

**Are you paying for  
Cockroach Control  
or just Pesticide  
Application? -  
A Case for  
Assessment-Based  
Pest Management  
(APM).**

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# Origin of Integrated Pest Management (IPM)

Texas A&M University

1950s discussion of overdependence on pesticides after WWII which led to insecticide resistance among pest populations and reductions in natural enemies.

1960s Rachel Carson publishes *Silent Spring* and the public is alerted to the problems with pesticides

1970s producers began organized application of IPM as an economically, and environmentally sound practice of *pesticide resistance management*.

# Applied IPM: A series of steps

- 1. Scouting the crop to identify any pests **assess** the pest pressure
- 2. Based on experience or pest information the **Economic Injury Level (EIL)** is determined
- 3. If scouting (assessment) determines that the **Economic Threshold Level (ETL)** is reached, a decision is made on what remediation measures make economic sense to apply
- 4. May scout again after treatment to if pests are now at a “*manageable*” level

# 1980s IPM was “pasted” onto the Urban Environment

- No EIL or ETL so what is a “*manageable level*” of bed bugs according to your mother?
- Do we even know what the pest level is?
- Does an apartment manager know what the IPM process looks like?
- Does the peach tree farmer ask the peaches to help him/her in the pest management process?





# Urban IPM



- Some organizations have an interest in IPM, but have little knowledge of what it actually involves.
- Humans are unwilling to tolerate even one bed bug, but still want the least expensive treatment.
- Feelings about pesticide use in the home is extremely variable.
- **Scouting or assessment is completely lost.**



Urban “IPM” has morphed into a belief that it is a low toxicity or non-toxic (to humans) pest control procedure that is carried out by the PCO.

Do apartment managers care about IPM?

“Not their money...not their home....the residents’ fault....”

# Integrated Pest Management (IPM) in HUD Contracts

- Quote from a Virginia US HUD contract: “Pesticides: HA **requires an integrated pest management** approach to pest control and *environmentally friendly pest control methods which are not toxic to humans.*”
- Suggested Products 2018:
  - “Caramates” (sic)
  - “Organic phosphates” (sic)
  - Both banned for indoor use since 1996



# Assessment is the Basis of IPM but...

- **No **assessment** of building infestation levels**
  - Managers have NO IDEA their units are so infested, they never look- for years
- **Consumers do not know what IPM is**
- **Maintain a belief that some product can eliminate cockroaches overnight**
- **Long-term pest issues easily blamed on the resident (instead of resistance to spray formulation insecticides)**
- **No one asks for records to indicating fewer cockroaches after treatment than before**



# Resistance is not Immunity!

## Multiple Types of Resistance

- **Three types of Resistance:**
  1. Reduced cuticular penetration
  2. Enhanced Mixed Function Oxidase (MFO) Activity
  3. *KDR* or Knockdown resistance
- German cockroaches in housing facilities are known to have all 3 types.



# The path to APM?: Sponsored Research (baits)

Major resistance to spray formulation insecticides; no resident clean-up





# Cockroach Populations Flourishing under the Current Pest Contract





**Populations have been there for  
a long time...**













# Sanitation at the Site







# Assessment-Based Pest Management

- Pre-trapping apartments
- Placed three sticky traps in each unit for 24 hours
  - Above the sink
  - Below the sink
  - Behind the toilet
- Returned the next day to pick up the traps and count the cockroaches
- *This is how we know that one apartment unit is more infested than another.*



# How Many Cockroaches?



# Baiting Protocol

- All units received 30 g of bait on Day 1
- On Day 14 units trap catch was evaluated for each unit and bait was applied according to infestation level
  - Trap catch  $>500$  received 60 g
  - Trap catch  $>100$  received 30 g
  - Trap catch 50-100 received 15 g
  - Trap catch  $< 50$  received 7.5 g
  - Trap catch  $<10$  receive 0 g



# How do we get all of this bait (30g) out?



¼ dime size applications will takes time.

**Time = Money**

Break even cost is \$1.00 - 1.50/minute

**Time constraints keep technician from applying enough bait!!!**

Here is a ¼ dime size application...How do you apply 30 grams and not take all day?



