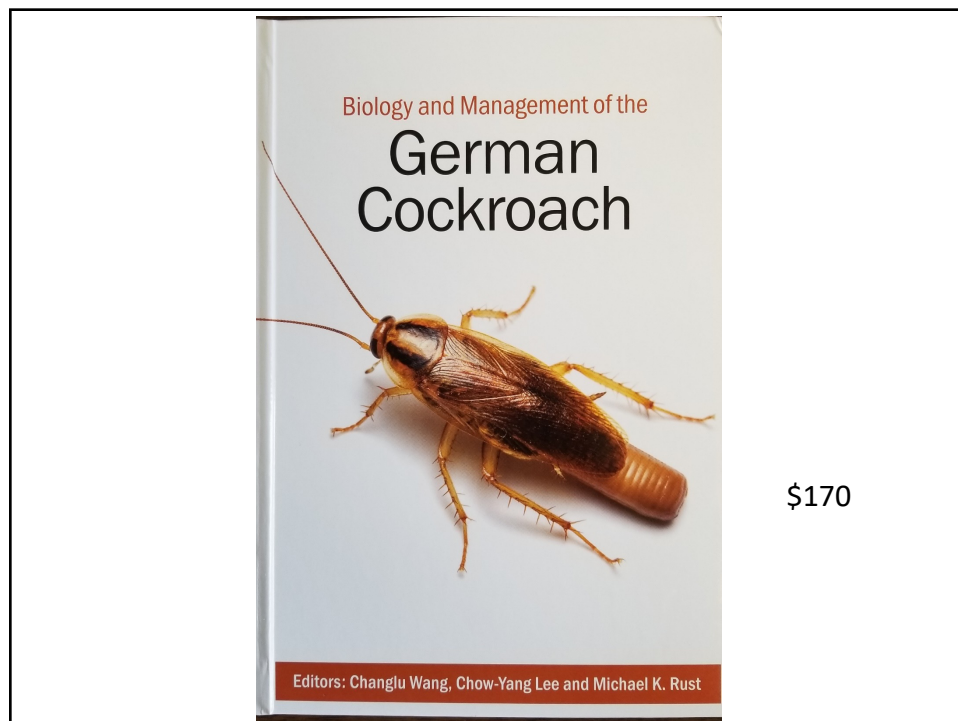
- IPM (Education + baits + traps) are highly effective in eliminating cockroach infestations
 - Thorough placement of bait and spending sufficient time based on infestation level is key to success in cockroach elimination

42

Summary (continued)

- Low cost cursory monthly service is not very effective in reducing infestation rates
 - Commit the necessary labor and materials to eliminate every infestation that is identified
- Building-wide monitoring using traps
- Elimination of infestations can still be achieved even with limited client cooperation

43



44

Thank you!

Contact:
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45

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Questions



German cockroach



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46

House Mouse Behavior and Management in Multifamily Settings

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47

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Background: The Deme

- **Deme:** tight social network and can exist within a size as small as 2 m
 - Behaviors based on social position within the deme
- **Dynamic Nest:** constant movement through exploratory scouts (15-30 m)
 - Nest expansion due to high fecundity of females
 - Nest budding driving by nomadic scouts creating their own nesting sites 30 m out
- **Mass Casualty:** expansion continues based on carrying capacity (K) resources
 - Ultimately, once K is exceeded, mass illness will diminish populations
 - However, human driver resources often keep K very high



48

Part 1 Objectives: Monitoring and Treatment

- Are residents' complaints a reliable indicator of infestations?
- Compare effectiveness of non-toxic food baits for detection
- Do mice visit specific "in-apartment" bait placement locations more often?
- What aspects of IPM have long term effects

49

Part 1 Materials and Methods

1. Building-wide Evaluation & Interviews (Trenton=246 and Linden=200)
 - a. Conduct resident questionnaire/interview
 - b. Install 2 monitors with blank baits (10.5 g) & chocolate (~1g dabs)
 - c. Return 1 week to determine presence / absence

Address	Unit	Apartment	Occupancy	Infestation	Comments
200	A1H	1000sq	Occupied	4.2	Y
200	↓	1000sq	Occupied	4.2	Y Y
200	A2H	1000sq	Occupied	0.5	Y Y
200	↓	1000sq	Occupied	0.5	Y Y
200	A3H	1000sq	Occupied	3.7	Y Y Y
200	↓	1000sq	Occupied	3.7	Y Y Y
200	A4H	1000sq	Occupied	0.5	Y
200	↓	1000sq	Occupied	0.5	Y
200	A5H	1000sq	Occupied	0.5	Y
200	↓	1000sq	Occupied	0.5	Y
200	A6H	1000sq	Occupied	10.0	Y Y
200	↓	1000sq	Occupied	10.0	Y Y



50

Part 1 Materials and Methods

2. Treatment: Start Week 4 (Trenton=19 and Linden=49 apartments)
 - a. Install 3 bait stations with rodenticide in apartments with activity
 - b. Return to service weeks 4 times (weeks 6, 7, 9, 11); weighed and replaced



