


**Why We Need to Pay for Pest Control Not Pesticide Application- A Case for Assessment-Based Pest Management (APM).**



Dini M. Miller, Ph.D  
 Department of Entomology  
 Virginia Tech  
 Blacksburg, VA

1

---

---

---

---

---

---

---

---

**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 agricultural producers began the application of IPM as an economically, and environmentally sound practice of **pesticide resistance management**.

2

---

---

---

---

---

---

---

---

**Applied IPM: A series of steps**  
**Ag producers know their business**

- 1. Scouting the crop to identify pests and **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




3

---

---

---

---

---

---

---

---

### Urban IPM



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

4

---

---

---

---

---

---

---

---

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 my money...not my home....the residents' fault..."**

5

---

---

---

---

---

---

---

---

### 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



6

---

---

---

---

---

---

---

---



7

---

---

---

---

---

---

---

---



8

---

---

---

---

---

---

---

---



9

---

---

---

---

---

---

---

---



10

---

---

---

---

---

---

---

---



11

---

---

---

---

---

---

---

---

**Assessment is the basis of Integrated Pest Management (IPM) but...**

- US HUD Managers do not understand IPM. No **assessment** of building infestation levels (for years)
- Managers often have NO IDEA their units are so infested – they do not require any assessment
- Management also does not require records indicating fewer cockroaches after treatment than before
- Long-term pest issues have been continuously blamed on the resident (instead of **resistance** to spray insecticides)
- "**Lowest Responsible Bidder**"- no assessment, because **no time!**
- Spray application is the primary treatment, but you are **paying for pesticide application...not pest control.**

12

---

---

---

---

---

---

---

---



13

---

---

---

---

---

---

---

---



14

---

---

---

---

---

---

---

---



15

---

---

---

---

---

---

---

---

### Assessment-Based Pest Management

- Pre-trapping apartments
- Placed three sticky traps in each unit overnight
  - 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.*



16

---

---

---

---

---

---

---

---

### How Many Cockroaches?



17

---

---

---

---

---

---

---

---

### Research 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

18

---

---

---

---

---

---

---

---

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



Time = Money  
Break even cost is \$1.50/minute  
**Time constraints keep technician from applying enough bait!!!**

Here is a 1/4 dime size application... How do you apply 30 grams and not take all day?

19

---

---

---

---

---

---

---

---

### Applying Multiple Grams of Bait Quickly



Applying Multiple Grams of Bait Quickly

20

---

---

---

---


---

---

---

---

### Cut into Squares



Cut into Squares

21

---

---

---

---

---

---

---

---



22

---

---

---

---

---

---

---

---



23

---

---

---

---

---

---

---

---



24

---

---

---

---

---

---

---

---



Cockroaches really liked these baits in wax paper!



25

---

---

---

---

---

---

---

---

Resident clean-up was not necessary!



26

---

---

---

---

---

---

---

---

These Populations Can Be Controlled...

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



27

---

---

---

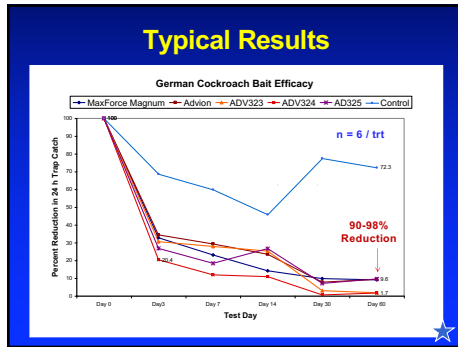
---

---

---

---

---



28

---

---

---

---

---

---

---

---

---

---

### 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

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

By the author | June 10, 2015

Conventional wisdom says we're never too old to learn something new. Well, that's the message of the newly published *Conference Paper: The Value of Wax Paper in Cockroach Baiting* from the *Proceedings of the 2015 International Cockroach Symposium*.

After 15 years of research, I've learned that cockroach baiting is not just about applying bait to cracks and crevices. It's about understanding the cockroach's behavior and using that knowledge to our advantage. Wax paper is a simple, yet effective, tool that can be used in a variety of ways to improve baiting results.

For more information, visit [www.pestmanagement.org](http://www.pestmanagement.org) and search for the *Conference Paper: The Value of Wax Paper in Cockroach Baiting*.