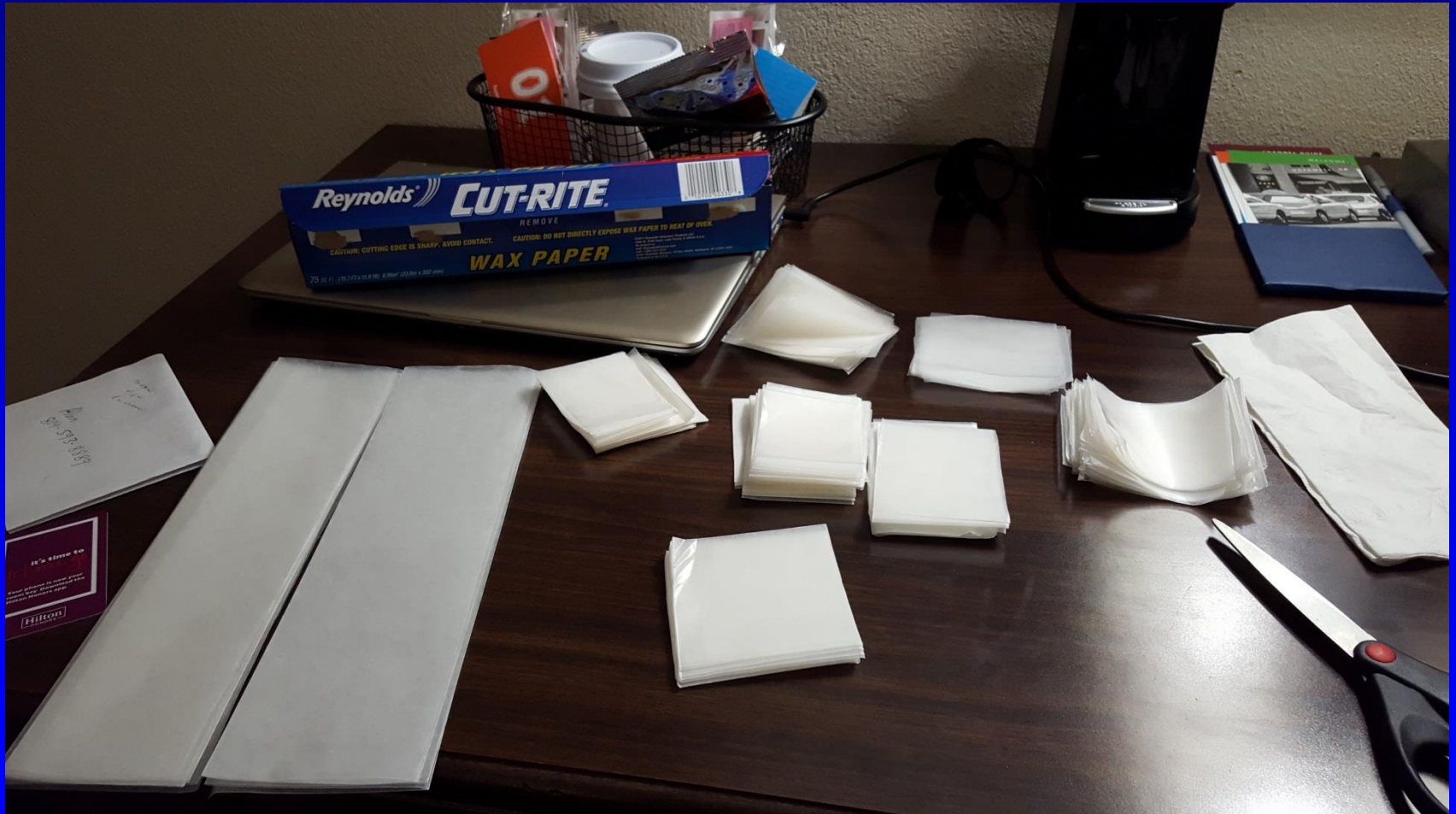
# Applying 30 g of Bait Quickly



# This is wax paper!



# Cut into Squares





# Marked our bait tubes...



# The Bait Taco







**Cockroaches really liked these baits in wax paper!**





# Resident clean-up was not necessary!



# These Populations Can Be Controlled...

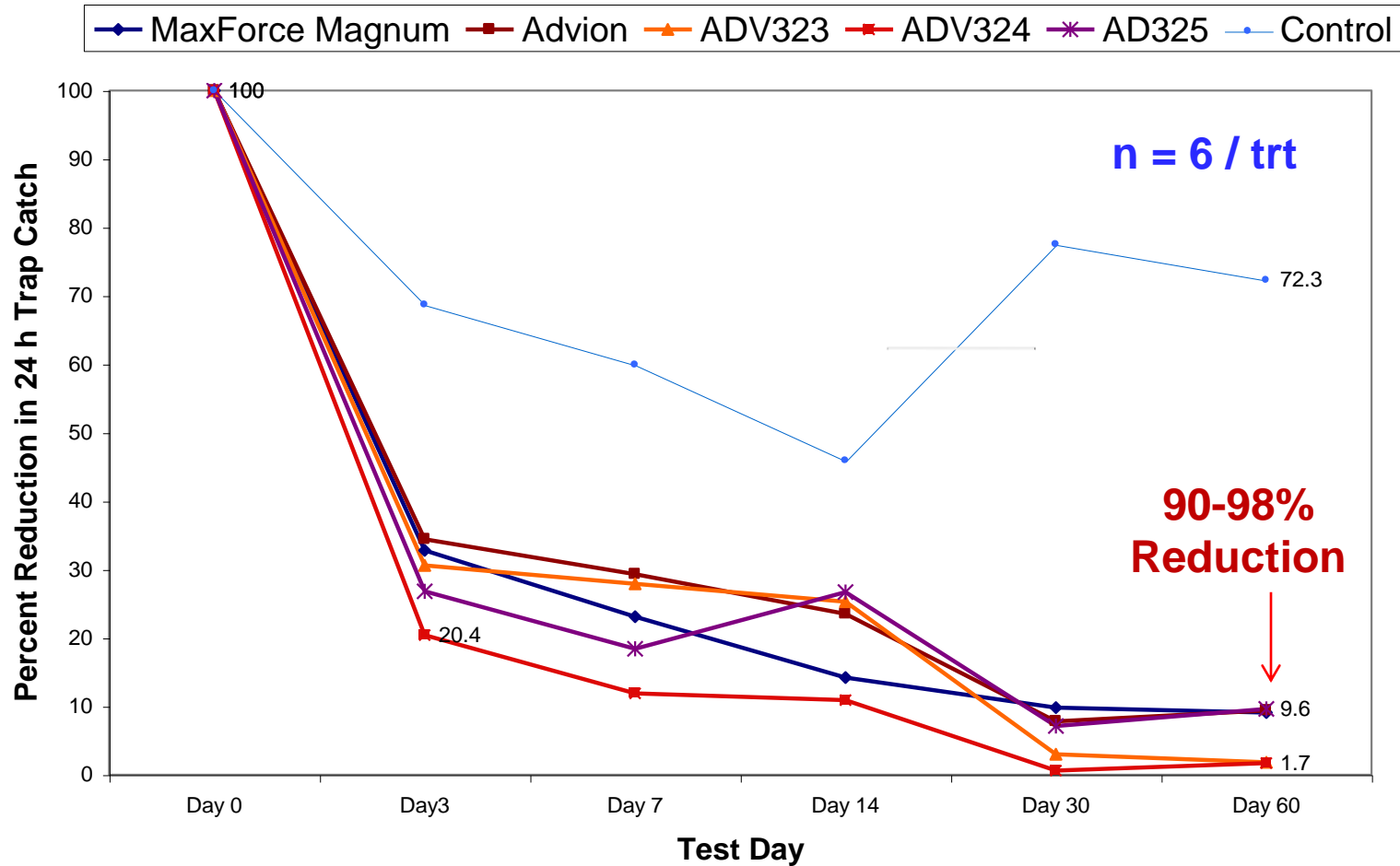
- **Advion-**
  - Indoxacarb 0.6%
- **MaxForce Magnum**
  - Fipronil 0.05%
- **Alpine**
  - Dinotefuran 0.5%
- **Vendetta**
  - Abamectin b1 0.05%





