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COMPOSITION OF FLIES AT THE POULTRY FARM, HULU LANGAT, SELANGOR

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COMPOSITION OF FLIES AT THE POULTRY FARM, HULU LANGAT, SELANGOR

BY

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A project report submitted to the Faculty of Agriculture, Universiti Putra Malaysia in fulfillment of the requirement of PRT 4999 (Final Year Project) for the award of the degree of Bachelor of Agricultural Science

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CERTIFICATION FORM

This project report entitled "Composition of flies at the poultry farm, Hulu Langat" is prepared by Ainie Haslinda binti Mohd Radzi and submitted to the Faculty of Agriculture in fulfillment of the requirement of PRT 4999 (Final Year Project) for the award of the degree of Bachelor of Agricultural Science.

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LIST OF ABBREVIATION

g	gram
µl	microliter
ml	milliliter
mm	millimeter
L	litre
^{o}C	Degree Celcius
%	percentage
min	minute
sec	second
rpm	round per minute
Kbp	kilobase pairs
bp	base pairs
V	volt
sp	species
COII	cytochrome oxidase subunit 2
DNA	deoxyribonucleic acid
PCR	polymerase chain reaction
EtBr	ethidium bromide
TAE buffer	Tris-acetate-EDTA buffer
NCBI	National Center of Biotechnology Information
ITIS	Integrated Taxonomic Information System

ABSTRACT

A survey of flies was conducted at a poultry farm in Hulu Langat, Selangor. A total of 2,038 fly specimens were collected which comprised of member of Calliphoridae (296.5±40.7), Muscidae (27±10.2) and Sarcophagidae (16.2±6.1). Mean number of flies captured in the morning session was 130±52.6 while a lower mean number of flies was recorded (96.3±46.1) in the afternoon session. Calliphoridae flies recorded the highest catch in both morning (323±69) and afternoon session (270±52.9), followed by Muscidae (44.7±10.8 and 9.3±2.2) and Sarcophagidae (22.3±14.2 and 9.7±4.9). The population of flies did not show significant different between the sampling times except for Muscidae flies. Flies from the three families were found abundant in the vacant area than the dumping area and feeding area. However, the mean number of flies from the three families recorded in these sampling areas did not show significant difference. Three sampling methods were used for sampling, the net bottle bait trap captured the highest number of specimens, followed by handpicking method and aquarium method. The net bottle bait trap could trap 4 times and 1 time more Calliphoridae than the handpicking and aquarium methods. This method also trapped 4 times and 30 times more Muscidae and Sarcophagidae than other methods. A detail study was carried out on the Calliphoridae flies. This family comprised of *Chrysomya megacephala*, *Chrysomya rufifacies* and *Lucilia cuprina* which were confirmed by morphological and COII gene identification. These species had scored 100% bootstrap percentage value when compared to other reference species in the GenBank. Among the Calliphoridae species, *C. megacephala* was abundant (79.2±12.4) in the poultry farm, followed by *Chrysomya rufifacies* (15.3±3.1) and *Lucilia cuprina* (5.8±1.1). It also scored the highest mean number of specimen captured in both morning and afternoon sessions at different sampling

areas using different sampling methods. *Chrysomya rufifacies* became the second abundant fly and *L. cuprina* became the least abundant fly recorded in all parameters tested. No significant different was found among the Calliphoridae flies when sampling at different sampling times at different sampling areas. The net bottle bait trap was the best sampling method to capture Calliphoridae species. Calliphoridae, Muscidae and Sarcophagidae are reported to transmit diseases to domesticated animals and human. Control measure should be taken as these flies were found easily in the poultry farm.

ABSTRAK

Tinjauan lalat telah dijalankan di sebuah ladang ternakan di Hulu Langat, Selangor. Sebanyak 2,038 spesimen lalat berjaya ditangkap yang mana terdiri daripada Calliphoridae (296.5 ± 40.7), Muscidae (27 ± 10.2) dan Sarcophagidae (16.2 ± 6.1). Bilangan purata lalat ditangkap pada sesi pagi adalah 130 ± 52.6 manakala jumlah min yang dicatatkan lebih rendah pada sesi tengah hari iaitu (96.3 ± 46.1). Calliphoridae mencatatkan tangkapan tertinggi dalam kedua-dua sesi pagi (323 ± 69) dan sesi petang (270 ± 52.9), diikuti oleh Muscidae (44.7 ± 10.8 dan 9.3 ± 2.2) dan Sarcophagidae (22.3 ± 14.2 dan 9.7 ± 4.9). Populasi lalat tidak menunjukkan perbezaan yang ketara antara waktu persampelan kecuali Muscidae. Lalat dari ketiga-tiga spesis didapati banyak di kawasan lapang daripada kawasan makan dan tempat buangan. Walau bagaimanapun, min bilangan lalat daripada tiga spesies yang dicatatkan di kawasan-kawasan persampelan tidak menunjukkan perbezaan yang ketara. Tiga kaedah telah digunakan untuk persampelan dan didapati jaringan perangkap umpan botol mencatat bilangan tertinggi spesimen, diikuti dengan kaedah menggunakan tangan dan kaedah akuarium. Jaringan perangkap umpan botol memerangkap 4 kali dan 1 kali lebih lalat jenis Calliphoridae daripada kaedah menangkap secara menggunakan tangan dan akuarium. Ia juga memerangkap 4 kali dan 30 kali lebih lalat Muscidae dan Sarcophagidae daripada kaedah lain. Satu kajian terperinci telah dijalankan ke atas lalat Calliphoridae. Keluarga ini terdiri daripada Chrysomya megacephala, Chrysomya rufifacies dan Lucilia cuprina yang mana telah disahkan oleh pengenalan gen morfologi dan molikular. Spesies ini telah menjaringkan 100% nilai peratusan bookstrap berbanding spesies lain dalam rujukan GenBank. Antara spesies Calliphoridae, didapati Chrysomya megacephala banyak (79.2 ± 12.4) di ladang ternakan ayam, diikuti dengan Chrysomya rufifacies

