

# PERFORMANCE OF AVERMECTIN BAIT FORMULATIONS AGAINST THE GERMAN COCKROACH (DICTYOPTERA: BLATTELLIDAE)

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**Abstract**—Commercial formulations of avermectin based baits were evaluated in laboratory and field studies against the German cockroach, *Blattella germanica* (L.). In continuous exposure tests with adult males,  $LT_{50}$ s ranged from ca. 2.5 to >200d for Roach Ender™ and an experimental aerosol gel formulation, respectively; dry formulations had lower  $LT_{50}$ s than water containing formulations. Moist formulations were preferred, however, by mixed populations in large arena tests. A powder formulation (Avert™) reduced cockroach trap catch in infested apartments more rapidly when applied at 50, rather than 12 sites, even when the same total bait was applied. When applied at ca. 50 sites, an aerosol formulation of Avert gel provided nearly an 80% reduction in trap catch. Other avermectin formulations provided significant, but not outstanding reductions in trap catch. Avermectin based baits can reduce German cockroach populations when properly applied.

## INTRODUCTION

In recent years, one of the most common and effective methods for controlling urban pests has been the use of insecticidal baits (Rust 1986, Appel 1990). Some of the newest active ingredients for baits include avermectin (avermectin B1) and the closely allied abamectin (80% avermectin B1a, 20% avermectin B1b). Baits containing avermectin have been evaluated against a wide variety of urban pests including ants (Glancey *et al.* 1982, Baker *et al.* 1985), clothes moths (Bry 1989), termites (Su *et al.* 1987) and yellowjackets (Chang 1988).

For cockroaches, avermectin baits are available in both professional use Avert™ (Whitmire Research Laboratories, St. Louis, Mo., U.S.A.) and over-the-counter Roach Ender (Reckitt & Colman, Carlstadt, N.J., U.S.A.). Avert is available to pest control operators as a brown dust. Roach Ender has been formulated as a small solid bait block and protected in a child-resistant plastic station similar to that of Maxforce bait stations (The Clorox Company, Oakland, CA., U.S.A.). Avert has been effective in controlling German cockroaches, *Blattella germanica* (L.) in laboratory and field tests (Ballard & Gold, 1983, Wright & Dupree, 1985). Arena tests using Avert (0.055% abamectin) resulted in 31-75% mortality of German cockroaches after 9 d, with most control being achieved by treating harborages (Koehler *et al.*, 1991). Most significantly, avermectin is effective against cockroaches that have developed resistance to conventional insecticides (Cochran, 1985). The objectives of this study were to evaluate the toxicity of and preference for several avermectin bait formulations and to determine the effects of avermectin bait placement and formulation efficacy against German cockroaches in public-housing apartments.

## METHODS AND MATERIALS

### Laboratory Evaluations

Four avermectin bait formulations were evaluated for toxicity in continuous exposure tests. Three baits were manufactured by Whitmire Research Laboratories: standard Avert powder, a new Avert Gel, and a new Avert Aerosol formulation. The fourth bait evaluated was the containerized avermectin bait, Roach Ender™, manufactured by Reckitt & Colman Household Products.

Insecticide-susceptible German cockroaches were reared in plastic trash cans with cardboard harborage and maintained at  $25 \pm 3^\circ\text{C}$ ,  $50 \pm 12\%$  RH, and a 12:12 (L:D) photoperiod. Ten adult male German cockroaches were confined in a 0.95-l glass jar with a piece of dog food, a moistened cotton wick, and a small piece of cardboard. The upper inside surface of the jar was lightly greased with petroleum jelly to prevent escape. In addition, cloth covers were secured with rubber bands over the openings. Approximately 1.5 g of one of the avermectin baits was placed in each jar.