# Typical Results

## German Cockroach Bait Efficacy



# Bait in Wax Paper

- Presented this method at many pest management, scientific, and housing meetings all over the world.
- US HUD took notice and asked me to write pest model pest management contract language for their facilities

nypmp.net/2015/06/16/added-value-leave-the-bait-gun-take-the-cannoli

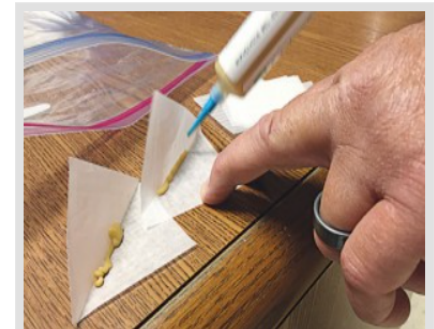
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## Added Value: Leave the Bait Gun, Take the Cannoli

By Ray Johnson | June 16, 2015

Conventional wisdom says we're never too old to learn new tricks of the trade. Well, this past January at the Smoky Mountain Conference in Pigeon Forge, Tenn., I learned a few new tricks from a great lineup of talented speakers.

One of them was my friend [Dr. Dini Miller](#) from Virginia Tech. Dini had attended the conference many times before and always presented cutting-edge research and useful tips about controlling cockroaches, bed bugs and other pesky critters. Her team of research assistants study these pests and work hard to control them in government housing units and other locations that involve real-life, down-and-dirty experiences. If you haven't heard her speak at PestWorld or other conferences, you've missed out on one of the best our industry offers.



Your use of bait will go farther with this tip because there's a good chance you've been overapplying them. Photo: Ray Johnson

Let me introduce you to the Cockroach Cannoli, which came from Dini's practical knowledge gleaned from many years of experience fighting cockroaches. This tip is the best I can share with you about the service aspect of our industry this year.

How many times have you seen a crack or crevice filled with insect bait like caulking? The bait was most likely applied years ago — hopefully, not by your company —but it will be there indefinitely. Even with our best training, technicians sometimes think more equals better.

So, here's the tip: Take a sheet of wax paper and cut it into several 3-in. squares. Apply your bait in a straight line diagonally across, and fold it up like a cannoli (or taco, if you're not into pastries). Place it where the pests will have access to eat all they want. You are actually doing them a favor by giving them a much cleaner environment in which to



# Proposal to Work at 3 Sites

- Considerable cockroach issues
- Three contracts
- Three prices
- Three treatment protocols



# Overnight-Trapping Assessment (60 units each site)





# Inspection revealed large numbers of German cockroaches (under contract why so many?)





# Lowest “Responsible” Bidder

- Budgets are often submitted a year in advance so previous years’ bid determines this year’s bid request.
- The term “responsible” is interpreted by management as meaning a licensed business with certified pesticide applicators on staff.
- However, “Responsible” is meant to allow flexibility, and is to be defined by management.
  - *Must provide management with initial pest assessment*
  - *Must provide pest reduction documentation*
- *Managers do not know this!*

# Managers thinks they are paying for product! But they need to pay for technician time!

- Sprays are used because they are cheap!
  - \$30/20gal-128 oz in a gallon
  - 11 oz/unit (\$0.03 - 0.12/unit)
- **They think the answer is in the spray. They give no credit to the technician!**
- They know nothing about resistance and think that insects must be sprayed!
- Sick (sprayed) cockroaches will not eat bait, and most recover from spray.



