

UNIVERSITI TEKNOLOGI MARA

**EFFECTS OF RADIO FREQUENCY
EXPOSURE ON HATCHING RATE
AND DEVELOPMENT PERIOD OF
Ae. albopictus (SKUSE) (DIPTERA:
CULICIDAE)**

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Project submitted in fulfillment of the requirements for
the degree of

**Bachelor in Environmental Health and Safety
(Hons.)**

Faculty of Health Sciences

January 2023

ACKNOWLEDGEMENT

In the name of Allah, The Most Gracious, The Most Merciful.

Alhamdulillah, all praise to Allah S.W.T., for the strength and His blessings in completing this writing. This dissertation could not be finished without the support, encouragement and cooperation from my supervisor, lab partner, parents, friends and others people.

Here, I would like to express my heartfelt gratitude and appreciation to my dedicated supervisor, Prof. Madya Ts. Dr. Nazri Bin Che Dom, for his efforts in guiding and keeping me on track from the start to the finish of this research journey. Not to mention all of the lecturers in the Centre of Environmental Health & Safety, Faculty of Health Sciences, who have always shared their thoughts, knowledge, and advice with me throughout my studies at UiTM Puncak Alam. In addition, I want to thank all of the laboratory personnel who worked and easing my data collection.

Last but not least, I would like to thank both of my parents, Mr Mat Seleei Bin Zainal and as well as my siblings for their endless love, support, and understanding throughout the completion of this study. Other than that, a special thanks to all of my batchmates from HS243 who helped me with their support and motivation. An honourable mention goes to my lab partners for their cooperation as well as a consideration during the research. I would be unable to complete this research without the assistance of the details mentioned above. Also, I want to congratulate myself for not giving up while completing this journey. Hence, I would like to thank everyone who was involved in this study, whether directly or indirectly.

Thank you.

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ABSTRACT

Telecommunication technologies such as radio, cell phones, and television were developed to meet human needs and have been widely used for decades. However, the invention relies on radio frequency (RF) transmission to transfer and receive signals, which increased concern about the effects of RF fields on human health, including mosquito-borne diseases caused by exposure to these fields. Hence, to address these concerns, a study was carried out to assess the effect of RF exposure on mosquitoes. This study aims to determine the effect of RF exposure on the hatching rate, development period, and egg morphology of the *Aedes* population. Under laboratory conditions, 50 *Ae. albopictus* eggs were exposed to three different exposures (control, low dose: 900 MHz, and high dose: 18 GHz). The effect of the exposure on hatching rate, development period, and egg morphology was observed. In conclusion, a high dose resulted in a lower hatch rate and a longer development period, but faster hatching days.

Keywords: *RF, Ae. albopictus, hatching rate, development period, egg morphology*

CHAPTER 1

INTRODUCTION

1.1 Background

The world's population is rapidly increasing, and it is predicted that rapid urbanisation in major cities will result in significant increases in population density, by 2050. In this regard, the demand for technologically based inventions for a sustainable living environment is escalating. As a result of this requirement, various technologies are being introduced to support human needs, one of which is the invention of wireless telecommunication, which is capable of allowing everyone to communicate easily. To enable wireless communication between users, radio frequency (RF) electromagnetic fields (EMFs) are used.

Current telecommunication networks use frequencies ranging from 0.1-6 GHz (Bhatt, et al., 2016; Nelson, 1996), whereas carrier frequencies for 5G networks can reach 300 GHz, entering the millimeter-wave frequency range. The wavelength becomes comparable to the body size of insects at these higher frequencies. When the wavelength and body size are of the same order of magnitude, the efficiency of RF-EMF absorption in the body is expected to increase (Bakker et al., 2010). The absorption of RF-EMF in biological tissues can result in an organism's dielectric heating (Hirata et al., 2007). Hence, the widespread use of these technologies has raised concerns about the potential effects of RF-EMF emissions on the environment, including mosquito-borne diseases, which are on the rise as wireless networks and devices usage expanded. Aside from that, the concern is whether future variations in RF-EMF will have a greater impact on *Aedes* populations, thereby impacting dengue transmission in urban environments. This is because little is known about the effect of