Evaluation of a peridomestic mosquito trap for integration into an *Aedes aegypti* (Diptera: Culicidae) push-pull control strategy

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ABSTRACT: We determined the feasibility of using the BG-Sentinel™ mosquito trap (BGS) as the pull component in a push-pull strategy to reduce indoor biting by *Aedes aegypti*. This included evaluating varying numbers of traps (1-4) and mosquito release numbers (10, 25, 50, 100, 150, 200, and 250) on recapture rates under screen house conditions. Based on these variations in trap and mosquito numbers, release intervals were rotated through a completely randomized design with environmental factors (temperature, relative humidity, and light intensity) and monitored throughout each experiment. Data from four sampling time points (05:30, 09:30, 13:30, and 17:30) indicate a recapture range among treatments of 66-98%. Furthermore, 2-3 traps were as effective in recapturing mosquitoes as 4 traps for all mosquito release numbers. Time trends indicate Day 1 (the day the mosquitoes were released) as the "impact period" for recapture with peak numbers of marked mosquitoes collected at 09:30 or 4 h post-release. Information from this study will be used to guide the configuration of the BGS trap component of a push-pull vector control strategy currently in the proof-of-concept stage of development in Thailand and Peru. ***Journal of Vector Ecology* 37 (1): 8-19. 2012.**

Keyword Index: *Aedes aegypti*, screen house, BG-Sentinel™ trap, push-pull strategy, Diptera, Thailand.

INTRODUCTION

Dengue and dengue haemorrhagic fever occur in the tropics and subtropics with an estimated 2.5 billion people residing in areas where dengue is endemic (WHO 2009). Dengue viruses are transmitted primarily by *Aedes aegypti*, a day-biting mosquito that feeds and rests indoors and preferentially bites humans (Gubler 1998, Harrington et al. 2005). Despite years of public health efforts and research progress, an effective vaccine against dengue virus is not yet available. For this reason, disease prevention remains dependent on vector management and control strategies (Reiter and Gubler 1997, WHO 2009). However, controlling *Ae. aegypti* has proven difficult due to its strong association with domestic and peridomestic human environments which harbor and sustain development sites for the immatures (i.e., artificial containers). Human-vector contact in and around human dwellings highlights the need for an intervention that is effective against the target mosquito while reducing potential hazards to humans.

Historically, indices for measuring the abundance of the immature stages of the mosquito (e.g., Breteau Index and more recently, pupae per person) have guided when and where control operations should be implemented (Reiter and Gubler 1997, Focks 2003, WHO 2009). Although these indices can provide useful information, they are not consistently predictive of the abundance of adult mosquitoes or dengue incidence (Tun-Lin et al. 1996, Morrison et al. 2004). Thus, the development of new, improved traps for adults, such as the BG-Sentinel™ (BGS) and Zumba™ traps, provides an opportunity for improved entomological surveillance and possibly also control of *Ae. aegypti* (Krockel et al. 2006, Maciel-de-Freitas et al. 2006, Williams et al. 2006, 2007, Ball and Ritchie 2010a, b, Bhalala and Arias 2009) and *Ae. albopictus* (Ritchie et al. 2006, Farajollahi et al. 2009).

The combination of attractant baits and insecticide-treated traps have been used to effectively create "infestation barriers" for nuisance mosquito populations (Kline 2006). Furthermore, trap and lure combinations have been successful in the control of several insects, including tsetse flies, the vector of African trypanosomiasis (Vale 1993, Torr 1994). Traps are important tools for surveying the abundance of vectors (Rupp and Jobbins 1969, Kline 2006) but most traps are relatively ineffective, especially against a day-biting mosquito such as *Ae. aegypti* (Service 1993, Scott and Morrison 2003, Facchinelli et al. 2008). New traps such as the BGS may be effective enough for incorporation as tools for the control of *Ae. aegypti*. The BGS trap incorporates in its design the most important elements of *Ae. aegypti* host-seeking behavior by combining an olfactory cue (BG Lure) with visual cues (black and white contrast) to attract the