51

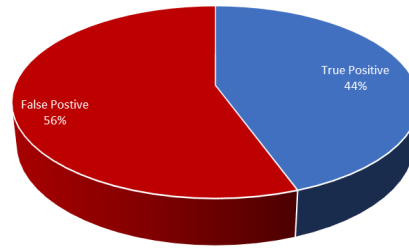
Part 1 Materials and Methods

3. Install 2 monitors with blank baits on week 11
 - a. Return the following week to evaluate treatment effectiveness
4. Repeat building wide inspections on months 6 and 12
 - a. Follow same process and protocols for initial inspection
 - b. Determine if IPM treatments had a long term effect

52

Part 1 Results: Residents' Complaints

- Of 18 apartments with residents that thought they had mice,
 - 56% did not have mice
- Among 19 apartments with mice
 - Only 42% were aware of it

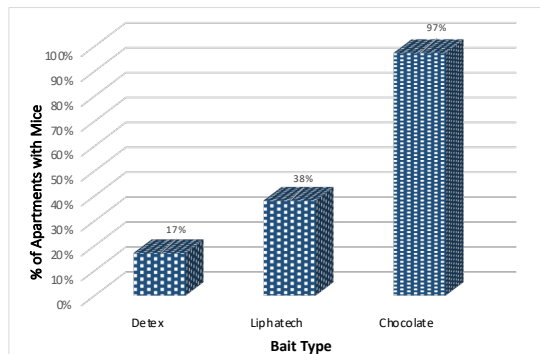


Proportion of observed activities confirmed or not by feeding activity

53

Part 1 Results: Effectiveness of Non-Toxic Baits

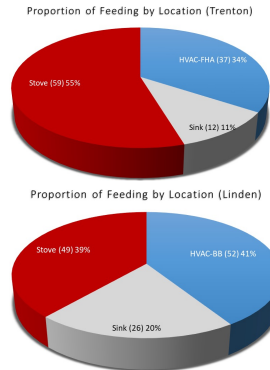
- Chocolate spread was fed upon more often than commercial baits
 - 69.5% of the feeding occurrences had only chocolate spread consumption
- Liphatech was consumed more than Detex soft bait



54

Part 1 Results: Location Effect

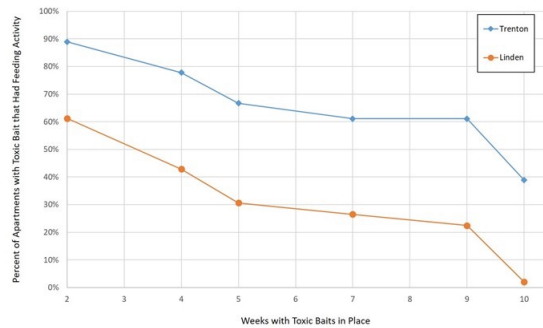
- Location preference was found among 3 locations
- However, this was different based on building construction
 - Trenton: Stove
 - Linden: HVAC & Stove



55

Part 1 Results: Impacts of IPM Treatments

- During the weeks the IPM was in place, there was a reduction in infestations



56

Part 1 Results: Effect of Sanitation/Clutter

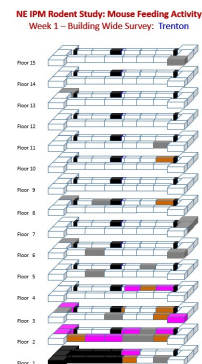
- Individual apartment sanitation and clutter did not impact mouse activity during treatments
 - Separate or combined



57

Part 1 Results: Impacts of IPM Treatments

- Lower 3 floors were more likely to have feeding activity
- Exclusion has a significant impact
 - Building wide aspect



58

Part 1 Conclusions

1. Are residents' complaints a reliable indicator of infestations?
 - Resident complaints are not a reliable way to identify activity
 - Building wide monitoring should be implemented
2. Comparative effectiveness of non-toxic food baits for detection
 - Chocolate Spread > Liphatech > Detex (soft)
 - Bait preference is very complex, based on pheromones, behavior and genetics
 - Bait preference is also not stable; alternatives should be investigated

59

Part 1 Conclusions

3. Mice may occur more often in certain locations in an apartment
 - Understanding building construction for within-envelop navigation is important
 - Based on runway routes
4. Building wide exclusion is important for long term management
 - Building wide aspects are more important than individual resident conditions
 - Outer envelope exclusion is of primary importance

60

Thank you!

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Rutgers Entomology, Urban IPM Laboratory

61

Questions



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62

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News You Can Use

April 7, 2021 **Reducing Pest Infestations in Multifamily Housing** Join the Northeastern IPM Center's StopPests in Housing Program on May 6th, 2021 from 2 p.m. to 3 p.m. Eastern for a webinar on using integrated pest management (IPM) strategies to manage two of the most troublesome and notorious pests of multifamily housing: cockroaches and mice.
More blog entries here.

New resources! IPM guides for property managers on cockroaches and bed bugs ([HERE](#)) and picture-based guides for residents on cockroaches, rodents, and bed bugs ([HERE](#)).

Looking for training on rodents? Find resources and recorded rodent webinars [HERE](#), including [Developing a Pest Exclusion Program for Cockroaches and Rodents](#) and [Tools for Eliminating Mice from Multifamily Housing](#). Find more training opportunities [HERE](#).

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63

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64

Recording

- Past recordings and today's webinar will be available to view **on demand** in a few business days.
- <http://www.neipmc.org/go/ipmtoolbox>
- You can watch as often as you like.

65

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66