

DEVELOPMENTAL AND REPRODUCTIVE EFFECTS OF THE INSECT GROWTH REGULATOR, FENOXYCARB, AGAINST THE ORIENTAL COCKROACH, *BLATTA ORIENTALIS* L.

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Abstract—In a laboratory study, groups of third instar *Blatta orientalis* nymphs were reared to adulthood in arenas containing fenoxycarb (48 mg ai/m²) treated ceramic or plywood tiles. The reproductive capacity of the emergent adults was assessed by pairing each individual with two untreated individuals of the opposite sex. Oothecal production, oothecal hatch and the numbers of nymphs emerging from each hatched ootheca were monitored. Exposure to one-day old deposits of fenoxycarb reduced adult emergence by 45–75% in comparison with an untreated control treatment. Substantial (>35%) mortality also resulted when nymphs were exposed to deposits up to 3.5 months old on plywood, and up to six months old on ceramic. All adult females exposed as nymphs to fenoxycarb failed to reproduce. Untreated females paired with treated males produced several oothecae of normal appearance, but the viability of these oothecae was extremely low with <3% hatching. With strong effects both on the development and reproduction of *B. orientalis*, fenoxycarb is an extremely promising agent for control of infestations of this species.

INTRODUCTION

Fenoxycarb is a member of the juvenile hormone analogue (JHA) group of insect growth regulators (IGRs) and is highly effective as a control agent of many public health insects, including cockroaches, fleas, stored product pests, ants and mosquito larvae (Mulla *et al*, 1985; Banks *et al*, 1988; Marchiondo *et al*, 1990; Reid *et al*, 1990; Edwards *et al*, 1991). Efficacy against cockroaches is particularly high and fenoxycarb has been shown to have activity against all life cycle stages of the German cockroach, *Blattella germanica* (L). Topical application of 10 and 100 g of fenoxycarb results in 76–100% mortality of first through to fourth instar nymphs, with nymphal mortality believed to be the result of ecdysis inhibition (King and Bennett, 1988). The dose required to sterilise adult *B. germanica* following topical application to last instar nymphs is 2.9–4.8 times lower for fenoxycarb than the other JHA developed for cockroach control, hydroprene (King and Bennett, 1989). Exposure to 10 g of fenoxycarb suppresses reproduction in both virgin and fertilized *B. germanica* females, adult males paired with untreated females and inhibits hatchability in four-day old oothecae (King and Bennett, 1990). No such effects occur at the same concentration of hydroprene. The efficacy of fenoxycarb against field populations of *B. germanica* has also been demonstrated (Reid *et al*, 1988; Ogg and Gold, 1988; Brenner *et al*, 1988).

Despite numerous evaluations of IGRs against *B. germanica*, there has been relatively little work done to assess efficacy of these compounds against other major cockroach species. In the UK, the Oriental cockroach, *Blatta orientalis* (L), is a more important pest than *B. germanica* because of its greater prevalence (Alexander *et al*, 1991). *B. orientalis* is often more difficult to control than *B. germanica* because of its ability to survive out of doors throughout the winter (Cornwell, 1968), and because conventional insecticides may degrade before oothecae present at the time of treatment have hatched. These factors have in many cases contributed to the persistence of chronic infestations of this pest in the UK, often despite considerable insecticidal pressure. So far the only IGR evaluated for activity against *B. orientalis* has been hydroprene. The exposure of late instar nymphs to deposits of this compound induces severely deformed genitalia and twisted wings in the emergent adults and strongly impairs reproductive capacity (Bao and Robinson, 1990; Short and Edwards, 1992). Hydroprene therefore shows considerable promise for control of *B. orientalis*, although no field evaluations have as yet been reported.

There exists a definite need for evaluations of other IGRs such as fenoxycarb against *B. orientalis*. This paper reports a laboratory investigation of the activity of fenoxycarb on the development and reproduction of *B. orientalis*, and discusses the likely role this compound may play as a control agent of this species.