**But who gets the blame?**





1538  
Coalter C

PESTICIDE FREE MONITOR



# Sanitation in the Kitchen





# Other Sanitation Issues?





# Resident Doing Their Own Pest Control



# Working with great people to Select Test Units



Richmond RHA - Mosby Ct. Date: 7/10-7/11 Test Day: 0

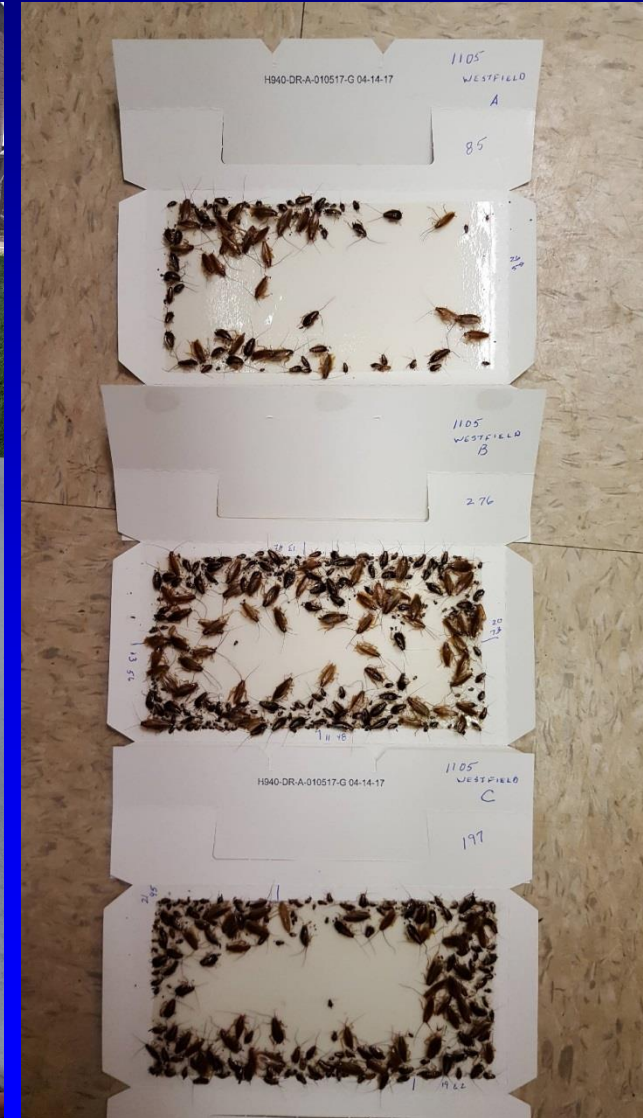
Unit #	Street	A	B	C	Total	Bit Applied:
1542	Coalter	3	4	3		✓ 7.5g
1540	Coalter	282	254	270		✓ 30g
1538	Coalter	100	275	359		✓ 30g
1532	Coalter	0	2	1		✓ <del>30g</del> X C new conv
1518	Coalter	99	0	5		✓ <del>7.5g</del> M 15g
1514	Coalter	21	151	68		✓ <del>30g</del> M 15g ✓
1512	Coalter	3	133	7		✓ M 15g
1504	Coalter	2	48	0		✓ 7.5g
1402	Coalter	0	1	0		✓ c
1907	R	19	38	1		✓ <del>7.5g</del> 7.5g L
1979	Redd	0	0	5		✓ 7.5g (control new)
1975	Redd	0	0	0		0 ✓ c
1951	Redd	81	85	218		✓ <del>30g</del> H
1949	Redd	136	111	X missing		✓ <del>30g</del> 30g ??? low
1922	Redd	99	11	2		✓ <del>7.5g</del> 15g M
1920	Redd	259	384	missing		✓ 30g
1904	Redd	9	6	1		✓ <del>15g</del> L 7.5g
1910	Accom	4	11	1		✓ <del>7.5g</del> 7.5g L
2013	Accom	32	113	3		✓ M 15g
2021	Accom	32	116	10		✓ <del>7.5g</del> 15g M
2102	Accom	2	0	0		✓ c
1201	Mosby					✓ c
1622	Gay	14	55	0		✓ 7.5g
1620	Gay	10	95	0		✓ <del>7.5g</del> 15g M
1618	Gay	9	14	0		✓ <del>15g</del> L 7.5g
1986	Raven	181	72	6		✓ <del>7.5g</del> 30g H
1984	Raven	7	106	27		✓ M 15g ✓ frontier
1982	Raven	1	39	X missing		✓ L 7.5g ✓
1978	Raven	134	199	135		✓ H 30g ✓
1951	Raven	152	28	37		✓ M 15g ✓





# Provide Managers with Documentation!

- Ranked
  - High,
  - Medium
  - low
- Determines amount of bait to be applied at the initiation of the test







**Low - Day 0**  
**Overnight**  
**40**  
**trap-catch**



**50**



**16**



**Medium-  
Day 0  
Overnight  
trap-catch  
217**

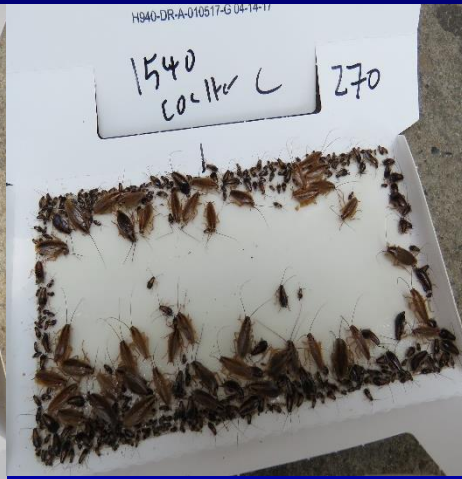
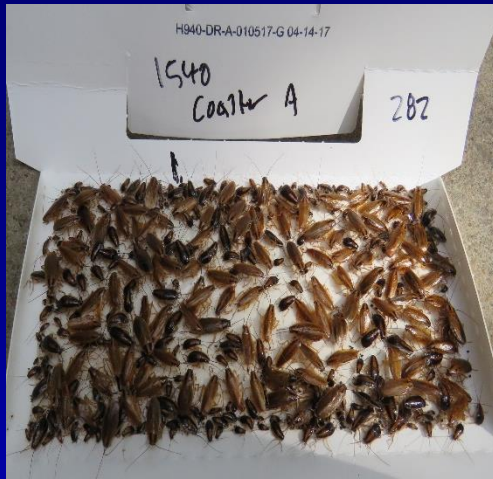


**175**



**240**





806



734



643+

High-  
Day 0  
Overnight  
trap-catch

# Treatment Based on Assessment:

- Advion Evolution (NC)
- Vendetta Nitro (VA)
- Maxforce Magnum (VA)
- Bait treatment: We decided on how much bait each unit received on Day 1
  - 0-24 controls
  - 25 - 74: applied 7.5 g
  - 75 - 249: applied 15 g
  - 250 +: applied 30 g





# Low Units: 7.5 grams of Bait



# Medium Units: 15 grams





# High Units: 30 grams



# Monitor again at Day 14 and bait according to trap count





# Baiting Protocol

- On Day 14 units trap catch was evaluated for each unit and bait was applied according to infestation level
  - Trap catch  $>500$  received 60 g
  - Trap catch  $>100$  received 30 g
  - Trap catch 50-100 received 15 g
  - Trap catch 1-50 received 7.5 g



