



# Surveillance of *Aedes aegypti* and *Aedes albopictus* (Diptera: Culicidae) in high-rise apartment buildings in Selangor, Malaysia

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## Abstract

Dengue is a mosquito-borne disease that causes high mortality and fatality rate among humans. The disease and the virus are spread through female *Ae. aegypti* and *Ae. albopictus*. 176 Modified Sticky Ovitrap (MSO) were installed in six blocks of high-rise apartment buildings in Petaling Jaya, Selangor. The specimens were collected throughout a duration of 26 weeks. NS1 dengue antigen kit was used to detect dengue antigen in mosquitoes, and positive mosquitoes were serotyped using Reverse Transcriptase-PCR, followed by Multiplex-PCR. The relationship between the number of *Aedes* mosquitoes and meteorological parameters was also determined. The association between the number of *Aedes* spp. captured, dengue cases, and positive specimens was also evaluated in this study. A total of 243 adult mosquitoes were successfully captured using MSO, with 95.1% (231) of the mosquitoes being *Ae. aegypti*, while 4.1% (10) and 0.8% (2) were *Ae. albopictus* and a mixed *Aedes* species, respectively. The molecular detection of the dengue virus showed that only 2 individual specimens of *Ae. aegypti* were positive, with one specimen being a dual serotype of DEN-II and IV, and another specimen was DENV-II. The weekly number of *Aedes* spp. captured correlated positively with Tmax, Tmin, and Tmean, and correlated negatively with RF and RH. The significant and useful data obtained from this study can be utilized in dengue vector management by local health authorities.

**Keywords** Dengue · *Aedes aegypti* · *Aedes albopictus* · Dengue virus · Meteorological parameters

## Introduction

Dengue is a vector-borne disease regarded as one of the major global public health concerns (Wilder-Smith et al. 2017; Jentes et al. 2016). Majority of dengue incidence (cases and outbreaks) are reported in urban and sub-urban areas of tropical and subtropical countries (Gubler et al. 2001). The vector that is responsible for the transmission of dengue belongs to the Culicidae family, and the *Aedes* genus (Gubler 1998). Worldwide, *Aedes aegypti* (Linnaeus, 1762) and *Ae. albopictus* (Skuse, 1894) have been incriminated as the primary and secondary vectors for dengue, respectively (Weaver and Reisen 2010). Both vectors are able to transmit

a single and mixed serotype of four distinct single-stranded RNA viruses, namely, DENV-I, DENV-II, DENV-III, and DENV-IV (Rodhain and Rosen 1997).

Tropical and sub-tropical countries with warm and humid climates are conducive for the survival of *Aedes* vectors (Eisen and Moore 2013). Studies have shown that the biology and ecology of vectors, intermediate hosts and the epidemiology of virus transmission can be affected by changes in temperature, humidity and rainfall (Higa 2011). For instance, temperature affects different stages of the mosquito life cycle including viability of eggs, development of larvae, dispersal and longevity of the adults (Delatte et al. 2009; Tun-Lin et al. 2000). Rainfall is closely associated with the abundance of potential breeding habitats of the vectors (Barrera et al. 2011) and humidity has been identified as a consistent, substantial abiotic factor to provide favourable conditions for dengue vector (Descloux et al. 2012).

Past studies showed that ovitrap was used in most of the *Aedes* surveillance in high-rise residential buildings, including in Putrajaya (Wan-Norafikah et al. 2010),

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