UNIVERSITI PUTRA MALAYSIA

SURVEY ON SARCOPHAGIDAE SPECIES AT A POULTRY FARM IN HULU LANGAT, SELANGOR

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FP 2016 27

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BY

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A project report submitted to 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

FACULTY OF AGRICULTURE
UNIVERSITI PUTRA MALAYSIA
SERDANG, SELANGOR
2015/2016

This project report entitled **Survey On Sarcophagidae Species At A Poultry Farm In Hulu Langat, Selangor** prepared by Mohamad Khairulanuar bin Mohd Isa 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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ACKNOWLEDGEMENT

First and foremost, Alhamdulillah and praise to God for giving me the will to complete my Final Year Project. For my supervisor Dr Lau Wei Hong, thank you so much for being the most supportive person throughout my project. Your guidance and motivation is one of the most valuable things in my life.

I would like to thank all of the seniors, Miss Siti Mahsuri Binti Talib, Miss Fateen Noorasyiqin binti Sarkowi, Mr. Tan Cheng Seng, Mr. Fahad Nazir, Dr. Isyaruddin bin Md Isa and Dr. Nurayu binti Asib for their willingness to help and show me the step to complete the task.

Besides that, special thanks dedicated to my friend, Miss Aini Haslinda binti Mohd Radzi, who is so helpful and generous in sharing information regarding this project.

Last but not least, I would like to give my gratitude to my beloved parents for their blessings and understanding and not to forget my family members and friends who are always there for me. Your encouragement is what keeping me from falling.

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LIST OF ABBREVIATION

%	percent
°C	degree Celcius
µl	microlitre
bp	base pair
COII	cytochrome oxidase subunit II
DNA	deoxyribonucleotide acid
dNTP	deoxyribonucleotide triphosphate
EDTA	ethylenediamine tetra-acetic acid
EtOH	ethanol
g	gram
h	hour
kbp	kilobase pair
L	litre
MEGA	Molecular Evolutionary Genetics Analysis
mg	milligram
min	minute
mm	millimetre
MtDNA	mitochondria deoxyribonucleotide acid
NCBI	National Centre for Biotechnology Information
PCR	Polymerase Chain Reaction
RNA	ribonucleotide acid
rpm	rotation per minute
sec	second

sp	species
spp	species (plural)
TAE Buffer	tris acetate-EDTA buffer
V	volt

ABSTRAK

Tinjauan lalat telah dijalankan di sebuah ladang ternakan ayam di Hulu Langat, Selangor. Sebanyak 2,037 spesimen lalat telah dikumpulkan yang terdiri daripada keluarga Calliphoridae (296.5±40.7), Muscidae (27.0±10.2) dan Sarcophagidae (16.2±6.1). Bilangan purata lalat ditangkap pada sesi pagi adalah 390.0±92.9 manakala jumlah purata lalat yang lebih rendah dicatatkan (289.0±59.9) pada sesi petang. Lalat Calliphoridae mencatatkan tangkapan tertinggi pada kedua-dua waktu pagi (323.0±69.0) dan sesi petang (270.0±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). Dalam keluarga lalat tersebut, dapatan tidak menunjukkan perbezaan yang signifikan antara waktu-waktu persampelan kecuali keluarga Muscidae. Kesemua keluarga lalat didapati banyak di kawasan lapang berbanding daripada kawasan pembuangan dan kawasan makan. Walau bagaimanapun, purata bilangan lalat daripada tiga keluarga yang dicatatkan di kawasan-kawasan persampelan tidak menunjukkan perbezaan yang signifikan. Tiga kaedah persampelan digunakan untuk persampelan, perangkap umpan jaring botol meangkap bilangan spesimen yang tertinggi, diikuti dengan kaedah tangkap menggunakan tangan dan kaedah akuarium. Perangkap umpan jaring botol dapat metangkap 4 kali dan 1 kali lebih Calliphoridae daripada kaedah tangkap menggunakan tangan dan kaedah akuarium. Ia juga boleh merangkap 4 kali dan 30 kali lebih Muscidae dan Sarcophagidae daripada kaedah lain. Satu kajian terperinci telah dijalankan ke atas lalat Sarcophagidae. Keluarga ini terdiri daripada spesies Amobia erythrura, Sarcophaga dux, Sarcophaga misera, Sarcophaga princeps dan Sarcophaga taenionota yang telah disahkan oleh pengenalan ciri-ciri morfologi dan C0II. Spesies ini telah menjaringkan nilai peratusan 100% mengikut spesies-spesies referen di GenBank. Antara spesies Sarcophagidae itu, S. dux adalah banyak (5.8±2.3) di ladang ternakan ayam, diikuti oleh S. princeps (5.0±1.8), S. misera (2.5±1.2), S. taenionota (2.5±1.1) dan A. erythrura (0.2±0.2). S. dux juga menjaringkan bilangan purata yang tertinggi iaitu spesimen ditangkap dalam kedua-dua sesi pagi dan petang di kawasan persampelan yang berbeza dengan menggunakan kaedah persampelan yang berbeza. S. princeps menjadi lalat yang kedua banyak dan A. Erythrura menjadi lalat yang paling kurang dicatatkan dalam semua parameter yang diuji. Tiada perbezaan yang signifikan didapati antara lalat

Sarcophagidae apabila pensampelan pada masa-masa persampelan yang berbeza dengan kawasan persampelan yang berbeza. Kaedah tangkap menggunakan tangan adalah kaedah pensampelan yang terbaik untuk menangkap spesies Sarcophagidae. Calliphoridae, Muscidae dan Sarcophagidae dilaporkan telah menjadi agen penyakit kepada haiwan ternakan dan manusia. Langkah kawalan perlu diambil memandangkan lalat-lalat ini didapati dengan mudah di ladang ternakan ayam.