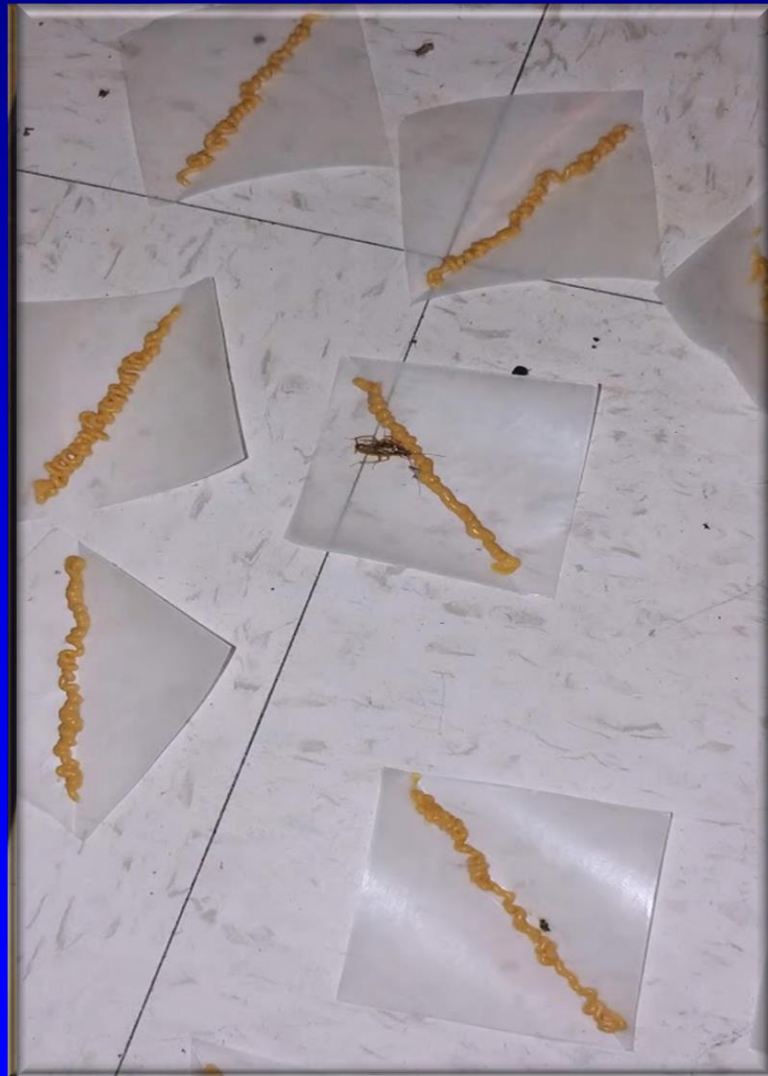
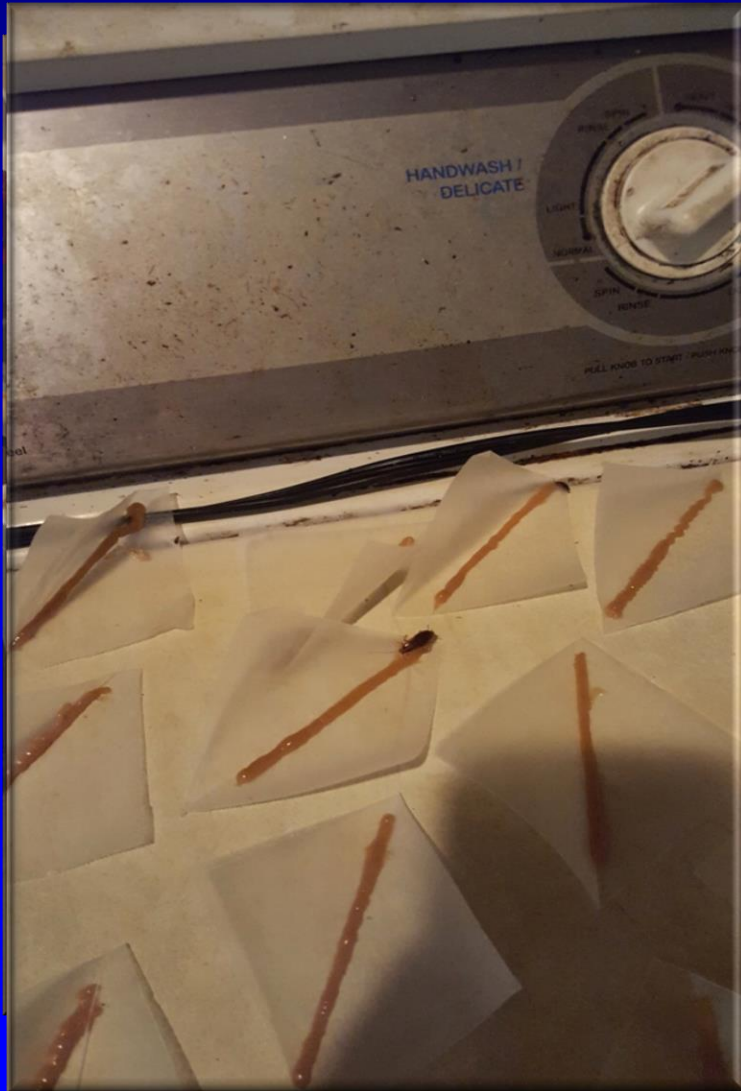
**Make  
sure you  
have  
plenty of  
bait!**





