Parasites & Vectors

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Effect of *Aedes aegypti* exposure to spatial repellent chemicals on BG-Sentinel™ trap catches

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Abstract

Background: An integrated approach to reduce densities of adult *Aedes aegypti* inside homes is currently being evaluated under experimentally controlled field conditions. The strategy combines a spatial repellent (SR) treatment (applied indoors) with the Biogents Sentinel™ (BGS) mosquito trap positioned in the outdoor environment. In essence, when combined, the goal is to create a push-pull mechanism that will reduce the probability of human-vector contact. The current study measured BGS recapture rates of *Ae. aegypti* test cohorts that were exposed to either SR or control (chemical-free) treatments within experimental huts. The objective was to define what, if any, negative impact SR may have on BGS trap efficacy (i.e., reduced BGS collection).

Methods: *Aedes aegypti* females were exposed to SR compounds within experimental huts in the form of either treated fabric (DDT and transfluthrin) or mosquito coil (metofluthrin). Test cohorts were released within individual screen house cubicles, each containing 4 BGS traps, following SR exposure according to treatment. Two separate test cohorts were evaluated: (i) immediate release (IR) exposed from 06:00–12:00 hours and released at 12:00 hours and (ii) delayed release (DR) exposed from12:00–18:00 hours and released at 05:30 hours the following day. BGS recapture was monitored at 09:30, 13:30 and 15:30 hours and the cumulative recapture by time point quantified.

Results: Exposure of *Ae. aegypti* females to either DDT or metofluthrin did not significantly impact BGS capture as compared to cohorts of non-exposed females. This was true for both IR and DR exposure populations. IR cohorts exposed to transfluthrin resulted in significantly lower BGS recapture compared to matched controls but this effect was primarily due to high mosquito mortality during transfluthrin trials.

Conclusion: Our data indicate no more than minor and short-lived impacts (i.e., reduced attraction) on BGS trap catches following exposure to the pyrethroid compounds transfluthrin and metofluthrin and no change in recapture densities using DDT as compared to matched controls. These findings suggest a combined SR and BGS approach to vector control could function as a push-pull strategy to reduce *Ae. aegypti* adults in and around homes.

Keyword: *Aedes aegypti*, Spatial repellents, Screen house, Experimental huts, BG-Sentinel™ trap, Push-pull strategy, Thailand

Background

Dengue and dengue hemorrhagic fever occur in the tropics and subtropics with an estimated 2.5 billion people residing in areas where dengue is endemic [1]. Dengue viruses are transmitted primarily by *Aedes aegypti*, a day-biting mosquito that feeds and rests indoors and preferentially bites humans [2-5]. 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 [1,4]. However, controlling *Ae. aegypti* has proven difficult due to its strong association with domestic and peridomestic human environments that harbor and sustain development sites (artificial containers) for the immatures. Furthermore, control of *Ae. aegypti* adults is commonly based on indoor and outdoor spraying of insecticides to reduce mosquito abundance and disrupt dengue virus

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