

THE INFLUENCE OF BAIT STATIONS ON FEEDING BEHAVIOR IN *PERIPLANETA AMERICANA*

R. A. BARLOW

Urban Pest Control Research Centre, Department of Entomology,
Virginia Polytechnic Institute and State University, Blacksburg, Va. 24061-0319

Abstract—Aspects of the feeding preferences and behavior patterns of cockroaches, and the influence of environmental factors such as the delivery system may contribute to the efficacy of toxic baits for cockroach control. The research objectives were to evaluate the influence of bait stations on the feeding of adult and nymphs of *Periplaneta americana* (L.), and to relate these differences to preferences for feeding on exposed or containerized (stations) baits. A delivery system of plastic stations and exposed food was evaluated for their influence on the feeding of adults and nymphs of *P. americana*. Cockroaches were confined in aquaria supplied with harborage and water; food consisted of either rat chow, dog food, or toxic bait (hydramethylnon, 1.65% AI), and was available in exposed sites or unexposed in two different size plastic bait stations. Feeding behavior and preference varied depending on the sex and life stage of the cockroaches tested.

INTRODUCTION

The use of toxic baits has become an effective component of domestic and peridomestic cockroach control programs around the world (MacDonald *et al.*, 1987; Patterson and Koehler, 1989; Appel, 1990; Short *et al.*, 1993). The effectiveness of baits may depend on several factors: palatability of the food materials which results in the cockroach ingesting a dose sufficient to produce mortality; a toxicant that is not repellent or a feeding deterrent; environmental conditions such as temperature and humidity; and the feeding behavior of domiciliary cockroaches. As more information on these and other factors becomes available the efficacy of baits will increase.

A variety of material has been used as the food matrix in cockroach control baits, including common household substances such as sucrose, potatoes, chocolate, and bread (Herms, 1915; Miesch and Howell, 1967; Reiersen and Rust, 1977). However, bait constituents have improved with information on general feeding behavior and the food preferences of cockroach species and their life stages (Tsuji, 1965; Ballard and Gold, 1982; Brenner and Patterson, 1988). Early baits for cockroach control were often home-made concoctions of a food matrix and slow acting toxicants such as boric acid, phosphorus, or arsenic (Herms, 1915). The availability of organophosphates and carbamates improved the efficacy of baits and led to commercial products for cockroach control (Lofgren and Burden, 1958; Eversole, 1971; Wright *et al.*, 1973). Further improvements in the food matrix and the toxicants (Silverman and Shapas, 1986; Koehler *et al.*, 1991) have resulted in baits becoming an accepted cockroach control strategy (Appel, 1992).

Aspects of the feeding behavior of cockroaches and the influence of environmental factors such as temperature and relative humidity may contribute to the efficacy of toxic baits. The nutritional requirements and quantitative feeding behavior of *Blattella germanica* (L.) (Gordon, 1959; Tsuji, 1965; Silverman and Bieman, 1993) and *Periplaneta americana* (L.) (Subbiah and Pandimuthu, 1981; Rollo, 1984; Rollo and Gunderson, 1984) influence bait consumption, and the competitiveness of baits with alternative household foods. The delivery of toxic baits to the household environment is typically in the form of tamper-proof containers to prevent access by nontarget organisms (children and pets). However, containerized delivery systems (stations) may affect the feeding behavior of the cockroach by limiting access, or introducing an obstacle between the target pest and bait.

The objectives of the research presented here were to evaluate the influence of bait stations on the feeding behavior of adults and nymphs of *P. americana*, and to relate these differences to the utility of containerized or exposed baits in American cockroach control programs.

