INTEGRATED PEST MANAGEMENT INTERVENTIONS FOR HEALTHIER HOMES

Comparison of Cost and Effectiveness for Cockroach Control

Two leading researchers on pest control in public housing studied the effectiveness and costs of implementing progressive pest control interventions based on integrated pest management (IPM). The studies show that vacuums and baits are much more effective at controlling cockroaches than traditional baseboard, and crack and crevice treatments. They also show that the more elements of IPM used, the more effective it will be. The studies indicate IPM costs more initially but, over time, can actually lower monthly pest management costs. However, this analysis did not include the benefits to residents (e.g., reduced asthma or stress) from effective pest control and reduced burden on staff and management in responding to pest complaints. Property managers and pest management professionals need to use the latest methods to effectively control cockroaches.

In a 2004 study, Dini Miller of Virginia Tech and Frank Meek of Orkin compared IPM-based methods that relied on cockroach vacuums, baits and insect growth regulators (IGRs) with traditional approaches that include baseboard spraying and borate dusts for cracks and crevices.[1] They found that the Integrated Pest Management-based (IPM-based) approach was dramatically more effective than traditional methods. Pesticide use was cut by more than 50 times from 827 grams per unit to less than 15 grams per unit. Eighty percent of the units were cockroach-free after one year compared with 6 percent before IPM treatment. The number of cockroaches trapped per unit dropped almost as dramatically. While the total cost per unit for IPM-based treatment over a year was more - $25.70 v. $10.43 – primarily due to the initial vacuuming, **at the end of the study, the monthly cost per unit was approximately 60% less - $0.87 for IPM v. $1.52 for traditional control.**

In 2006, Purdue University's Changlu Wang and Gary Bennett compared a broader IPM program to a bait-only treatment for cockroach control.[2] In essence, they added education, trapping, and housekeeping intervention to the IPM-based approach used by Miller and Meek. They did everything reasonably expected of a pest management professional. However, they did not incorporate critical maintenance steps, which include sealing cracks, eliminating moisture intrusion, and physically blocking cockroach entry and movement.

Why Cockroaches?

Live cockroaches, as well as their remains and feces, cause asthma attacks in people sensitive to cockroach allergens according to a 2000 Institute of Medicine Report. The Inner City Asthma Study found that more than 60% of inner city children were sensitive to cockroach allergens. Asthma is a costly disease that disrupts a family and undermines a child's ability to learn. There is growing evidence that mice might have a similar effect.

This case study is one of a series addressing integrated pest management (IPM) in low income housing. To access the series, visit www.healthyhomestraining.org/ipm/studies.htm.

IPM is a commonsense approach to pest management to keep pests out, reduce their harborage, food and water, and, where necessary, use low-risk pesticides.

In this study, pesticide use decreased by more than two-thirds, and at one point all of the IPM-based units were cockroach free. Only one unit had a serious housekeeping relapse after showing initial promise. Although the IPM method cost nearly doubled the bait-only methods over the six months of the project - $65 to $35, it is likely more aggressive management support for housekeeping and better maintenance would have reduced this difference, especially over time.

Neither study calculated the following cost savings from IPM:

- Benefits to the health and well-being of residents from a cockroach-free home;

[1] Miller, D. M., and F. Meek.,2004, Cost and efficacy comparison of integrated pest management strategies with monthly spray insecticide applications for German cockroach control in public housing, J. Econ. Entomol. 97: 559-569. See web.ento.vt.edu/ento/project.jsp?projectID=21.
[2] Wang and Bennett, 2006, Comparative Study of Integrated Pest Management and Baiting for German Cockroach Management in Public Housing, J. Econ. Entomol, 99: 879-885. See www.beyondpesticides.org/documents/IPMstudyPurdue.pdf

- Reduced burden on management and staff in responding to tenant complaints about pest infestations;
- Reduced burden on families responding to asthma attacks or taking time to file a complaint with management;
- Long-term benefits in reducing likelihood of developing "bait averse" cockroaches; and
- Broader benefits beyond pests – such as reduced mold – from better housekeeping and maintenance that would result from IPM.

Table 1 provides a summary comparison of each of the studies against the ten program elements established by the U.S. Department of Housing and Urban Development on February 3, 2006, and revised on May 27, 2007, for an effective IPM program.[3] The costs for each method are at the end. Results are in italics. However, a few items deserve note:

1. Both studies addressed buildings as a whole. All units were treated with one method or the other.
2. The Portsmouth, Virginia, study lasted one year – January to December. The Gary, Indiana, study started in May and ended in November. Cockroaches are especially hard to control during the hot, humid summer.
3. The Portsmouth, Virginia, researchers did not focus on changing resident behavior. In contrast, the Gary, Indiana, researchers educated residents and referred residents with housekeeping issues to a mandatory four-hour training program. One resident was evicted for lease violations related to housekeeping. The researchers applied 25% of the pesticides (215 of the 879 grams) used in the Partial IPM Program on this one unit.
4. The schedule of treatments varied between the studies. The Gary, Indiana, researchers added treatment after two weeks and did not treat for the fifth and sixth months. The Portsmouth, Virginia, researchers monitored the units and intervened as needed each month.
5. The Gary, Indiana, researchers assessed sanitation. They scored each unit on a scale of 1 to 5 with 5 being severely dirty. The scoring considered three factors: amount of clutter, amount of trash on floor, and amount of food on floor and kitchen counter. The Portsmouth, Virginia, researchers did not assess sanitation.
6. The sanitation score for units treated with the IPM Approach improved from 3.8 to 2.4 – a statistically significant difference. The score from 4.0 to 3.2 in the Bait-Only Approach units but was not statistically significant. The improvement indicates initial cockroach cleanout and resident education makes a difference in unit sanitation.

