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## Short Research Communications

# Larval habitats of *Aedes albopictus* (Skuse) in rural areas of Calicut, Kerala, India

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The role of *Aedes albopictus* (Skuse) in the spread of many arboviral infections including dengue and chikungunya is now well-documented<sup>1–3</sup>. *Aedes albopictus* currently shows a global presence and recognized as a major threat to human health. In India, re-emergence of chikungunya has been reported from several states since 2005<sup>4</sup>. *Aedes aegypti* (Linnaeus) plays a key role in the transmission in various states of India. Observations in Kerala showed the occurrence of *Ae. albopictus*, the Asian tiger mosquito, as a principal vector in hilly, rural and suburban environment in the affected areas<sup>5–7</sup>. Kerala has now become an endemic state for dengue and chikungunya. Hundreds of cases of chikungunya and dengue reported every year since 2006 from different districts of Kerala. In Calicut district, the cases recorded an increase throughout the study period (2006–09) and a major outbreak of chikungunya was reported during 2009 in many rural and plantation regions. A study was conducted from 2006–09 in the rural areas around Calicut City, Kerala to find out the major larval habitats of *Ae. albopictus* and with an objective to evolve a targeted source reduction programme and thus to enhance the effectiveness of the control strategy.

Calicut district is situated between 11.25°N longitude and 75.77°E latitude. Topography consists of hills, plains and coastal areas with an average rainfall

of 3266 mm and temperature ranging from 14 to 39°C<sup>8</sup>. Most parts of the district are covered with coconut plantations and the eastern hilly parts of Western Ghats region are covered with rubber, areca and cocoa plantations. The study carried out was descriptive observation type. Chikungunya and dengue show a seasonal trend coinciding with southwest monsoon occurring from May to October, due to increase in vector density. Hence, observations were made during this period. Rural areas adjacent to Calicut City were identified and four *Panchayats*, viz. Olavanna (11°13'43" N, 75°49'56" E), Perumana (11°14'18" N, 75°52'36" E), Peruvayal (11°15'41" N, 75°54'16" E) and Mavoor (11°16' 0" N, 75° 55' 0" E) were selected for the study. From each *Panchayat* one ward was selected using random sampling method. In each ward, first house was identified using simple random technique from the listed houses and then 24 nearby houses were selected for the study. Thus, a total of 100 houses were covered during house-to-house larval survey for potential container breeding sources in June and July, for the years 2006–09. The larvae collected were identified for *Ae. albopictus*<sup>9</sup> and *Aedes* larval indices, viz. container index, house index and breteau index were calculated. The container habitats were enumerated and classified according to type such as coconut shells, plastic objects, tyres, flower pots and glass waste.

**Table 1. *Aedes albopictus* larval indices in the study area during 2006–09**

Year	Total no. of containers	No. of +ve containers	No. of +ve houses	Container index	House index	Breteau index
2006	622	131	37	21.06	37	131
2007	570	184	41	32.28	41	184
2008	543	155	30	28.54	30	155
2009	618	188	51	30.42	51	188

Table 1 shows the *Ae. albopictus* larval indices recorded during the observation period for the study area. Container, house and breteau indices were found to be higher than normally acceptable limits<sup>10</sup>. Fig. 1 shows the percentage of different container breeding sites recorded in the area. Major breeding sites found were coconut shells and plastic materials. Tyres, flower pots, earthen wares and glass waste were also detected though in less numbers. A similar trend was observed in case of containers recorded positive for *Ae. albopictus* breeding.

Chikungunya cases reported from Calicut district showed an increasing trend through out the study period. In 2006, there were a few localized outbreaks when the study was initiated<sup>11</sup>. Number of confirmed cases was 840 in 2007 and 557 in 2008<sup>12</sup>. In 2009, full-fledged epidemic was reported with an estimated number of cases reaching >10,000<sup>13</sup>. This year greater part of the district was affected. The findings

on larval indices of this study corroborate the chikungunya situation in the district during the study period.

*Aedes albopictus* as a container breeder is well-documented world over. It breeds in both natural and man-made habitats. It is primarily a forest-fringe mosquito breeding in natural sites including rock pools, leaf axils, tree holes, cut bamboo stumps, etc. Widespread deforestation and increase in plantations especially of rubber, cocoa and areca nut contributed to the rapid spread of tiger mosquito in Kerala. Extensive breeding was found in containers used for collecting rubber sap in rubber plantations during the rainy season<sup>6</sup>. In Western Ghat regions of Malabar, profuse breeding was observed in shed leaf sheaths of areca nut palms and cocoa pods hanging from the trees as well as grounded<sup>5,14</sup>. Due to highly invasive nature and ecological plasticity, it spread to rural and suburban niches breeding in artificial containers like plastics and tyres. Hiriyan *et al*<sup>15</sup> reported breeding of this mosquito in plastic cups around tea vendor shops in Ernakulam City, Kerala.

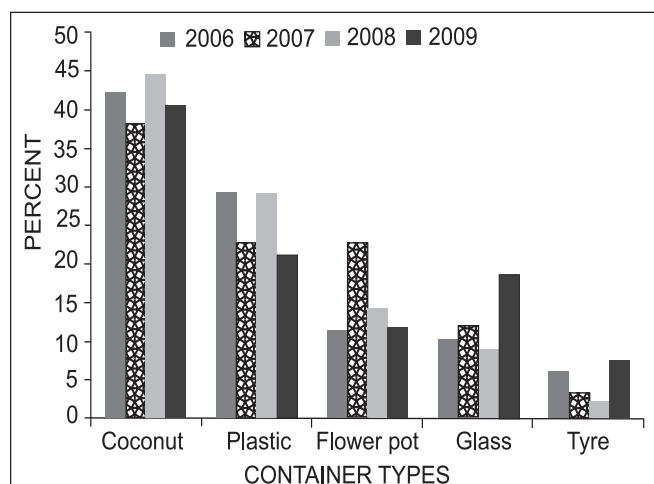


Fig. 1: Percentage of container types surveyed in the study area

This study showed coconut shells and plastics dumped around the households as the major source of breeding of *Ae. albopictus* in rural settings of Calicut, Kerala. Other breeding sites recorded were flower pots, glass products and tyres. These observations suggest that source reduction programme should specifically be directed at proper disposal of these objects with special attention to coconut shells, plastic waste and tyres in the area for effective control of *Ae. albopictus*. Presently such activities are of generalized nature and are undertaken by the village-level local health workers and volunteers. Many

small and minor breeding sites are often missed by these teams due to the geographical extent of affected area as well as enormous number and wide distribution of container breeding sources. Lack of resources and trained workers resulted in operational failure of control measures. As dengue and chikungunya are now endemic in Kerala, source reduction activity should be made regular and routine part of health care system. Level of community participation in the antimosquito operations in the area has been found to be minimal due to lack of awareness in the community regarding the breeding pattern of vector mosquitoes and spread of these diseases. Efforts should be made to augment this to enhance the extent and effectiveness of control measures.

*Aedes albopictus* has spread from south-east Asia to Africa, Europe and Americas. It is highly adaptive, invasive and flexible in its behaviour. Change in breeding pattern from the present semi-domestic to domestic ecotypes cannot be ruled out. High priority and consideration should be given to control this mosquito in Kerala.

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