29

---

---

---

---

---

---

---

---

---

---

### Proposal to Work at 3 Sites

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





30

---

---

---

---

---

---

---

---

---

---

**Overnight-Trapping Assessment**  
(60 units each site)

31

---

---

---

---

---

---

---

---

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

32

---

---

---

---

---

---

---

---

**Managers often assume that 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)
- **Humans think the answer is in the spray. They give no credit to the technician!**
- They know nothing about resistance. Humans think PCOs must spray!
- Sick (sprayed) cockroaches will not eat bait, and most recover from spray.

33

---

---

---

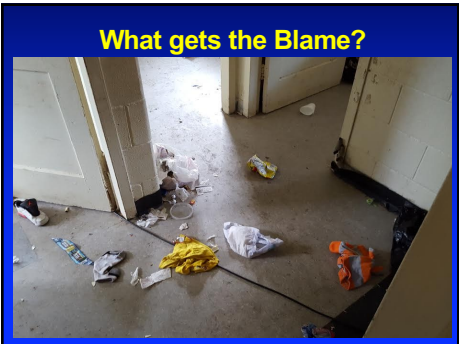
---

---

---

---

---



34

---

---

---

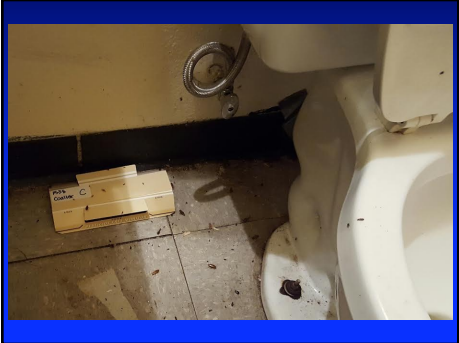
---

---

---

---

---



35

---

---

---

---

---

---

---

---



36

---

---

---

---

---

---

---

---



37

---

---

---

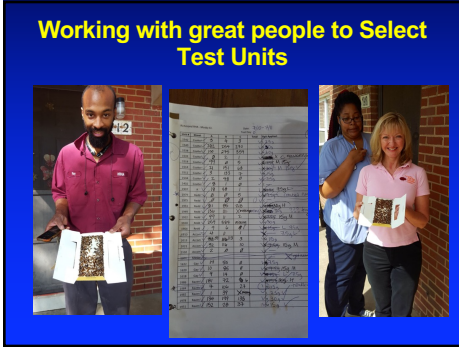
---

---

---

---

---



38

---

---

---

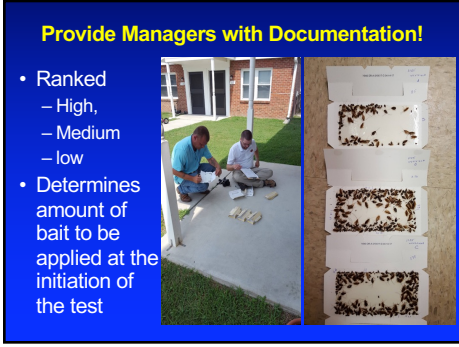
---

---

---

---

---



39

---

---

---

---

---


---

---

---

### Baiting Determined by Trap Catch

Infestation Level	Trap catch: Grams of Bait
High	>500 cockroaches: 60 grams (2 tubes) >100 cockroaches: 30 grams (1 tube)
Medium	50-100 cockroaches: 15 grams (1/2 tube)
Low	1-50 cockroaches: 7.5 grams (1/4 tube)