ABSTRACT

A survey of flies was conducted at a poultry farm in Hulu Langat, Selangor. A total of 2,037 flies specimens were collected which comprised of member of Calliphoridae (296.5±40.7), Muscidae (27.0±10.2) and Sarcophagidae (16.2±6.1). Mean number of flies captured in the morning session was 390.0±92.9 while a lower mean number of flies was recorded (289.0±59.9) in the evening session. Calliphoridae flies recorded the highest catch in both morning (323.0±69.0) and afternoon session (270.0±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 respectively. It also trapped 4 times and 30 times more Muscidae and Sarcophagidae than other methods. A detail study was carried out on the genus of Sarcophagidae flies. This family comprised of *Amobia erythrura, Sarcophaga dux, Sarcophaga misera*, *Sarcophaga princeps* and *Sarcophaga taenionota* which were confirmed by morphological and *C0II* gene identification. These species had scored 100% bootstrap percentage value when compared to other reference species in the GenBank. Among the Sarcophagidae species, *S. dux* was abundant (5.8±2.3) in the poultry farm, followed by *S. princeps* (5.0±1.8), *S. misera* (2.5±1.2), *S.*

taenionota (2.5±1.1) and *A. erythrura* (0.2±0.2). It also scored the highest mean number of specimen captured in both morning and afternoon sessions at different sampling areas using different sampling methods. *S. princeps* became the second abundant fly and *A. Erythrura* became the least abundant fly recorded in all parameters tested. No significant different was found among the Sarcophagidae flies when sampling at different sampling times with different sampling areas. The handpicking method was the best sampling method to capture Sarcophagidae species. Calliphoridae, Muscidae and Sarcophagidae are reported to have transmitted diseases to domesticated animals and human. Control measure should be taken as these flies were found easily in the poultry farm.

CHAPTER 1

INTRODUCTION

Sarcophagidae is a family of synanthropic flies which is ecologically associated with human activities. The members of Sarcophagidae species are called flesh flies and they may transmit disease to human either biologically or mechanically through their living style (Gabre and AbouZied, 2003). It is important to keep the fly population under controlled in order to prevent the spreading of diseases, either to human or animals.

Transmission of human and animal diseases via flies has been reported worldwide (Sukontason, 2007). Flesh flies have sensory cells on their appendages that are very sensitive to detect compounds like carbon dioxide and ammonia released from animal faeces or another decomposing organic material (Tan *et al.*, 1997). They will transmit pathogens through their body hairs, sticky pads on their feet, mouthparts, faeces, stomach and their vomit (Graczyk *et al.*, 1999) to human facilities. Several studies have shown that Sarcophagidae flies can cause myiasis, melioidosis, pneumonia, diarrhoea, nosocomial infections, gastroenteritis and typhoid in human and animals (Sulaiman *et al.*, 2000; Fetenea and Workub, 2009).

Flesh flies are also forensically important dipterans in Thailand (Sukontason *et al.*, 2010). A total of 67 *Sarcophaga* species have been identified in Thailand and grouped according to their larviposition behavior, such as coprobiodotic flies (larviposition on faeces), necrobiodotic flies (larviposition on carrion) including *S. peregrina*, and amphibiodotic flies (larviposition on both feces and carrion) including *S. dux*, *S. ruficornis*, and *S. annandalai* (Bänziger and Pape, 2004). Necrobiodotic and amphibiodotic flesh flies are frequently found in forensic study (Sukontason *et al.*,

2007). While in Malaysia, a total of 42 Sarcophagidae species have been reported by Tan (2012) and they were either carrion eating flies or parasites of other insects and invertebrates.

Morphological identification is important in insect identification. However, the immature stage of insects becomes a challenge for identification. Researches have proven that molecular identification is a more reliable method in species identification and proven applicable to any life stages of an insect as long as sufficient amount of specimens DNA is obtained (Harvey *et al*., 2003; Tan *et al*., 2009). Many researchers combined the use of morphological and molecular identification to confirm the species.

Hulu Langat is located in the south eastern of Selangor state. This sub-district is surrounded by bushes and forests, and a diverse flora and fauna can be found there. Vegetable and livestock farming is active in this sub-district and the agricultural waste has attracted many flies to hunt for food. The selected poultry farm for the present study is located near to the agriculture lands and villages in Hulu Langat. Based on Jabatan Perkhidmatan Veterinar Negeri Selangor (2015), there are 222 farmers who are registered as a farmer. The farming activities have provided an easy access to synanthropic flies. These flies may bring harm to the domesticated animals and villages. Therefore, the objective of this study was to survey the Sarcophagidae species at the poultry farm in Hulu Langat, Selangor. The data generated from this study may provide a baseline study for the management of pest in poultry farming.

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