# 60 grams High units day 14

## 500+ cockroaches



# Placing the Bait





# Results (They eat it up!)





# Dead Cockroach Mess? Vacuum!



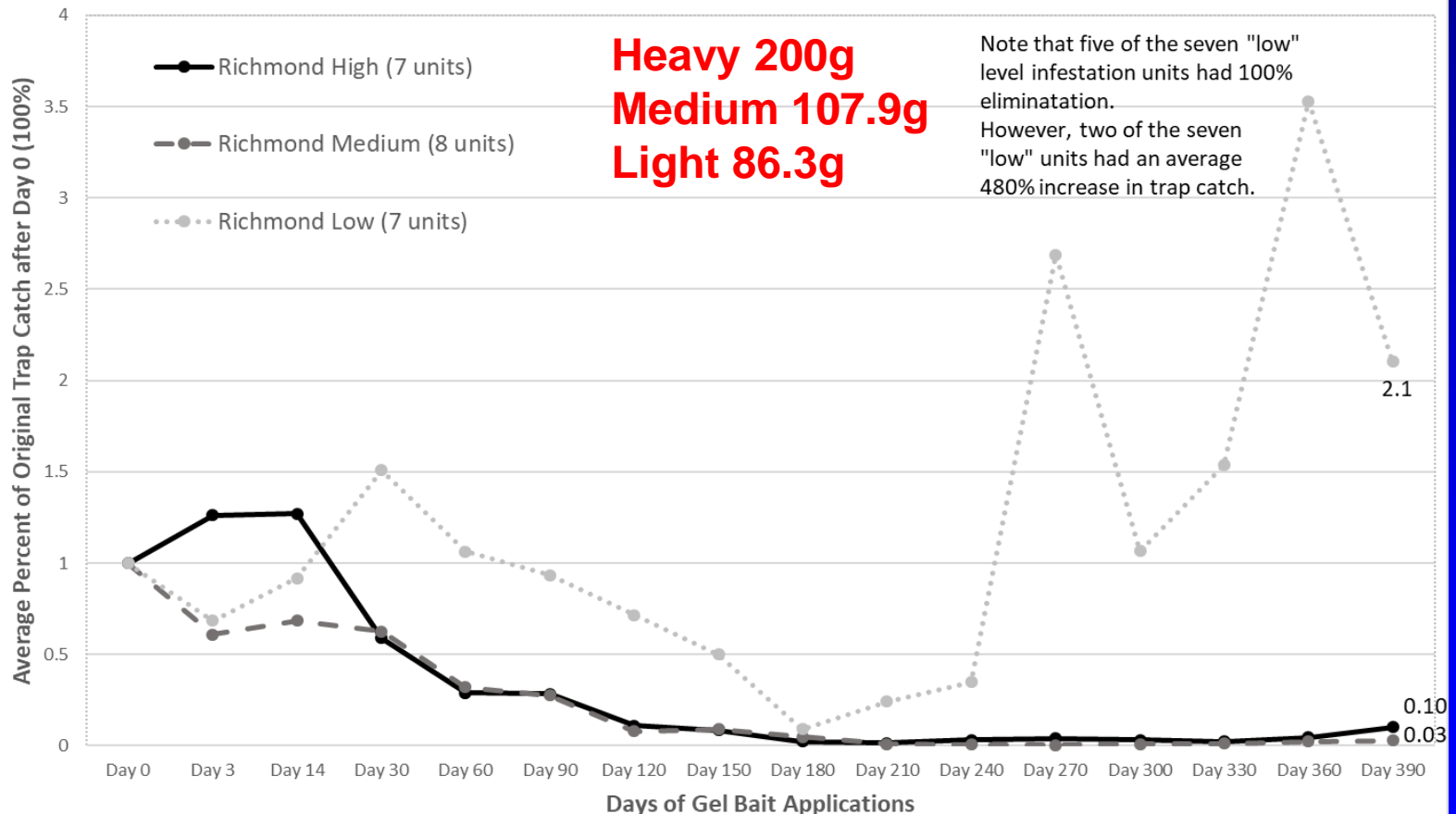


# Reduced by 90 %

Maxforce Magnum  
Optigard Cockroach  
Vendetta Nitro  
Advion Evolution

## Richmond Rehabilitation and Housing Authority

Average % reduction at each infestation level based on overnight trap catch.

