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Occurrence of a mosquito vector in bird houses: Developmental consequences and potential epidemiological implications

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ABSTRACT

Even with continuous vector control, dengue is still a growing threat to public health in Southeast Asia. Main causes comprise difficulties in identifying productive breeding sites and inappropriate targeted chemical interventions. In this region, rural families keep live birds in backyards and dengue mosquitoes have been reported in containers in the cages. To focus on this particular breeding site, we examined the capacity of bird fecal matter (BFM) from the spotted dove, to support *Aedes albopictus* larval growth. The impact of BFM larval uptake on some adult fitness traits influencing vectorial capacity was also investigated. In serial bioassays involving a high and low larval density (HD and LD), BFM and larval standard food (LSF) affected differently larval development. At HD, development was longer in the BFM environment. There were no appreciable mortality differences between the two treatments, which resulted in similar pupation and adult emergence successes. BFM treatment produced a better gender balance. There were comparable levels of blood uptake and egg production in BFM and LSF females at LD; that was not the case for the HD one, which resulted in bigger adults. BFM and LSF females displayed equivalent lifespans; in males, this parameter was shorter in those derived from the BFM/LD treatment. Taken together these results suggest that bird defecations successfully support the development of *Ae. albopictus*. Due to their cryptic aspects, containers used to supply water to encaged birds may not have been targeted by chemical interventions.

1. Introduction

Dengue has become a major international public health concern, and outbreaks can now occur almost anywhere and at any time (WHO, 2014). Previously considered as the primary vector, *Aedes aegypti* has been joined by *Aedes albopictus* in many parts of the world (Rochlin et al., 2013). This latter species has been suggested to have played roles in recent outbreaks of dengue (Rezza, 2012; Das et al., 2013), a disease that kills more people than any other mosquito-borne virus globally (Gubler, 2004; Farrar et al., 2007). The main strategy to control dengue vectors is the use of insecticides through the application of larvicides and space spraying (WHO, 2010). Apart from increased resistance to the main families of insecticides (Dia et al., 2012), the control of dengue vectors is complicated by the existence of cryptic larval habitats that can be highly productive (Gonzalez et al., 2007; Arana-Guardia et al., 2014; Barrera et al., 2014). *Ae. albopictus* has been reported in cryptic habitats (Lam et al., 2010). According to Russell and colleagues, when secretive breeding sites are present, but unknown,

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