

Resistance to Synthetic Pyrethroids in *Aedes aegypti* (Diptera: Culicidae) in Thailand

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ABSTRACT

The insecticide susceptibility level of mosquito populations is one of the major factors influencing the success of vector control. In this study, *Aedes aegypti* from seven localities with a current dengue outbreak in Thailand were subjected to synthetic pyrethroid insecticide susceptibility assays. The results revealed that *Ae. aegypti* from all localities were strongly resistant to bifenthrin, permethrin and deltamethrin. High resistance to lambda-cyhalothrin was detected from all localities with the exception of *Ae. aegypti* from Bangkok and Uttaradit which demonstrated incipient resistance. However, *Ae. aegypti* from Bangkok, Phra Nakhon Si Ayutthaya, Sakon Nakhon and Chumphon showed incipient resistance to alpha-cypermethrin whereas *Ae. aegypti* collected from Uttaradit, Mukdahan and Phatthalung were susceptible. In addition, *Ae. aegypti* from Bangkok, Phra Nakhon Si Ayutthaya and Uttaradit demonstrated incipient resistance to cypermethrin while susceptibility of *Ae. aegypti* from Mukdahan, Sakon Nakhon, Phatthalung and Chumphon to cypermethrin was observed. It was concluded that field-collected *Ae. aegypti* from all localities had developed resistance to the synthetic pyrethroids, with the majority of these being to bifenthrin, permethrin and deltamethrin.

Keywords: *Aedes aegypti*, synthetic pyrethroid, resistance, Thailand

INTRODUCTION

The incidence of dengue fever and dengue hemorrhagic fever (DF/DHF) has increased dramatically around the world in recent decades, especially in tropical and subtropical regions; about 2.5 billion people—two fifths of the world's population—are now at risk from DF/DHF and it is estimated that there are 50 million dengue infections worldwide every year (World Health Organization, 2012, 2014). The incidence of DF/DHF is still consistently high with 153,765 reported cases in Thailand (Ministry of Public Health, 2013). The disease is transmitted by *Aedes*

aegypti, a primary vector of DF and DHF (Gubler, 1997).

Aedes aegypti, a day-biting mosquito, is highly anthropophilic and often rests and feeds in or near human dwellings (Christophers, 1960). This mosquito has been found to be highly adapted to all man-made and natural environments. The key to preventing dengue transmission relies mainly on vector control, the most effective method for reducing disease transmission (Pant, 1979; Reiter and Gubler, 1997). During the past decade, several synthetic pyrethroids—namely permethrin, deltamethrin, lambda-cyhalothrin and etofenprox—were

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