

Effect of expanding farmlands with domestication of animals in the vicinity of disturbed swamps and built-up farmland ponds on population dispersion and decline of locally adapted *Mansonia* vectors (*Diptera: Culicidae*)

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Abstract

Background and Objectives: The adaptive processes and resilience of *Mansonia* vectors responsible for bioindicators can change in response to climate, land use, and environmental changes. This study evaluated the effects of expanding farmlands with the domestication of animals in the vicinity of either disturbed swamps or built-up farmland ponds on the population dispersion and decline of locally adapted *Mansonia* faunas as a result of expanding farmlands in Thailand.

Materials and Methods: Based on environmental surveys, four different geographically defined study sites were selected: I - the expanding farmlands with domestication of livestock and pet animals in the vicinity of low-lying swamp with habitat fragmentation and aquatic vegetation; II - the expanding farmlands with domestication of pet animals in the vicinity of elevated swamp with habitat destruction and aquatic vegetation; III - the expanding farmlands with domestication of livestock and pet animals in the vicinity of low-lying farmland ponds with restoration and aquatic vegetation; and IV - the expanding farmlands with domestication of pet animals in the vicinity of elevated farmland ponds with restoration and aquatic vegetation. Human landing catch collection method was used to periodically assess the species composition and abundance of *Mansonia* vectors.

Results: Aggregated distributions and seasonal abundances of *Mansonia* faunas (*Mansonia uniformis*, *Mansonia indiana*, *Mansonia annulifera*, *Mansonia annulata*, *Mansonia bonneae*, and *Mansonia dives*) with variable proportions were observed at all the study sites. A decline in the population of *Mansonia* faunas, except for *Ma. uniformis*, was observed at study sites I and II.

Conclusion: The anticipated effects of expanding farmlands affected the population dispersion and decline of locally adapted *Mansonia* faunas, thus representing a diverse assemblage of *Mansonia* species with different adaptations, ecological tolerances, and host exploitation strategies in life. These effects depended either on the function of disturbed swamps or on the development of farmland ponds, whether they provided a wide range of freshwater habitats, or on the domestication of animals, whether they provided animal blood meal sources.

Keywords: built-up farmland ponds, disturbed swamps, expanding farmland, freshwater habitats, and animal blood meal sources, *Mansonia* fauna.

Introduction

Mansonia mosquitoes (*Diptera: Culicidae*), belonging to the genus *Mansonia*, are known to be vectors for arboviruses [1–3] and lymphatic filarial nematode parasites *Brugia malayi* [4–7] and *Wuchereria bancrofti* [8, 9]. *Mansonia* is a strong zoophilic species that can attack livestock, poultry, and wild or domestic animals. Certain *Mansonia* spp.

are major nuisance pests. Due to their seasonal abundance, they become more pestiferous to livestock and humans [2, 4, 10]. *Mansonia* fauna (i.e., all *Mansonia* species present in a particular area or time) is sessile to a wetland ecosystem at a particular altitude over time. *Mansonia* faunas that infest freshwater/blackish habitats across the globe are classified into two subgenera: *Mansonia* Blanchard and *Mansonoides* Theobald [11, 12]. Understanding the population dispersion, abundance, and spatial/temporal distribution of *Mansonia* fauna is crucial in establishing the importance of veterinary public health regarding nuisance pests to animals and the potential in the transmission dynamics of pathogens to animals and humans. The subgenus *Mansonia* consists of approximately 15 species [11, 12]: *Mansonia amazonensis*, *Mansonia*

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