

**UNIVERSITI TEKNOLOGI MARA**

**ASSESSMENT OF ATTRACTIVE  
TOXIC SUGAR BAIT (ATSB) ON  
FEMALE *Aedes aegypti* AND  
*Aedes albopictus*  
(DIPTERA: CULICIDAE)**

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## AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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## ABSTRACT

The thesis aimed to determine the effect of two prototype attractive toxic sugar bait (ATSB) formulations on the mortality adult female *Aedes aegypti* (*Ae. aegypti*) and *Aedes albopictus* (*Ae. albopictus*). The ATSB is an alternative adult mosquito control that exploits the sugar feeding behaviour of mosquitoes by attracting them using aromatic compound and then killing them through ingestion of sugar incorporated with oral toxin. There were three objectives achieved in this thesis. The first objective was to determine the effect of four (10%, 30%, 50% and 70%) sugar concentrations to the fecundity and biting behaviour of *Ae. albopictus*. ANOVA was conducted to determine the significant difference between the sugar concentrations and the fecundity and biting behaviour of mosquito. The result after the 6-days experiment period indicated that the daily fecundity and biting rate of females *Ae. albopictus* increase as it fed on higher sugar concentration with the highest fecundity and biting rate recorded in 70% sucrose concentration. The second objective of this thesis was to determine the female *Ae. aegypti* and *Ae. albopictus* response to papaya and pineapple peel extracts after 2 minutes in an olfactometer. The experiment was conducted in two assays; no choice assay where the mosquitoes exposed to papaya or pineapple peel extracts and choice assay where the mosquitoes exposed to both peel extracts simultaneously. The number of mosquito attracted to the peel extracts was analysed with *t*-test. Both *Aedes* species attracted to papaya and pineapple peels extracts in no choice assay. In choice assay, *Ae. albopictus* also attracted to both peel extracts while *Ae. aegypti* was significantly attracted to papaya peel extract only. The third objective was to examine the efficacy of papaya seed extract as the oral toxin component in two attractive toxic sugar bait (ATSB) formulations on the mortality of female *Ae. aegypti* and *Ae. albopictus* in a laboratory setting. A papaya seed toxicity bioassay was conducted to determine the papaya seed extract concentration needed in ATSB formulations and probit analysis was conducted at 24-hour interval to provide the mean lethal concentration (LC) required to kill 50% and 90% of both mosquito populations (LC<sub>50</sub> and LC<sub>90</sub>) respectively. 1% papaya seed extract concentration was selected as the oral toxin component in both ATSB formulations based on LC values. In two separate cages, both female *Ae. aegypti* and *Ae. albopictus* mosquitoes were exposed to ATSB A and ATSB B for 72-hours to determine the mortality rate. The efficacy of 1% papaya seed extract was measured by comparing the mortality rates of ATSB A and ATSB B against a control population. The results indicated that the *Ae. aegypti* mortality rate was significantly higher in ATSB A and ATSB B but there was no significant difference between *Ae. albopictus* mortality rates in ATSB A and the control group. However, the *Ae. albopictus* mortality rate was found to be significantly higher in ATSB B. Therefore, the study concluded that, while both papaya peel and pineapple peel extracts are toxic to mosquitoes, the addition of 1% papaya seed extract increased the mortality rates in both *Aedes* species, especially in the *Ae. albopictus* population. The study's findings can contribute in data collection of ATSB application to control the adult mosquito population.

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