

UNIVERSITI TEKNOLOGI MARA

**ANALYSIS OF BLOWFLY LARVAE
GROWTH RATE IN RELATION TO
LARVAL MASSING ACROSS THREE
DIFFERENT ENVIRONMENTAL
CONDITIONS**

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ABSTRACT

Forensic entomology estimates the postmortem interval (PMI) in criminal investigations by analysing the larval growth rate in relation to the surrounding temperature of the crime scenes and the temperature experienced within the larval mass during the development. This relationship can be used to estimate when the dead body is initially colonised by blowfly's larvae based on larval size and development stages. The size of larvae is commonly measured in terms of length, weight and width. The aim of this research is to investigate the relationship between surrounding temperature and larval massing temperature on the growth rate of blowflies' larvae at three different environmental locations. The three different locations are the outdoor site, jungle site, and abandoned building site representing three different environmental conditions. In this study, three chicken carcasses, each equipped with a temperature logger, were placed in three different environmental conditions. An additional temperature logger was positioned nearby at each site to record the surrounding temperature. Three replications were incorporated to minimise the error by calculating the average value at the end of the study. Our findings indicate that each location significantly influences the surrounding temperature differently caused by natural or anthropogenic factors. The jungle site has the highest surrounding temperature recorded followed by outdoor site and abandoned building site. The larval massing temperature showed a relationship with the surrounding temperature such as jungle site with higher surrounding temperature has higher larval massing temperatures. In conclusion, the jungle site exhibited the highest growth rates of larvae in length and width due to its optimal environmental conditions, followed by outdoor site while the abandoned building site showed the lowest growth rate most likely due to suboptimal temperatures and less favourable conditions. In addition, *Chrysomya megacephala* and *Chrysomya rufifacies* were found to be pre-dominant among the larvae collected for identification. These results provide a basis for further application especially when conducting investigation involving a deceased body infested with larvae at different environmental locations. These findings can enhance the accuracy of PMI estimations, improving the reliability of forensic analysis and entomology. Future studies should include more environmental variables, such as humidity, and larger carcass models to better understand the influence of carcass size on larval growth rates.

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CHAPTER 1

INTRODUCTION

1.1 Background of Study

Forensic entomology is a large field study of insects and arthropods that are used to assist in the forensic procedures and often providing information that can help in solving crime as part of judicial system (Marchiori, 2021). Medico-legal entomology is a subfield of forensic entomology that widely use insect evidence as criminal component in forensic investigations (Theresa, 2022). Insect evidence is the used of carrion-feeding insects particularly blowflies, in order to estimate post-mortem interval (PMI) and providing information about the circumstances of death such as any movement of corpse post-mortem, manner and causes of death (Bugelli et al., 2023; Marchiori, 2021).

PMI is the elapsed time between death and the time when the body is discovered, or the actual time passed by since the body is left exposed to the environment (Turchetto & Vanin, 2004; Wood *et al.*, 2022). The colonisation of remains by insects such as beetles, wasps, and mainly by blowflies as a pioneer species which generally initiates shortly after death during the first decomposition stages (Auberon *et al.*, 2019; Rana, 2020). The body starts to decompose immediately after death which attracts insects to lay eggs because of the volatile chemicals known as apneumones that was released and it would actively contributes to the decomposition process (Baskaran *et al.*, 2022; Rana, 2020). Decomposition is the process of dead body breakdown after death in which enzymes proceed to break down its cellular components which is also known as autolysis process (Onyejike *et al.*, 2022; Rana, 2020).

Estimating the PMI requires utilising any array of collection and preserving techniques along with labelling of the insect's species, period of growth with various temperatures and abiotic factors such as water and light (Turchetto & Vanin, 2004). Many biotic factors such as presence of insects and scavengers along with abiotic factors such as temperature and humidity are required to be collected to calculate the most accurate PMI estimation because these parameters are known