40

---

---

---

---

---


---

---

---

### 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



41

---

---

---

---


---

---

---

---

### Medium Units: 15 grams



42

---

---

---

---

---

---

---

---



43

---

---

---

---

---

---

---

---



44

---

---

---

---

---


---

---

---

**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



45

---

---

---

---

---

---

---

---

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



46

---

---

---

---

---

---

---

---

**60 grams High units day 14**  
500+ cockroaches



47

---

---

---

---

---

---

---

---

**Placing the Bait**



48

---

---

---

---

---

---

---

---





49

---

---

---

---

---

---

---

---

---

---



50

---

---

---

---

---

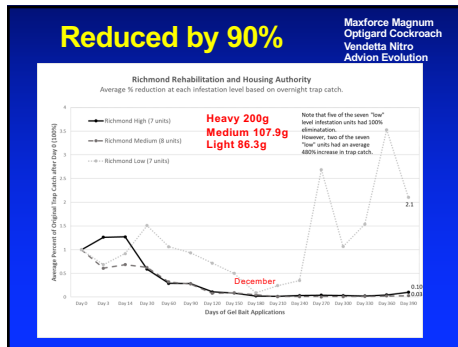
---

---

---

---

---



51

---

---

---

---

---

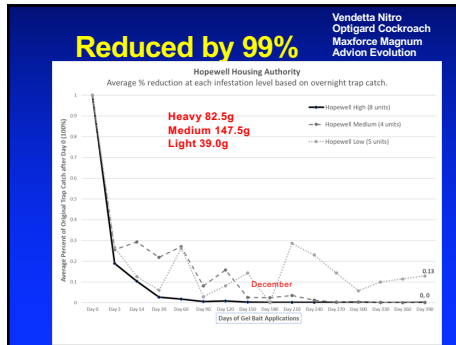
---

---

---

---

---



52

---

---

---

---

---

---

---

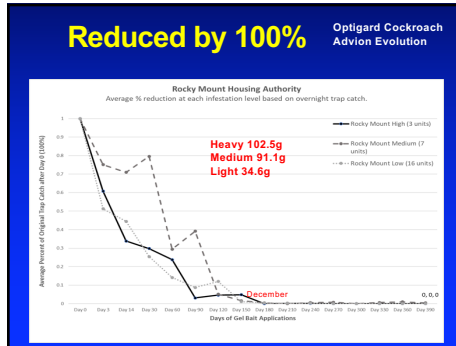
---

---

---

---

---



53

---

---

---

---

---

---

---

---

---

---

---

---

**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!

54

---

---

---

---

---

---

---

---

---

---

---

---

### 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



55

---

---

---

---

---

---

---

---

### Costs: Average Labor Time (30+ units at each site)

Times for Richmond Public Housing (2020)	Infestation Level	Entry Day 1	Place traps	Entry Day 2	Pick up and document traps (photographing)	Prep and place bait tacos
High	0:44 sec	1:00 min	1:07 min	1:46 min	14:02 min	
Medium	0:42 sec	0:43 sec	0:34 sec	1:50 min	4:57 min	
Low	1:10 min	0:54 sec	0:50 sec	1:38 min	2:31 min	
0-trap catch	0:41 sec	0:50 sec	0:49 sec	1:21 min	0:00 min	

3 Lo-Line Traps at 0.81 = \$2.43  
Bait tube - \$6.00; \$3.00; \$1.50

56

---

---

---

---

---

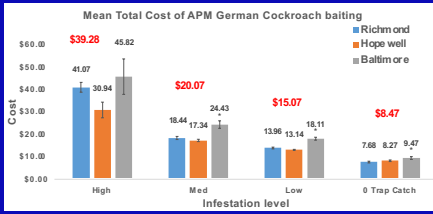
---

---

---

### Total Cost = Labor (\$1.50/min) + 3 traps (\$2.43) + bait (\$6.00/tube)

Mean Total Cost of APM German Cockroach baiting



Infestation level	Richmond	Hope well	Baltimore
High	41.07	30.94	45.82
Med	18.44	17.34	24.43
Low	13.96	13.14	18.11
0 Trap Catch	7.68	8.27	9.47

Means separated using Tukey's HSD Test;  $P_{adj} < 0.05$   
\* Indicates significance

57

---

---

---

---

---


---

---

---

### Why doesn't do we not think of PCOs like we do plumbers and electricians?

- Why are we paying \$5.00/door for the last 30 years? Do we really think that is what pest control costs?
- How do we change this so that we achieve pest control?!!!!
- We do not need resident cooperation, we need to be paid!
- **We must pay for pest control, not just pesticide application.**



58

---

---

---

---

---

---


---

---

### Why Use APM?

- PMPs **must assess** so Manager can be informed what is in their 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!!!

**We can totally eliminate infestations!!**  
**WE HAVE THE POWER!!!!!!**



59

---

---

---

---

---


---

---

---

### Questions?

Again: Are you in the *Pesticide Application* business or the *Pest Control* business?



**We can totally eliminate German cockroaches with NO Resident Cleaning!!!!!!**

60

---

---

---

---

---

---

---

---