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ORIGINAL RESEARCH PAPER

A study on *Wolbachia*-dengue-carrying *Aedes* mosquitoes (diptera: culicidae) focuses on the sustainability and frequency of *Wolbachia* in high-rise buildings in Selangor, Malaysia

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Abstract

The challenge of dengue control due to the unavailability of a specific medication stresses the importance of releasing *Wolbachia*-carrying mosquitoes through vector control programs. This study investigated the sustainability and frequency of *Wolbachia* in *Wolbachia*-dengue-carrying mosquitoes in two dengue hotspot localities in Selangor. A modified sticky ovitrap was used to collect adult mosquitoes in two *Wolbachia*-releasing areas in Selangor, Kelana Puteri and Kelana D'Putera condominiums. All mosquito samples were subjected to PCR using wsp-specific primers for *Wolbachia* detection. Dengue virus was detected using RT-PCR, followed by multiplex-PCR. Out of the 80 *Aedes* spp. collected, *Ae. aegypti* was the most predominant species. More than one-third of *Ae. aegypti* were positive for *Wolbachia*, with 22.9% being superinfected with both *Wolbachia A* and *B* strains. About 61.4% of the species were uninfected with *Wolbachia*. *Ae. aegypti* carrying the *Wolbachia A* strain was also identified, which has previously never been reported. This strain was similar to the one found naturally in *Ae. albopictus*. None of the *Ae. aegypti* and *Ae. albopictus* were positive for dengue virus. This study could serve as a model for local researchers or health authorities to design and plan an effective field release and monitoring of *Wolbachia*-infected mosquitoes.

Keywords *Aedes aegypti* · *Aedes albopictus* · Dengue virus · Modified sticky ovitrap · *Wolbachia*

Introduction

Dengue is a serious global health issue caused by a virus transmitted through mosquitoes. Dengue cases have been increasing over the past few decades, with over 2.4 million cases reported worldwide. There has been a significant increase in dengue cases in Malaysia, with a record of 5.2 million cases in 2019. While the COVID-19 pandemic resulted in a reduction in the number of cases in 2020 and 2021, dengue remains a major health problem in Malaysia, with 43619 cases and 28 deaths reported. Selangor has been the most affected, with 22613 cases and 208 deaths reported between December 2019 and May 2023 (Ministry of Health 2023).

There are four types of dengue virus: DENV-I, DENV-II, DENV-III, and DENV-IV (Rodriguez-Roche and Gould 2013), with infected female *Aedes* mosquitoes being the primary cause of dengue virus transmission to humans. The primary vector responsible for transmitting the virus is *Aedes aegypti*, while *Aedes albopictus* is considered the

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Data availability All data are included in the manuscript.

Declarations

Conflict of interest The authors declare that they have no competing interests.

Consent of publication All the authors read and approved the final version of the manuscript. All of the people involved in the study gave their consent for its publication.

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