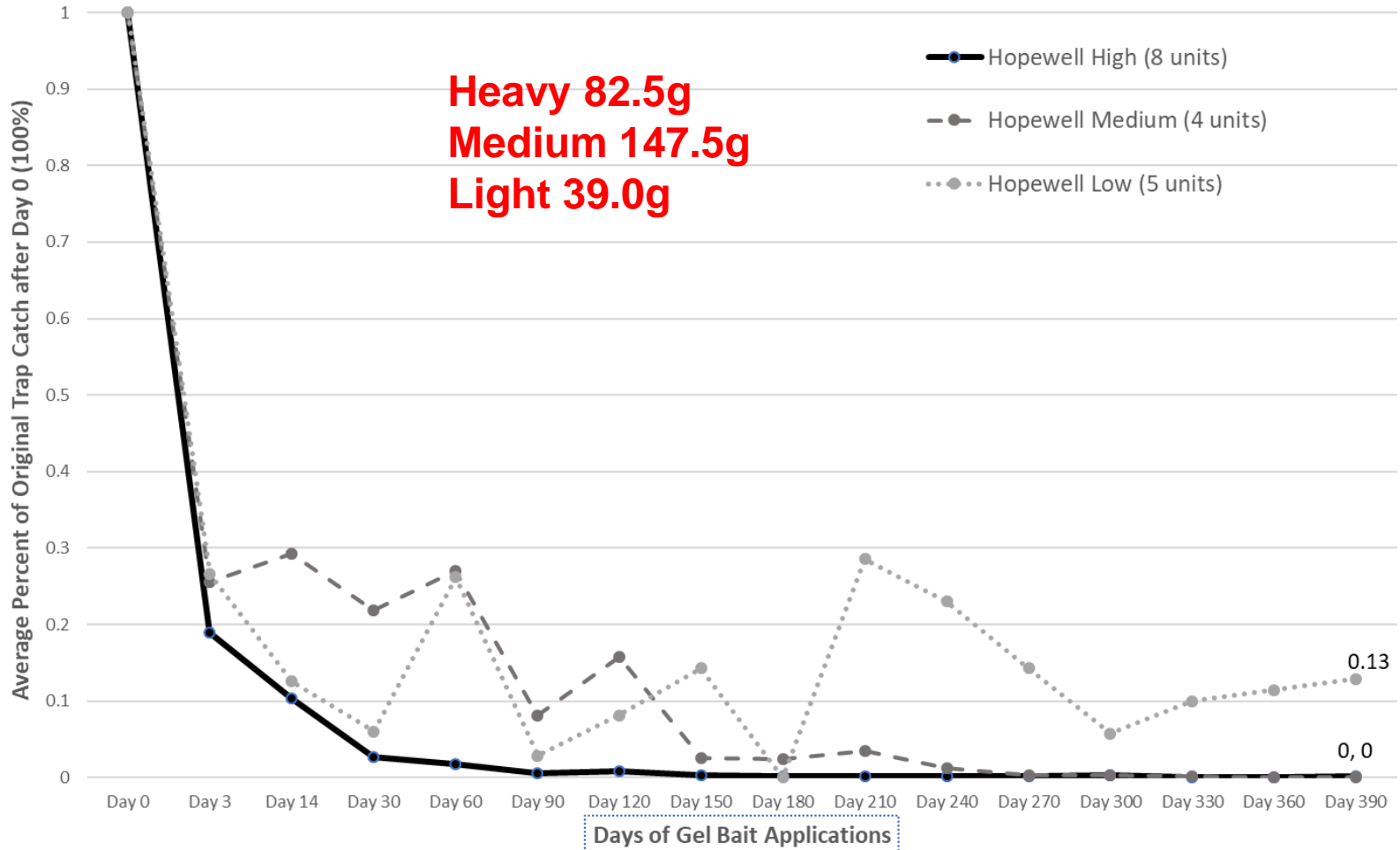


# Reduced by 99%

Vendetta Nitro  
Optigard Cockroach  
Maxforce Magnum  
Advion Evolution

## Hopewell Housing Authority

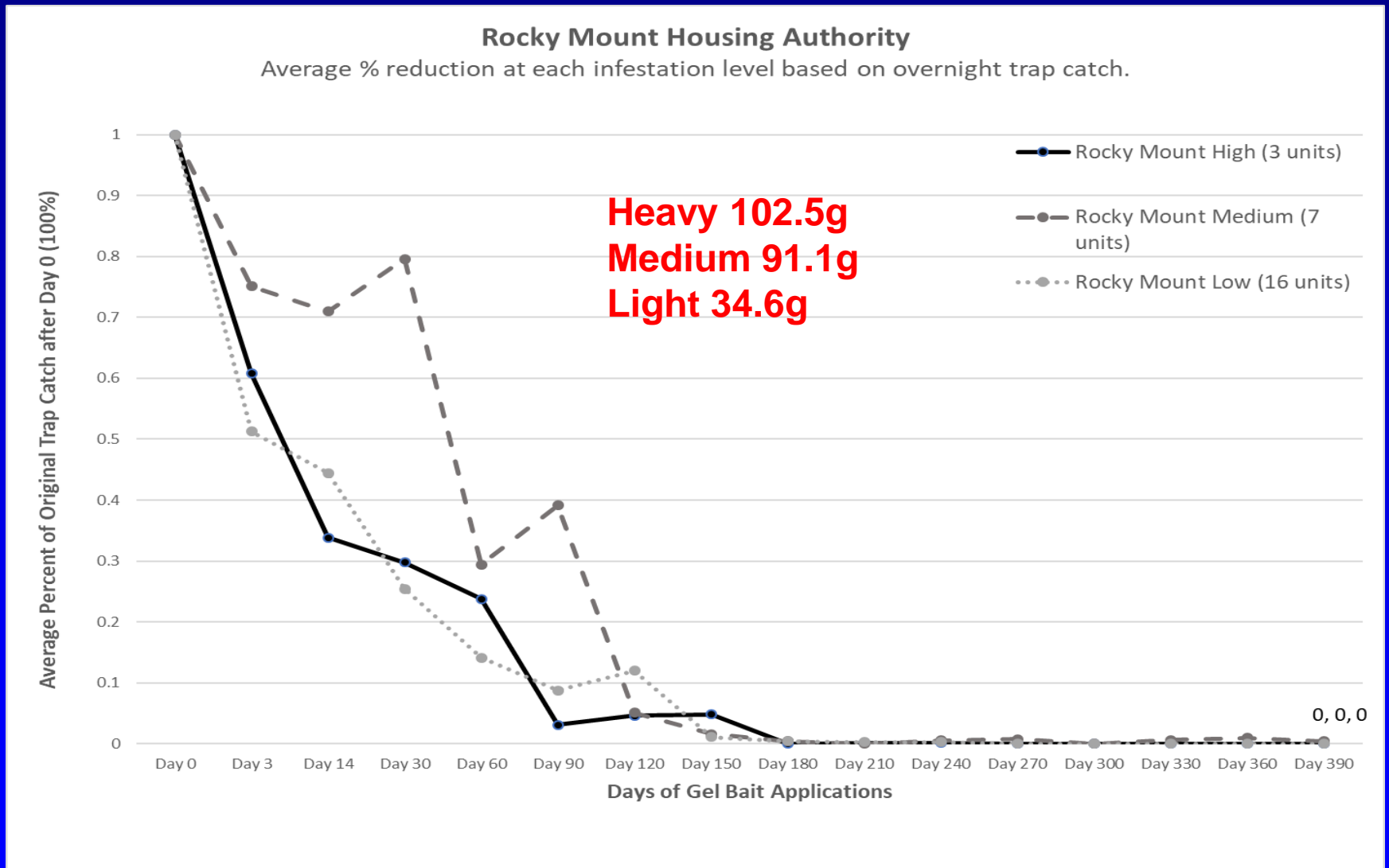
Average % reduction at each infestation level based on overnight trap catch.