[3] U.S. Department of Housing and Urban Development, 2006, *Guidance on Integrated Pest Management*, Notice PIH 2006 – 11(HA). See www.hud.gov/offices/pih/publications/notices/07/pih2007-12.pdf.

For More Information

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COMPARISON OF GARY, INDIANA, AND PORTSMOUTH, VIRGINIA, PEST CONTROL STUDIES TO HUD'S IPM PROGRAM ELEMENTS SHOWING IPM METHODS ARE MORE EFFECTIVE AND COST LESS..

HUD IPM Program Elements *(Results of Study in Bold Italics)*		**Gary IN / Purdue Study**		**Portsmouth VA / Virginia Tech Study**	
		IPM Program (all elements but pest exclusion & maintenance)	Bait and Growth Regulators	Vacuum Trapping, Bait & Growth Regulators	Traditional Spray & Dust
1. Communicate Policies Communicate Housing Authority's IPM policies and procedures to: • All building occupants • Administrative staff • Maintenance personnel • Contractors.		Communicated to residents and staff in the impacted buildings. Seminars for resident managers and community program staff on IPM.		Communicated to residents and staff in the impacted buildings.	
2. **Identify Problems** Identify pests and environmental conditions that limit the spread of pests.		Comprehensive initial assessment for 66 units in 12 buildings.		Comprehensive initial assessment for 100 units in 22 buildings.	
3. **Monitor and Track** Establish an ongoing monitoring and record keeping system for: • Regular sampling and assessment of pests • Surveillance techniques • Remedial actions taken • Assessment of program effectiveness.	*Results at End of Study*	Assessed at weeks 2, 4, 8, 12, 16, and 29 with 6 glue traps. Scored sanitation on a 1 to 5 scale on three variables. 5 is worst		Assessed monthly with 3 glue traps. No scoring of sanitation.	
	Sanitation	***Improved significantly from 3.8 to 2.4***	***Improved moderately from 4.0 to 3.2***	***Not Assessed.***	
	Severity of Infestation	***Units without heavy infestations improved from 65% to 97%***	***Units without heavy infestations improved from 66% to 84%***	***Adjusted # trapped per unit improved 60%***	***Adjusted # trapped per unit improved 15%***
	No trapped roaches	***Improved from 59% to 84%***	***Improved from 56% to 72%***	***Improved from 6% to 80%***	
4. **Set Thresholds for Action** Determine, with involvement of residents: • Pest population levels – by species – that will be tolerated • Thresholds at which pest populations warrant action.		Tolerance set at zero cockroaches.		Tolerance set at zero cockroaches.	
		Flushing and vacuuming dropped if < 12 trapped roaches/ unit. ***One unit vacuumed twice and another three times***.	No changes.	Treatment reduced to 3 months if < 3 trapped roaches per unit.	No changes.

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5. **Improve Non-Pesticide Methods** Improve: • Mechanical pest management methods • Sanitation • Waste management • Natural control agents that have been carefully selected as appropriate in light of allergies or cultural preferences of staff or residents.	Cleanout initially and when > 11 trapped roaches per unit using backpack vacuum and limited pyrethrin & piperonyl butoxide flush. Sticky traps capture remaining cockroaches.	No changes.	Cleanout initially and at 6 months using backpack vacuum in kitchen and bathroom.	No changes.
6. **Prevent Pest Entry and Movement** • Monitor and maintain structures and grounds including o Sealing cracks o Eliminating moisture intrusion and accumulation • Add physical barriers to pest entry and movement.	*None*		*None*	
7. **Educate Residents and Update Leases** • Develop an outreach/educational program • Ensure that leases reflect residents' responsibilities for: o Proper housekeeping o Reporting presence of pests, leaks, and mold.	Residents given educational packet and educated again during visit. One resident in each building asked to educate peers.	*None*	*None*	*None*
8. **Enforce Lease** Enforce lease provisions regarding resident responsibilities such as: • Housekeeping • Sanitation • Trash removal and storage.	Sanitation score given to property mgmt. Residents with poor sanitation (score of 4 or 5) required to attend 4-hour housekeeping class. One resident evicted.	*None*	*None*	*None*

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9. **Use Pesticides Only When Necessary** Use pesticides only when necessary, with preference for products that, while producing the desired level of effectiveness, pose the least harm to human health and the environment, and, as appropriate, notifying PHA management before application.		Baits and insect growth regulators used as needed. No sprays or fogs used.		Baits and insect growth regulators used as needed.	Sprays for baseboard. Dusts for cracks and crevices.
		879 grams used per unit over 29 weeks	***780 grams used per unit over 29 weeks***	***14.8 grams used per unit over 52 weeks***	***827 grams used per unit over 52 weeks.***
10. **Post Signs** Provide and post 'Pesticide Use Notification' signs or other warnings.		Notified at visits		Notified at visits	
Total Cost Per Unit Over Length of Study		***Total Over 29 Weeks***		***Total Over 52 Weeks***	
	Labor	***$49***	***$22***	***$20.90***	***$10.03***
	Pesticides	***$16***	***$12***	***$ 4.80***	***$ 0.43***
	Total	***$65***	***$35***	***$25.70***	***$10.43***
Treatment Cost Per Unit at End of Study		***Last Visit***		***Last Visit***	
	Labor	***$ 0.74***	***$ 2.12***	***$ 0.69***	***$ 1.50***
	Pesticides & Traps	***$ 0.53***	***$ 0.53***	***$ 0.18***	***$ 0.02***
	Total	***$ 1.27***	***$ 2.65***	***$ 0.87***	***$ 1.52***