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Daily and seasonal variation of muscid flies (Diptera: Muscidae) in Chiang Mai province, northern Thailand

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ABSTRACT

Flies of the family Muscidae, or muscids, are of medical and veterinary importance worldwide due to their recognition as nuisance pests and myiasis-producing agents. Effective control of muscids requires biological information on population dynamics daily and across seasons. In this study, such patterns were investigated in three different microhabitats (e.g., forest area, palm plantation and longan orchard) in a suburban area of Chiang Mai Province, northern Thailand. Adult fly samplings were conducted for 24-h intervals using semiautomatic traps and 1-day old beef offal as bait. Samplings were carried out twice per month from July 2013 to June 2014. A total of 3,419 muscids were trapped, comprising nine species, with *Musca domestica* Linnaeus accounting for the majority (n = 1,329; 38.9%) followed by *Hydrotaea spinigera* Stein (n = 770; 22.5%) and *Musca ventrosa* Wiedemann (n = 740; 21.7%). The greatest overall abundance was in the longan orchard location (n = 1,508; 44.1%). Community structure peaked during the rainy season (mid-May to mid-Oct). Peak activity during the day was late morning (9.00 to 12.00 h) for *M. domestica*, early morning (6.00 to 9.00 h) for *H. spinigera*, and early afternoon (12.00 to 15.00 h) for *M. ventrosa*. Temperature had no significant effect on the abundance of *M. domestica* (r_s= -0.030, p = 0.576) or *H. spinigera* (r_s = 0.068, p = 0.200), but had a weak negative correlation with *M. ventrosa* (r_s = −0.238, p = 0.0001). Relative humidity had a weak negative correlation with *M. domestica* (r_s = −0.263, p = 0.0001), *H. spinigera* (r_s = −0.107, p = 0.043) and *M. ventrosa* (r_s = −0.344, p = 0.0001). More females (n = 2,078) were trapped than males (n = 761). These results provide baseline information of daily and seasonal dynamic activity of muscid flies under natural conditions, which is the prerequisite information for effective control measures.

1. Introduction

The Muscidae, filth flies or muscids, is one of the most diverse groups within Diptera with more than 100 species reported in Thailand (Tumrasvin and Shinonaga, 1978, 1982). Muscid flies include non-biting and hematophagous species of medical and veterinary pests (Byford et al., 1992; Malik et al., 2007; Baldacchino et al., 2013). Some non-biting muscids, such as the house fly, *Musca domestica* Linnaeus, and the bazaar fly or eye-seeking fly, *Musca sorbens* Wiedemann, are mechanical vectors of several pathogenic microorganisms (Sukontason et al., 2007; Khamesipour et al., 2018; Pohlenz et al., 2018). At least 130 pathogens, including bacteria, fungi, virus, protozoa, and helminth eggs, have been isolated from *M. domestica* (Khamesipour et al., 2018). Furthermore, *M. domestica* is an ectoparasite that can cause facultative myiasis in humans (Derraik et al., 2010; Abosdera and Morsy, 2013). In forensic investigations, many cases reported muscids associated with the death scenes, e.g., *M. domestica, Hydrotaea spinigera* Stein and *Synthesiomyia nudiseta* (van der Wulp) (Sukontason et al., 2007; Sanford 2017). However, muscid flies have received little interest in forensic entomology research due to taxonomic limitations regarding their identification (Grzywacz et al., 2017).

Although, research on muscids has been conducted on their

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