

Population Structure of *Stomoxys calcitrans* (Diptera: Muscidae) From Nine Regions of Thailand

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ABSTRACT Starch gel electrophoresis of isozymes was used to estimate gene flow among nine populations of *Stomoxys calcitrans* (L.) (Diptera: Muscidae) from Thailand. Of the 13 putative loci, nine polymorphic loci were detected. Limited genetic differentiation among populations was observed ($F_{ST} = 0.060$). The highest level of polymorphism was observed in flies from eastern Trat and northern Chiang Mai provinces (69.2%), whereas the lowest level of polymorphism was seen in flies from central Saraburi Province (23.1%). Gene flow between populations varied from 3.27 to 27.53 reproductive migrants per generation. Among the nine populations sampled, no correlation was seen between genetic and geographical distances showing that sampled *S. calcitrans* fit closely in the same cluster taxa. The electrophoresis of ten isozymes shows a genetic homogeneity of *S. calcitrans* populations at the scale of Thailand.

KEY WORDS *Stomoxys calcitrans*, genetics, isozyme, gene flow, Thailand

The genus *Stomoxys* (Muscidae: Stomoxyinae) contains at least 18 described species (Zumpt 1973). Both sexes of all species are blood-feeding insects and considered significant economic pests and disease vectors of livestock and other warm-blooded animals in many parts of the world (Bruce and Decker 1958, Zumpt 1973, Masmeatahup et al. 2006, Mullens et al. 2006). Among these flies, the cosmopolitan *Stomoxys calcitrans* (L.) is an aggressive, vicious biter, and will readily attack humans (Harwood and James 1979, Wall and Shearer 1997). This species can serve as mechanical or biological vectors of several important veterinary pathogens such as *Trypanosoma evansi* (Steel) or *T. vivax* (Ziemann) in horses, cattle, camels and dogs, several species of gastrointestinal *Habronema* nematodes of equines, and the filarial parasite of cattle, *Setaria cervi* (Rudolphi). Stable flies also have been implicated in the transmission of polio virus, equine infectious anemia, anthrax, and fowl pox (Greenberg 1971, Harwood and James 1979, Lehane 1991, Wall and Shearer 1997). Although most active near livestock, *S. calcitrans* can be a significant nuisance to humans on

beaches and in residential areas near agricultural areas, with a typical flight range of ≈ 1 –2 km from their origins (Jones et al. 1991).

In Thailand, five species have been identified in the genus *Stomoxys* with the most prevalent being *S. calcitrans* (Masmeatahup et al. 2006). *S. calcitrans* is found in many areas of Thailand, mainly in the central and northeastern regions (Sucharit and Tumrasvin 1981, Echeverria et al. 1983). Recent investigations have indicated that *S. calcitrans* is widespread throughout Thailand where domestic and wild animals are common (Masmeatahup et al. 2006; V.M., unpublished data). Wind-assisted active migration (appetitive flight) or passive wind-borne dispersion play a role in the movement patterns of *S. calcitrans* (Williams and Rogers 1976, Hogsette and Ruff 1985). Other findings suggest that greater movement over 1–3 km seems to be a normal characteristic of *S. calcitrans* (Eddy et al. 1962, Bailey et al. 1973). In addition, Hogsette and Ruff (1985) acknowledged a wind-assisted flight range of 225 km in Florida.

A better understanding of the biology of *S. calcitrans*, especially population genetics, is needed before initiating fly control activities. Knowledge of population structure can help estimate migration between/among different stable fly populations, provide insight into the epidemiology and transmission of pathogens, and support more responsive and effective fly control. In this study, we measured the genetic relationships among populations of *S. calcitrans* collected from nine locations of Thailand by using allele variation frequencies of isozymes.

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