(15.3 ± 3.1) dan Lucilia cuprina (5.8 ± 1.0). Ia juga memperoleh bilangan min spesimen yang tertinggi dalam kedua-dua sesi pagi dan petang di kawasan persampelan yang berbeza dengan menggunakan kaedah persampelan yang berbeza. Diikuti Chrysomya rufifacies yang kedua banyak. Manakala, L. cuprina kurang dicatatkan dalam semua parameter lalat yang telah diuji. Tiada perbezaan yang bererti didapati antara lalat spesies Calliphoridae apabila pensampelan pada masa yang berbeza di kawasan persampelan yang berbeza. Manakala, jaringan perangkap umpan botol adalah kaedah pensampelan yang terbaik untuk menangkap spesies Calliphoridae. Calliphoridae, Muscidae dan Sarcophagidae merupakan salah satu jenis lalat yang menjadi agen penyebaran penyakit kepada haiwan ternakan dan manusia. Oleh itu, lungkah kawalan perlu diambil jika populasi lalat ini meningkat melebihi tahap yang sepatutnya..

CHAPTER 1

INTRODUCTION

Flies belong to the order Diptera. Dipterans only have a pair of wings while another pair of wings is reduced to club like structures known as halters which are used for balance (Vockeroth, 2002). Other characteristics which allow them to be classified in the order Diptera are: they have compound eyes, sucking or sponge-like mouthparts, and have a larger mesothorax compared to the prothorax and metatorax (Vockeroth, 2002). Flies also undergo complete metamorphosis (Vockeroth, 2002; Penjore and Gyeltshen, 2009).

Flies bring both advantages and disadvantages to the biodiversity. The advantages are that they play an important role in the ecosystem as a decomposing agent and also as a biological agent in the pollination process (Vockeroth, 2002). They are also important in the medical field especially for bio surgery in removing infected tissue and speeding up the healing process (Vockeroth, 2002; Szpila *et al*., 2008). The disadvantages of flies are that they act as natural carriers of pathogens to both human and animals which play a role in transmission of pathogens such as viruses, fungi, bacteria, and parasites. They transfer the pathogens via all parts of their body which include their mouthparts by proboscis, legs and through their vomiting (Förster *et al*., 2007; Malik *et al*., 2007).

Animal diseases reported to have been caused by flies are myiasis, rabbit hemorrhagic disease virus, bird flu, newcastle disease, aujeszky's disease, respiratory syndrome, foot and mouth disease, anthrax, tuberculosis, diarrhea, mastitis, brucellosis, skin disease, and eye worm disease. The pathogens that are liable in the disease transmission include virus, bacteria, protozoa, cestodes and

nematodes. Animals which are host to these diseases include birds, pigs, cattle, and rabbit (Greenberg, 1973; Abrams, 1976; Bech-Nielsen *et al.*, 1982; Shane *et al.*, 1985; Medveczky *et l.*, 1988; O'Hara *et al.*, 1989; Yeruham *et al.*, 1996; Graczyk *et al.*, 1999; Fischer *et al.*, 2001; Bram *et al.*, 2002; Otake *et al.*, 2004; Gestmann *et al.*, 2012).

In Malaysia, cases regarding the issue of the outbreak of surra was reported. This disease is caused by *Trypanosome evansi* which are found among the rhinoceros and deer population. This protozoa was carried by flies includes *Tabanus* and *Stomoxys* flies which lead to economic loss to farm (Vellayan *et al.*, 2004; Mohamad *et al*., 2005; Adrian *et al*., 2009). While, 2 species bacteria: *Campylobacter* and *Salmonella* was detected on house flies in poultry farm which could cause food poisoning (Choo *et al.*, 2010). In addition, according to Sawabe *et al.* (2004), a high rate of highly pathogenic H5N1 influenza A viruses was recorded in Japan in 1997, 2003 and 2004. A total of 225,000 chickens was infected in February in the year 2004 and 15,000 chickens resulted in the economic loss in the beginning of March in the year 2004 was recorded from the two poultry farms at Tamba Town, Kyoto, Japan. The H5 influenza A virus gene was detected from *Calliphora nigribarbis* and *Aldrichina graham* belonging to the Calliphoridae family.

Since the Calliphoridae flies may bring diseases to poultry farms, it is important to know their composition in order to control the outbreak of these diseases. The specimens were collected at poultry farm, Hulu Langat, Selangor. This farm was chosen to be a sampling site because of the many problems caused by flies surrounding the farm area including the feeding, dumping and vacant areas. In order to control the fly population, Mr. Anuar owner of the poultry farm has chosen

chemical methods to reduce the population of flies. However, chemical insecticides that have been used may cause environmental effects in a long run. In addition, the flies have a tendency to develop resistance towards insecticides. Therefore, the objective of conducting this project was to survey the population of Calliphoridae species at the poultry farm in Hulu Langat. The data obtained will be useful for the improvement of sanitation and reduction of fly population in the poultry farm.

CHAPTER 7

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