# Reduced by 100%

Optigard Cockroach  
Advion Evolution



# 390 Day Cockroach Study!

- **Monitoring and baiting every 30 days**
- **Rotate bait formulations every 90 days**
- **Vacuuming to remove dead bodies**
- **NO resident cleaning or preparation!!!!**
- **Do not disturb your cockroaches then try to feed them snacks!**



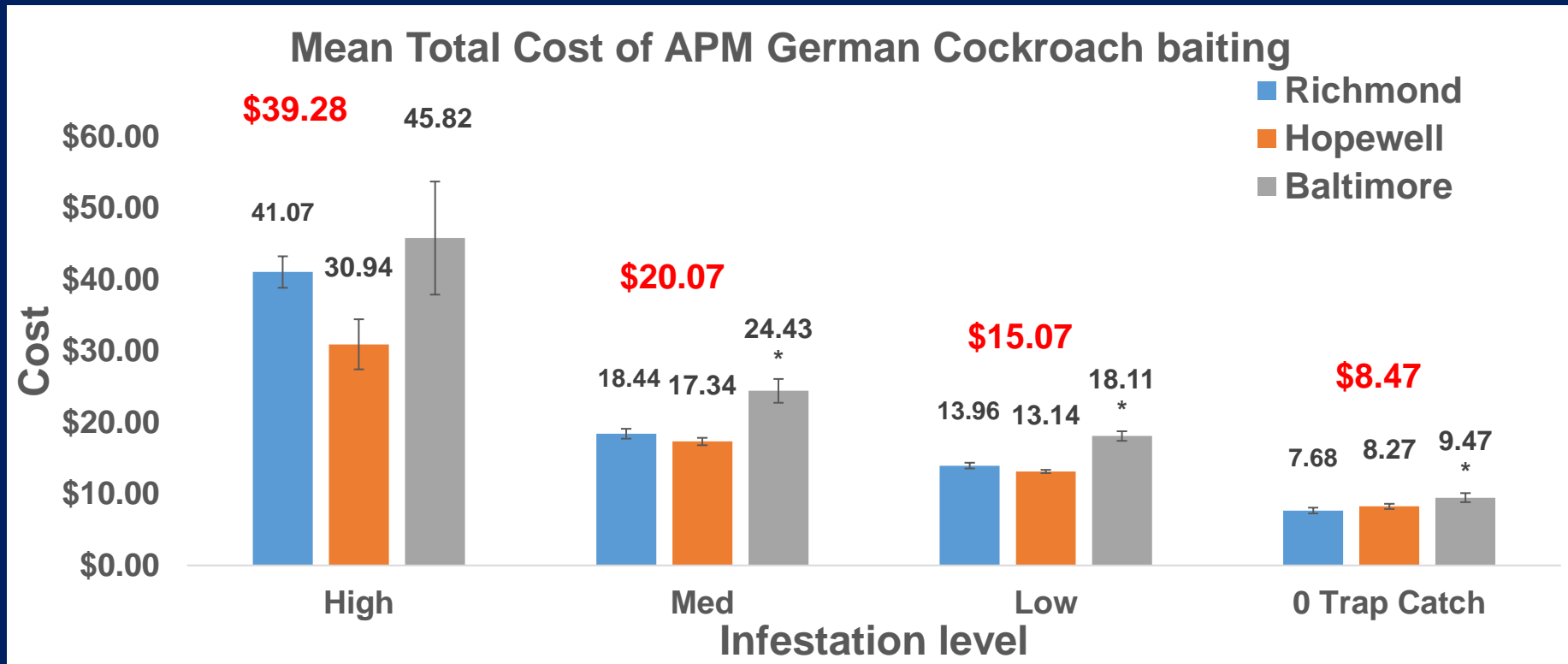


# 390 Day Cockroach Study!

- Winter months are the ideal time for major cockroach elimination efforts
  - No summer population rebounds.
- Bait amount determined by overnight trap catch
  - We have a method, no more guessing!
- More bait applied in a single unit than ever before.
  - 34g - 200g over a 390 day period



# Pest Control Cost = manual labor (\$1.50/min) + 3 traps + bait (g) (profit not included)



Means separated using Tukey's HSD Test;  $P \leq 0.05$

\* Indicates significance



# Not paying for Pest Control

- *Paying for pesticide application only.*
- Look at your lowest bid. Divide it by the number of times the technician will annually visit each unit (once a quarter?), then divide by the number of units to get a price per door.
  - Ex. \$2,749.00 per quarter to service 479 units = ~6.00 per door (\$5.79)
- Break even cost for pest company is \$1.50 - 2.00 per min. So the newest, cheapest Technician must take less than 3 min to treat an apartment
  - Takes an average of 49 sec to get in the door.
- **So the technician is under pressure to spray something and get out. This is not “pest control”.**

# **“The residents don’t clean up!”**

- **When cockroaches are still abundant after treatment....the 40 year excuse...**
  - **“It’s the resident’s fault”.**
  - 1. When the technician has no time to do “pest control”
  - 2. Tech does not have time to treat all units
  - 3. Management does not ask for any documentation of pest reduction
  - 4. Management has asked the contracted company to do less than they are contracted for.
- **Imagine contracting to have 5 roofs replaced, but workers do not have time to complete the roofs, and skips two of them. Management asks for no documentation that the roofs were completed. If anyone complains “it is the residents’ fault”?**



# **We can eliminate cockroaches!**

## **We have the data!**

- **In a court of law – “pest control” and “pesticide application” are different! Which are you contracting for?**
- **Are you supervising the process (time spent per unit)?**
- **Are you requiring for documentation of pest reductions?**
- **Are you being responsible to your residents?**
  - **Bed bugs opened the door to class action law suits that cockroaches can walk right through.**

# Why Use APM?

- **We must assess** so we know what is in our units!
- Marriage to **spray** has led to cockroach resistance. But everyone thinks we must **SPRAY**. This has got to change.
- **Assessment needs to be the basis of urban IPM.**
- No wasting time guessing how much to apply. **We use the numbers!**
- Failure to control cockroaches is no longer to be blamed on residents!!!
- **Is your contractor a “pesticide application” company? Or are they in the “pest control” business?**
- ***We can totally eliminate infestations!! WE HAVE THE POWER!!!!!!***





# Any Questions?

- **Contact information**

- **Dini Miller**

- [dinim@vt.edu](mailto:dinim@vt.edu)

- **Office 540 231- 4045**

- **Cell 540-577-6208**

- Subterranean termites
- Drywood termites
- Pest ants
- Peri-domestic cockroaches
- **BED BUGS!!!**

