Determination of critical density in *Culex tritaeniorhynchus* Giles, 1901 (Diptera: Culicidae) as a deciding factor influencing the transmission of Japanese encephalitis virus in southern India

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**ABSTRACT:** Japanese encephalitis virus (JEV) causes a severe neurobiological health hazard, namely, Japanese encephalitis (JE) which has been rampant in Cuddalore district in the 1970s and 1980s, transmitted mainly by *Culex tritaeniorhynchus*. The authors have been working on various aspects of transmission dynamics of JE in Cuddalore district, south India, for past more than two decades and have analyzed varied data on ecology and biology of vector *Cx. tritaeniorhynchus*, to develop a model for depicting the critical density which is a primary requisite to develop control strategy against vector. Such a model of critical density for the vector will be helpful to forecast prospective outbreaks of the disease exacting heavy morbidity and mortality in many parts of India. © 2016 Association for Advancement of Entomology

**KEYWORDS:** Cuddalore, JE virus, *Culex tritaeniorhynchus*, Critical density

**INTRODUCTION**

Japanese encephalitis (JE) is widespread over South East Asia and Pacific regions where 3 billion people are at risk of infection. It is a leading cause of viral encephalitis in Asia, caused by a virus from the family Flaviviridae and mainly occurs and prevailing in rural setting, especially in rural and suburban areas where rice growing and pig farming culture coexist (Campbell *et al.*, 2011; Halstead and Jacobson, 2008). It is of greater public health importance since it produces mild infection to permanent brain damage with increasing case fatality rate through causing serious inflammation of the membranes around the brain (Bhowmik *et al.*, 2012). Japanese encephalitis virus (JEV) is transmitted to humans by infective bites of female mosquitoes mainly belonging to *Culex tritaeniorhynchus, Culex vishnui* and *Culex pseudovishnui*. In India, *Culex vishnui* group (*Culex tritaeniorhynchus, Culex vishnui* and *Culex pseudovishnui*) are the chief vectors of JE which breeds particularly in stagnant water in the flooded rice growing fields (WHO, 2001). JEV is maintained in an enzootic cycle between mosquitoes and amplifying vertebrate hosts, primarily pigs and wading ardeid birds. Humans are incidental or dead-end hosts, because they usually do not develop a level or duration of viremia necessary to infect mosquitoes (Susan *et al.*, 2012).

JE disease was first reported in Japan in 1924, was subsequently reported in other Asian countries whereas in India the first case was reported in the state of Tamil Nadu in 1955. Till 2012, about 17 states/UTs in India have reported incidence of JE.