

SUSCEPTIBILITY in FIELD STRAIN GERMAN COCKROACHES (DICTYOPTERA: BLATTELLIDAE) to FIPRONIL BAITING

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Field strain male German cockroaches, *Blattella germanica* (L.), considered “resistant” to fipronil by standard topical application methodology, were found to readily consume a novel 0.03% fipronil gel bait and succumb. Although a simple method, valid for contact sprays or residual deposits, topical application may not be the most appropriate method or best predictor of activity for consumed passive products. Passive treatment performance is dependent not only on active ingredient (mode of action and temperature activity), but palatability of the bait and amount consumed. Lethal doses are often much lower, at nanogram rather than microgram per roach levels. Additionally, inherent variation in lethal dose may be more likely at ng levels, especially when comparing laboratory strains, selected over decades for rapid homogeneous development, to field strains.

The process of developing a new fipronil gel bait for cockroaches offered the opportunity to investigate susceptibility via oral toxicity to fipronil across strains. A number of *Blattella germanica* field strains, collected from regional sources and trials, representing random as well as “problem” strains (for purported physiological and/or behavioral causes to a variety of active ingredients) were maintained under laboratory conditions.

A field-strain population of mixed age and sex was utilized for basic formulation optimization, which was based on improved consumption and subsequent speed of mortality. Different strains did have varying preferences for food components incorporated into prototype baits. Adult males from different strains, offered a 0.03% fipronil gel bait, were evaluated for bait consumption, speed of knockdown, and mortality. All the strains tested readily consumed the bait, but knockdown time varied. While the lab strain had a KT_{50} of 3.4 hours, field strain KT_{50} ranged from 2.6-12.5 hours. Knockdown with complete mortality occurred in all strains. Consumption of ng AI per male indicated that field strain males typically consumed ~15 times the highest predicted LD_{99} , based on topical bioassays for field strain males. Relative to lab strains, bait consumption by field strains was ~375 times the LD_{99} . As lab strain susceptibility lies within the range of susceptibility of field strains, it explains why cockroaches predicted to be “resistant” are controlled, assuming the bait matrix is preferred. Determination of susceptibility via the oral route appears to be a more accurate method for toxicity prediction in *Blattella* than contact methods.