



UNIVERSITI
TEKNOLOGI
MARA

Institut
Pengajian
Siswazah

THE DOCTORAL RESEARCH ABSTRACTS

Volume: 14, October 2018

14th
ISSUE

75



Name : MUHAMMAD AFIQ BIN ZAKI

Title : RESISTANCE STATUS OF *Aedes albopictus* (Skuse)(Culicidae:Diptera) MOSQUITOES TOWARDS ORGANOPHOSPHATE AND PYRETHROID INSECTICIDES IN SELECTED DENGUE OUTBREAK AND NON OUTBREAK AREAS, SELANGOR

Supervisor : DR. HAMZAH FANSURI HASSAN (MS)
ASSOC. PROF. DR. RODZIAH ISMAIL (CS)
PROF. DR. ABU HASSAN AHMAD (CS)

Aedes albopictus is known as a day biting mosquito and a vector of dengue viruses in Malaysia. One of the most effective prevention and control method for dengue currently in practice is the use of insecticides to control adult *Aedes* populations. Nonetheless, this *Aedes* species can develop resistance towards different types of insecticides and threaten vector control programs. In Subang Jaya, the escalating numbers of confirmed dengue cases in recent years suggest that the presence of resistance. Hence this study in the Subang Jaya Municipal area is intended to fill vital gaps in information on the extent of changes in its biological characteristics, development of resistance towards organophosphates and pyrethroids and the expression of metabolic genes. A total of 1,200 ovitraps were placed in 12 dengue outbreak and non outbreak known as hotspots (HS) and non-hotspots (NHS) areas respectively. Analysis of biological characteristics revealed significant differences in fecundity, gonotrophic cycles, duration of immature stages and longevity in mosquito specimens in these two areas. HS *Ae.albopictus* specimens showed enhanced vectorial capacity as compared to NHS specimens. WHO adult bioassays using 4 different types of insecticides against a total of 9,600 individual *Aedes albopictus* mosquitoes collected in HS and NHS areas indicated that the majority of local vector populations were already resistant to Malathion and Permethrin, yet susceptible to Deltamethrin and Lambdacyaluthrin. Analysis of gene expression, using 720 individual *Ae.albopictus*

mosquitoes using qRT-PCR procedures, revealed that *Ae.albopictus* was capable of sequestering detoxification enzymes. Most HS mosquito specimen showed high positive amplification of Glutathione – S – Transferase (GST) and Cytochrome P450 (CytoP450). Similar findings were observed for NHS mosquitoes but gene expression was relatively low, indicating that vector populations were still susceptible towards existing insecticides. As for Esterase Lipase (EL) gene only the specimens collected from 2 localities demonstrated amplification, suggesting cross resistance. Risk ratio (RR) calculated for Mortality Rate (Mr) and Knockdown Rate (Kdr), suggested both HS and NHS specimens had equal risk of resistance (RR=1) towards Malathion. Resistance for Permethrin, Deltamethrin and Lambdacyaluthrin were found respectively, to be 1.2, 6.0 and 2.5 times higher among the HS specimens. Multivariate analysis employing 15 parameters, confirmed that there were significant differences of parameters tested in both HS and NHS specimens with Bonferroni adjusted p – value of $\alpha < 0.003$. In conclusion, this study revealed significant differences in resistance status and underlying resistance attributes in *Aedes albopictus* obtained across Subang Jaya municipal areas. Therefore it appears that current mitigation measures, for managing dengue outbreaks using insecticides, may no longer be effective.