



اَللّٰهُمَّ صَلِّ وَسَلِّمْ عَلٰى
UNIVERSITI
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**METABOLIC RESISTANCE STATUS OF SUBANG JAYA POPULATIONS
OF *Aedes albopictus***

BY

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DECLARATION

I hereby declare that this thesis is my original work and has not been submitted previously or currently for any other degree at UiTM or any other institutions.



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ABSTRACT

Metabolic Resistance Status of Subang Jaya Populations of *Aedes albopictus*

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Dengue fever and dengue haemorrhagic fever cases have intensely increase in Malaysia and become an alarming health issue. Dengue control mechanism relies almost completely on targeting the mosquito vectors by the use of chemical insecticides as either adulticides or larvicides. However the massive used of the insecticides against the vector has led to the global dissemination of insecticide resistance. Twelve dengue hotspots and non-hotspot were selected from different localities in study areas in Subang Jaya Municipality namely Subang Jaya, Seri Kembangan, Seri Serdang and Kinrara. Field collected eggs are reared in Vector Laboratory, and once the larvae and pupae emerged, they were transferred into cages accordingly. A total of 750 mosquitoes were used in this study, where 30 mosquitoes from each Lab strain (USM), hotspot and non-hotspot locations were used to triplicate the samples. 3 to 5 days old female *Ae. albopictus* were captured (aspirator) and preserved for the next step. The preserved mosquitoes are extracted for RNA and then being reversed transcribed to obtain the cDNA for RT-qPCR. A total of 25µl consisted of SYBR Green master mix, reverse and forward primers of the Gene of Interest (GOIs), cDNA template and RNase Free Water is used to run each samples in BioRad CFX96. Molecular assay showed there are expressions of Glutathione S-Transferases and Cytochrome P450 genes within Subang Jaya's *Ae. albopictus* populations with 91.6% for both GOIs in hotspot areas, meanwhile 66.6 % (GSTs) and 75% (Cytochrome P450) for non-hotspots areas respectively. Real time quantitative PCR (RT-qPCR) showed elevated detoxification enzyme activities of the three GOIs and these have indicated that the populations is developing resistance towards the organophosphate and pyrethroids based insecticides. Meanwhile, as for the third GOI, Esterase Lipase, there is no expression detected for all twelve hotspot and non-hotspot within the study locations. Amplification of the GSTs and Cytochrome P450 is mostly upregulated for hotspot areas compared to non-hotspot areas, whereas the Esterase Lipase has no amplification at all for all populations tested. Resistance towards insecticides used is commonly due to the ability to metabolize and hydrolyze the xenobiotics that enters the vector body systems causing them to refuse toxification and fatalities. Once the insecticides resistance is developed, the current chemical controls is no longer affecting the populations, explaining the higher number of dengue cases and dengue outbreaks and the needs for further study is warranted to curb these rising issues.

Keywords: *Aedes albopictus*, GSTs, Cytochrome P450, Esterase Lipase, RT-qPCR, Insecticides resistance

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