

Geographic Distribution of Stomoxyine Flies (Diptera: Muscidae) and Diurnal Activity of *Stomoxys calcitrans* in Thailand

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ABSTRACT Stomoxyine flies (*Stomoxys* spp.) were collected in 10 localities of Thailand using the Vavoua traps. These localities represented four major ecological settings, as follows: small local dairy farms, large industrial dairy farms, a national park, and one elephant conservation area. Three species of stable flies were identified in the following proportions: *Stomoxys calcitrans* (91.5%), *Stomoxys indicus* (7.9%), and *Stomoxys sitiens* (0.6%). The number of flies collected differed significantly among collection sites ($\chi^2 = 360.15$, $df = 3$, $P < 0.05$). The greatest number of stomoxyine flies was captured in dairy farms. Seasonal and daily activity of *S. calcitrans* was observed during a 1-yr period at two selected locations (Dairy Farming Promotion Organization of Thailand and Khao Kheow Open Zoo). *S. calcitrans* was more abundant during the rainy season (March–September), but was not associated with the total rainfall ($r^2 = 0.0002$, $P > 0.05$). Peak of daily flight activity of males *S. calcitrans* was at 1000 and 1600 h, whereas females showed an increase of activity all along the day until 1600 h. A better understanding of stomoxyine fly behavior related to patterns of daily activity will facilitate and improve the efficiency of fly control measures in private and government sectors.

KEY WORDS *Stomoxys* spp., distribution, seasonal and diurnal activity, Vavoua traps, Thailand

The genus *Stomoxys* (Muscidae: Stomoxyinae) contains at least 18 described species (Zumpt 1973). They are obligate blood-sucking insects with some species considered significant economic pests of livestock and other warm-blooded animals in many parts of the world (Zumpt 1973, Mullens et al. 1988, Masmeathathip et al. 2006). Among these, *Stomoxys calcitrans* (L., 1758), known as stable fly, is the most important and cosmopolitan species. Both male and female stomoxyine flies feed on blood, generally once each day. Adult flies have a typical flight range of 1 mile (≈ 1.6 km). The biology of stable flies is described elsewhere

(LaBrecque et al. 1975, Berry et al. 1976, Smith et al. 1985).

Stomoxyine flies can be a severe problem in dairies and feedlots, where they breed in moist soil and similar substrates (Meyer and Petersen 1983). Severe biting activity can result in a reduction in animal weight and milk production. Significant economic losses as a result of reduction of anticipated gross weight gain and 30–40% decreases in milk yields have been observed (Hall et al. 1982, Mullens et al. 1988). In the United States, the estimated economic loss to the beef and dairy industry is nearly 400 million dollars annually (Smith et al. 1987). The high number of flies biting cattle and other affected animals may have a direct influence on the epidemiology of communicable diseases. Several stomoxyine fly species have been implicated as mechanical vectors of anaplasmosis (*Anaplasma marginale*), trypanosomosis (*Trypanosoma* spp.), and different viruses (e.g., bovine leucosis virus, bovine herpesvirus-2, and lumpy skin disease virus) (Buxton et al. 1985, Mihok et al. 1995, Torr et al. 2006, Carn 1996).

Stomoxys species have been found to have a wide host range (Warnes and Finlayson 1987). In Egypt, domestic donkeys and horses are the preferred hosts (Hafez and Gamal-Eddin 1959). Warnes (1984) found *S. calcitrans* preferred to feed on cattle and horses in the United Kingdom. Numerous host factors appear to influence the long-range olfactory responses of stable

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