

Cincy Cockroach Reminds of Dangers of Poor Pest Control

Baits are essential to effective cockroach control. In housing, they have generally replaced fogs and sprays. However, cockroaches are adapting to avoid the baits – reducing the baits’ effectiveness. Property managers need to adopt an integrated pest management (IPM) program that includes housekeeping, maintenance, and targeted monitoring, to reduce the need for chemical controls, including baits.

Cincinnati housing has its own cockroach strain. Dubbed the “Cincy cockroach” in a 2004 report by researchers at Purdue University, the cockroaches developed “bait aversion.” The cockroaches avoided gel baits with certain sweeteners most cockroaches cannot resist.¹ The sugars are fructose, glucose, maltose, and sucrose. Cincinnati is not alone. A gel bait manufacturer reports that bait-averse cockroaches are in every major city.² Put simply, the cockroaches lost the “sweet tooth” that made them so vulnerable to the pesticide in the baits.

The Cincy cockroach also developed a limited resistance to two common active ingredients in baits – abamectin and fipronil. Resistance means that the species has evolved so the active ingredients are not as effective against the pest.

The researchers, Changlu Wang, Michael Scharf, and Gary Bennett, published a follow-up study in 2006.³ The researchers found that, in breeding the Cincy cockroach with a cockroach strain without the bait aversion characteristic, some of the offspring had bait aversion. The trait was inheritable. Once the trait is inheritable, then it is likely to spread.

The researchers found that the Cincy cockroaches paid a price for this new genetic trait – the egg cases were smaller and had lower number of eggs in each case.⁴



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.

¹ Wang, Scharf, and Bennett, 2004, *Behavioral and Physiological Resistance of the German Cockroach to Gel Baits*, J. Econ. Entomol. 97(6): 2067-2072. See [http://entnemdept.ufl.edu/Wang_et_al_\(gel_bait_aversion\).pdf](http://entnemdept.ufl.edu/Wang_et_al_(gel_bait_aversion).pdf)

² Email correspondence with Gordon Morrison of Bayer Environmental Science. See also Miller and McCoy, 2005, *Comparison of commercial bait formulations for efficacy against bait averse German cockroaches*. pp. 115-121. Proceedings of the 5th International Conference on Urban Pests. Singapore. Bao, and Macom, 2005, *Resurrection of bait aversion and management strategies for the German cockroach*. pp. 73-79. Proceedings of the 5th International Conference on Urban Pests. Singapore.

³ Wang, Scharf, and Bennett, 2006, *Genetic Basis for Resistance to Gel Baits, Fipronil, and Sugar-Based Attractants in German Cockroaches*, J. Econ. Entomol. 99(5): 1761-1767. See www.level1diet.com/research/id/475930.

⁴ Wang, Scharf, and Bennett, 2004, *Behavioral and Physiological Resistance of the German Cockroach to Gel Baits*, at 2067.

Fortunately, the bait manufacturers modified their bait formulations to attract strains of bait-averse cockroaches. They used new active ingredients to address the resistance issue. The researchers found that these reformulated baits were effective.⁵

In the 2004 study, the researchers concluded that “First, rotating gel baits containing different active ingredients apparently will not circumvent this form of resistance. Second, cockroaches will likely develop similar behavioral resistance in response to other inert gel bait matrix ingredients after repeated exposure. Although better control can be achieved by changing the bait matrix, efficacy is likely to diminish over time if current management practices are not revised.”⁶

This news is not a surprise. Studies in 1995 and 1997 demonstrated that cockroaches were beginning to adapt through bait aversion.⁷

The lesson remains: Chemical controls as the first – or only – line of defense against residential cockroach infestations are not an effective means of pest management. Cockroaches have an uncanny ability to adapt to pesticides just as bacteria adapt to antibiotics if not effectively eliminated. .



The warning is especially serious in light of two reports on the health threats posed by cockroaches. In 2000, the National Academy of Science concluded that cockroaches and the debris they leave behind trigger asthma attacks in sensitive children.⁸ The 2005, Inner City Asthma Study found that more than 60% of inner city children have been sensitized to cockroach allergens – most likely as a result of early and sustained exposure.⁹ Children in public housing are most likely to live in the inner city. Controlling cockroaches is an important method to protect these children from asthma attacks.

We have compelling reasons to use the best available tools to protect residents from cockroaches – for their health today and for the future.

Integrated pest management (IPM) is the best available approach to pest management. Studies by Purdue University at Gary Housing Authority in Indiana¹⁰ and the experiences of many pest management professionals in the field make this point clear. Traditional pest control is less effective than IPM. Because it controls cockroaches more effectively, IPM:

- Makes better use of limited resources;
- Reduces cockroaches in housing;
- Helps prevent asthma attacks among residents;
- Improves the quality of life for residents; and
- Provides effective long-term pest control, meaning fewer call-backs and complaints.

⁵ Id. See Miller and McCoy 2005; Bao and Macom 2005.

⁶ Id at 2071.

⁷ Ross and Silverman, 1995, *Genetic studies of a behavioral mutant, glucose aversion, in the German cockroach*, Journal of Insect Behavior, 8(6): 825-834 and Ross, M. H., and J. Silverman. 1995a. *Genetic studies of a behavioral mutant, glucose aversion, in the German cockroach*, J. Insect Behav. 8: 825D834.

⁸ Institute of Medicine, 2000, *Clearing the Air: Asthma and Indoor Air Exposures. Executive Summary* Institute of Medicine, ISBN 0-309-06496-1. See www.nap.edu/books/0309064961/html/.

⁹ Rebecca Gruchalla, et al, 2005, *Inner City Asthma Study: Relationships among sensitivity, allergen exposure, and asthma morbidity*, J. Allergy Clin. Immunol.

¹⁰ Changlu Wang and Gary W. Bennett, 2006, *Comparative Study of Integrated Pest Management and Baiting for German Cockroach Management in Public Housing*, J. Econ. Entomol. 99(3): 879-885.

For More Information

On Case Study

Tom Neltner
National Center for Healthy Housing
10320 Little Patuxent Parkway, Suite 500
Columbia, MD 21044
443.539.4160 / Fax: 443.539.4150
tneltner@nchh.org

On Series

Kathy Seikel
U.S. Environmental Protection Agency
Mail Code 7511C, 1200 Penn. Ave., N.W.
Washington, DC 20460
703.308.8272 / Fax 703.305.5558
Seikel.Kathy@epamail.epa.gov



This case study was prepared by the National Center for Healthy Housing through a contract with U.S. Environmental Protection Agency's Office of Pesticide Programs and Battelle.