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INFLUENCE OF LOCATION AND DISTANCE OF BIOGENTS SENTINEL™ TRAPS FROM HUMAN-OCCUPIED EXPERIMENTAL HUTS ON *AEDES AEGYPTI* RECAPTURE AND ENTRY INTO HUTS

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ABSTRACT. A mark–release–recapture study was conducted to refine the "push–pull" strategy for controlling the dengue, chikungunya, and Zika virus vector *Aedes aegypti* in a peridomestic environment by determining optimal locations and distances from human-occupied experimental huts for placement of the "pull" component (Biogents Sentinel™ [BGS] traps) to maximize the capture of mosquitoes. The BGS traps were placed at portals of entry (windows or doors) or corners of the experimental huts and at varying distances from the huts (0, 3, and 10 m). The location optimization trials revealed higher trap capture rates and reduction in entry of mosquitoes when the BGS traps were positioned nearer the experimental hut portals of entry than those placed in the corner of the huts. The trap capture rate at huts' portals of entry was 38.7% (116/300), while the corners recorded 23.7% (71/300). The percentage reduction in entry of mosquitoes into the huts was 69% and 31% at portals of entry and corners or vertices, respectively. In the distance optimization trials, the highest captures were recorded at 0 m (18.5%; 111/600) and 10 m (14.2%; 128/900) distances from the hut. Moreover, the highest percentage reduction in entry of mosquitoes into the huts occurred for traps set at 0 m (65.6%) compared with 3 m (17.2%) or 10 m (14.6%) distances from the huts.

KEY WORDS *Aedes aegypti*, BG-Sentinel™ trap, distance and position optimization trials, mark–release–recapture, push–pull strategy

INTRODUCTION

In a series of experiments, we evaluated a "push–pull" strategy against the primary dengue and chikungunya virus vector, *Aedes aegypti* (L.), to reduce its human contact in and around homes. The "push" component focused on using a spatial repellent (SR) and/or contact irritant (CI) chemical in sublethal doses to the mosquito (also rendering them safer for expended human exposure) applied to fabric to reduce indoor biting (Salazar et al. 2012). The Biogents Sentinel™ (BGS) trap (Biogents AG, Regensburg, Germany), was used as the preferred trapping method of adult female *Ae. aegypti* (Krockel et al. 2006, Maciel de Freitas et al. 2006, Williams et al. 2006, Barrera et al. 2013), representing the "pull" component to remove chemically repelled or excited/irritated mosquitoes from the test environment and thus further reduce human–vector contact.

Our previous studies demonstrated the effectiveness of BGS traps to recapture released *Ae. aegypti* in a screened house setting (Salazar et al. 2012) and confirmed that *Ae. aegypti* previously exposed to repellents/irritants (i.e., dichlorodiphenyltrichloroethane (DDT), metofluthrin, or transfluthrin) can be effectively captured by BGS traps (Salazar et al. 2013). This study aimed to determine the extent to which capture of released females is influenced by the positioning of BGS traps in relation to host-occupied experimental huts. Specifically, we quantified recapture rates for BGS traps positioned near hut windows or doors (entry points), for hut corners, and for traps placed at different distances outside the huts. Additionally, we used interception traps fixed to hut windows and doors to quantify attempts of mosquito entry to the hut in relation to BGS trap positioning.

MATERIALS AND METHODS

Study area

Studies were conducted in 2011 near Pu Teuy (14°17′N, 99°11′E), a small rural village (<1,500 inhabitants) located 150 km northwest of Bangkok in Sai Yok District, Kanchanaburi Province, Thailand. The village, where *Ae. aegypti* is naturally prevalent, is surrounded by dense primary forest, fruit orchards, and vegetable plots. The abundance of immature *Ae. aegypti* in water-holding containers was surveyed

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